Bro Tathan Utilities – Arboricultural Impact Assessment & Method Statement

Welsh Government

August 2023

Ecus Ltd

Report to: Welsh Government

Report Title: Bro Tathan Utilities – Arboricultural Impact Assessment & Method Statement

Version: *V1.0*
Issue Date: August 2023
Report Ref: 21578

Originated By: [redacted]
John Mitchener
Principle Arboricultural Consultant Date: 04 August 2023

Reviewed By: [redacted]
Karen O'Shea
Associate Director of Arboriculture Date: 14 July 2023

Approved By: [redacted]
Dave Farmer
Senior Arboricultural Consultant Date: 04 August 2023

Prepared by:
Baleen House, Whale Wharf, Littleton-upon-Severn, Bristol, BS35 1NP
0117 403 9050

Version	Author	Description	Date
V0.1	John Mitchener	For comment	13 July 2023
V0.1	John Mitchener	Minor updates to design	04 August 2023
V1.0	John Mitchener	Final and Issue	04 August 2023

Contents

1. Introduction

1.1.1 Ecus Limited (Ecus) was commissioned by Welsh Government to provide this report in support of a planning application for the construction of utilities on land at Ministry of Defence (MOD) St Athan (hereafter referred to as 'the Site').

1.1.2 The purpose of this report is to provide the information necessary for Vale of Glamorgan Council to meet the duty placed upon them by s.197 of the Town and Country Planning Act 1990. This duty requires that local planning authorities "*ensure, whenever it is appropriate, that in granting planning permission for any development adequate provision is made, by the imposition of conditions, for the preservation or planting of trees*."

1.1.3 This report assesses the potential effects of development on trees and puts forward proposals for mitigation where appropriate. In order to avoid additional, or otherwise unforeseen adverse arboricultural impacts, it is essential that the mitigatory measures described within this report are implemented in full during site clearance and construction.

1.2 Scope of report

1.2.1 The scope of this report has been determined with reference to British Standard BS 5837:2012 *Trees in relation to design, demolition and construction – Recommendations* (British Standards Institution, 2012) (BS 5837). It includes reference to the following:

- A tree survey schedule,
- An Arboricultural Impact Assessment,
- Arboricultural Method Statement, and
- Tree Retention and Removal Plans.

1.2.2 Root protection areas (RPAs) have been identified and represent the minimum area around a tree (m^2) deemed to contain sufficient roots and rooting volume to maintain a tree's viability. The RPA, initially plotted as a circle, has been adjusted to account for constraints to root growth such as retaining walls, carriageways and building foundations.

1.2.3 The BS 5837 gives recommendations and guidance on the relationship between trees and the design, demolition, and construction process. It sets out the principles and procedures to be applied to achieve a harmonious and sustainable relationship between trees and structures. These recommendations and guidance have been applied throughout this report and form the basis of the Arboricultural Impact Assessment (AIA), Arboricultural Method Statement (AMS) and Tree Retention and Removal Plans.

1.3 Study area

1.3.1 The study area has been defined as including all arboricultural features whose RPAs are within, or extend within 15m, of any proposed utility alignment. This approach accords with BS 5837 insofar as it ensures that all arboricultural features which could, foreseeably, be adversely impacted during construction are surveyed.

1.4 Validity period

1.4.1 Trees are dynamic organisms which are influenced by a variety of environmental variables and whose health and condition can rapidly change. Because of this any recommendations made within this report are valid for a period of 24 months from the date of survey or when any site conditions change or pruning or other works unspecified in this report are carried out to, or affecting, the subject trees, whichever is sooner.

1.5 Overview of the proposed scheme

1.5.1 The Proposed Scheme comprises the installation of various underground services and necessary diversions to foul and surface water drainage. Construction is to include the installation of service ducting within which some of the underground services will be located. Underground services which are wholly, or partially, located within the proposed ducting include communication cable, BT Openreach cable and both high voltage and low voltage electrical cable.

1.5.2 Construction work will be highly mobile and will only occur for a limited duration in any single location. It is possible that construction work may occur in several locations simultaneously.

1.5.3 Aspects of the Proposed Scheme which are of arboricultural relevance include:

- The construction of ducting,
- The installation of underground services external to the ducted areas, and
- The construction of diverted foul and surface water drains.

1.5.4 Elements of the Proposed Scheme which have the potential to result in adverse arboricultural impacts include:

- The removal of trees to facilitate construction,
- Damage to tree roots arising from excavation and soil compaction, and
- Unintentional damage to tree stems and branches caused by machinery movement and the storage of materials.

2. Tree survey

2.1 Baseline data collection

2.1.1 Baseline data collection has been obtained through:

- A desk-based study,
- A survey of trees, tree groups and hedges.

Desk-based study

2.1.2 A desk-based study was initially undertaken in January 2023 and was subsequently updated in June 2023. The purpose of the desk-study is to identify the presence of statutory and environmental designations which may apply to arboricultural features within the study area.

2.1.3 The desk-based study reviewed existing information available in the public domain. The desk-based study has considered the following statutory and environmental constraints.

Tree Preservation Orders and Conservation Areas

2.1.4 Details relating to the potential presence of tree preservation orders and conservation areas were obtained from the Vale of Glamorgan Council[1].

Ancient and Veteran Trees

2.1.5 Details relating to the potential presence of ancient and veteran trees were obtained from the Woodland Trust's Ancient Tree Inventory (ATI)[2].

Tree survey

2.1.6 A tree survey was undertaken in January 2023 with additional data gathered in June 2023. The survey was conducted by John Mitchener (Arboricultural Consultant) with Ordnance Survey MasterMap, aerial photography and some topographical data used as base mapping.

2.1.7 The tree survey has been undertaken with reference to BS 5837. The tree survey was undertaken without reference to any site layout proposals; tree quality assessments account for health, condition and an estimated remaining contribution based on current site conditions.

2.1.8 In accordance with BS 5837 trees have been recorded as tree groups where they combine to form distinct arboricultural features either aerodynamically, visually or because they contain trees of similar cultural and biodiversity values. Further details on the methodology used to obtain tree survey data are provided in **Appendix 1: Tree Survey Methodology**.

[1] Vale of Glamorgan Council , 2023 . My Maps . [online] Available at: https://myvale.valeofglamorgan.gov.uk [Accessed 23 June 2023].
[2] Woodland Trust , 2023 . Ancient Tree Inventory . [online] Available at: https://ati.woodlandtrust.org.uk/ [Accessed 23 June 2023].

Third-part tree survey data

2.1.9 Tree survey data for trees and tree groups located on the southern side of Eglwys Brewis Road was provided by Vale of Glamorgan Council.

2.1.10 Third-party tree survey data includes 39 trees and nine tree groups. These features are referenced as G1-G5, G11, G12, G14, G15, T7-T19, T21-T28, T30, T31, T34, T35, T37-T48, T50 and T51.

2.2 Summary of tree survey results

Desk-based study

2.2.1 Findings from the desk-based study indicate that none of arboricultural features within the study area are subject to statutory protection by virtue of a tree preservation order or conservation area. Furthermore, there are no recorded ancient or veteran trees present.

Tree survey

2.2.2 The tree survey recorded 179 arboricultural features comprising 155 trees, 22 tree groups and two hedges. A schedule of surveyed trees is presented in **Appendix 2: Tree Survey Schedule**, locations are shown in the Tree Retention and Removal Plans presented in **Appendix 3: Tree Retention and Removal Plans**.

2.2.3 The tree survey recorded 91 moderate-quality BS 5837 category trees and six tree groups. These trees and tree groups include specimens which may exhibit some minor, or non-significant structural, or physiological defects. They have estimate remaining life-expectancies in excess of 20 years and have been valued on the basis of their visual and landscape merits. These are trees and tree groups which, although lacking significant individual amenity value, act collectively to provide a positive visual contribution to their immediate surroundings.

2.2.4 The tree survey recorded 55 low-quality BS 5837 category C trees, 16 tree groups and two hedges. Low-quality trees, tree groups and hedges have estimate remaining life-expectancies in excess of ten years. The include individuals with physiologically or structurally impairments or those whose small size means they provide only limited visual amenity and landscape value.

2.2.5 The tree survey also recorded nine very-low quality BS 5837 category U trees. Very low-quality trees include specimens which, by virtue of poor health or structural condition, are unsuitable for retention beyond ten years. Their short life-expectancy dictates that they are of negligible arboricultural or visual value and, in the context of development, their substitution with new trees is often desirable.

3. Arboricultural Impact Assessment

3.1.1 The scope of this Arboricultural Impact Assessment (AIA) has been established with reference to BS 5837 Clause 5.4 'Arboricultural Impact Assessment'. The scope of assessment is defined as including an evaluation of the direct and indirect arboricultural effects of the Proposed Scheme.

3.1.2 This AIA includes specific reference to the effects of any tree loss and other potentially damaging activities which would foreseeably occur in the vicinity of retained trees. Further reference is made concerning recommendations for mitigation, including those matters which require inclusion within an Arboricultural Method Statement (AMS).

3.1.3 The spatial relationship between surveyed trees and the Proposed Scheme is presented within **Appendix 3: Tree Retention and Removal Plans**.

3.2 Assumptions

3.2.1 This AIA has been produced on the basis of the following assumptions:

- That construction will require the laying of ducting and services into a trench, the dimensions of which will be up to 1m in width and with a minimum depth of 600mm,
- That, in specific areas such as within the RPA of a tree which is to be retained, the trench can be manually excavated using hand tools. This will permit excavation with the ability to retain tree roots where they are important for tree stability and health,
- That some minor localised amendments to the positioning of the trench will be possible where this would either avoid construction work within an RPA or would minimise/avoid damage to tree roots.

3.3 Tree removals and potential construction impacts

3.3.1 The requirement to remove trees has identified as including any tree which cannot be sustainably retained throughout the construction process. For the purposes of this assessment this includes trees which, if retained, would either prohibit construction or suffer irremediable damage leading to foreseeable structural failure or death.

3.3.2 Construction impacts are defined as anything which has the capacity to adversely affect the health, growth, life expectancy or safety of any retained tree. Construction impacts may arise as result of damage to a tree's rooting environment, roots, stem or branches.

3.3.3 Significant adverse impacts are defined as those which may materially affect the retention, health, life-expectancy or quality of a tree, tree group or hedge. Non-significant adverse impacts include those where effects are likely to be transitory and without obvious visual, structural or physiological symptoms.

3.3.4 Tree removals and potential construction impacts are discussed with reference to their associated Tree Retention and Removal Plans, as presented in **Appendix 3: Tree Retention and Removal Plans**.

Figure 1

3.3.5 No foreseeable adverse arboricultural impacts. Dependent upon the proposed working area required during construction, temporary ground protection and tree protection fencing shall be employed to protect the RPA of tree T671.

Figure 2 and Figure 3

3.3.6 Identifiable adverse impacts extend to the removal of a section of low-quality tree group G725 and the removal of low-quality tree T662. These impacts are unavoidable if proposed foul water arrangements are to connect to the existing sewerage system. Removals associated with tree group G725 are likely to consist of a 2-3m wide access route for service installation and machinery. The majority of tree group G725 will remain intact and undamaged.

3.3.7 The removal of tree T662 and the partial removal of G725 will not generate any significant adverse landscape or visual effects. If desirable, mitigation can be provided through replacement tree planting or natural regeneration via seed from neighbouring trees.

3.3.8 In addition to the above, surface drainage will require the construction of a headwall within the RPA of tree T668. The headwall is positioned at the periphery of the RPA and, whilst construction may require some severance of roots, the likelihood of encountering roots over 50mm diameter is reduced. On this basis, and subject to supervision by the Project Arboriculturist, construction work is unlikely to generate any significant adverse arboricultural impacts.

3.3.9 Dependent upon the proposed working area required during construction, temporary ground protection and tree protection fencing shall be employed to protect the RPAs of all retained trees.

Figure 4 and Figure 5

3.3.10 Identifiable adverse impacts extend to the partial removal of low-quality tree groups G11 and G15, and the removal of low-quality trees T43 and T47. Other potential adverse impacts may arise due to the encroachment of construction work into the RPAs of low-quality trees T45, T46, T50 and T51, and moderate-quality trees T79, T80, T82, T84 and T85.

3.3.11 The removal of low-quality trees and the partial removal of low-quality tree groups will not generate any significant adverse landscape or visual effects. If desirable, mitigation can be provided through replacement tree planting.

3.3.12 Encroachment into RPAs is generally minimal and will be mitigated through the availability of compensatory rooting volume outside the area of construction. Furthermore, any encroachment

into the RPA will be directly supervised by the Project Arboriculturist with any roots under 25mm diameter cut back with a sharp saw or secateurs. Roots over 25mm in diameter will be retained where practicable, and services installed with regard for root retention. Whilst some adverse impacts may arise, these are unlikely to be significant and a requirement for tree removal is not likely.

Figure 6

3.3.13 No significant adverse arboricultural impacts are anticipated. Minor encroachments into the RPAs of trees T399, T445, T450, T491 and T513 may occur. These encroachments will not cause substantial disturbance to the RPA and will be mitigated through the availability of compensatory rooting volume outside the area of construction. Furthermore, any encroachment into the RPA will be directly supervised by the Project Arboriculturist with any roots under 25mm diameter that may be present will be cut back with a sharp saw or secateurs.

3.3.14 Dependent upon the proposed working area required during construction, temporary ground protection and tree protection fencing shall be employed to protect the RPAs of retained trees.

Figure 7

3.3.15 Based upon the current alignment, construction will require the removal of trees T702 and T703 and is likely to cause substantial disturbance to the RPA of tree T704.

3.3.16 These potentially significant adverse impacts shall be avoided by re-aligning the cable route to the proposed location shown in Figure 7. This will avoid the need to remove trees although there remains the likelihood of substantial disturbance to the RPA of tree T700.

3.3.17 Whilst a requirement to remove tree T700 due to root damage cannot be entirely discounted, the likelihood of this occurring will be greatly reduced by applying tree protection measures which include supervision by the Project Arboriculturist, hand excavation and, where feasible, the retention of roots over 25mm diameter.

3.3.18 There may be a minor encroachment into the RPA of tree T659. This encroachment will not cause substantial disturbance to the RPA and will be mitigated through the availability of compensatory rooting areas to the north, south and west. Furthermore, any encroachment into the RPA will be directly supervised by the Project Arboriculturist with any roots under 25mm diameter that may be present cut back with a sharp saw or secateurs.

3.3.19 Additionally temporary ground protection and tree protection fencing shall be employed to protect the RPAs of all retained trees.

Figure 8

3.3.20 No foreseeable adverse arboricultural impacts. Dependent upon the proposed working area

required during construction, temporary ground protection and tree protection fencing shall be employed to protect the RPA of tree group G732.

Figure 9

3.3.21 It is anticipated that a short, possibly 1-2m long, section of low-quality hedge H729 will be removed. This will not adversely impact the value of the hedge and can be mitigated by either replanting or by natural regeneration from the seeds of neighbouring plants.

3.3.22 Construction will occur within the RPA of low-quality tree T688. Excavation will be undertaken under the direct supervision of the Project Arboriculturist with any roots under 25mm diameter that may be present treated sympathetically and cut back with a sharp saw or secateurs. Should roots in excess of 25mm diameter be encountered then these will be retained and worked around. Alternatively, the cable alignment will be moved in an easterly direction to ensure that encroachment into the RPA is minimised and potential damage to important roots is avoided.

Figure 10

3.3.23 With the exception of trees T678 and T692, no significant adverse arboricultural impacts are anticipated. Minor encroachments into the RPAs of trees T676, T677, T681, T682 and T685 may occur. These encroachments will not cause substantial disturbance to the RPA and will be mitigated through the availability of compensatory rooting contiguous to the RPA. Furthermore, any encroachment into the RPA will be directly supervised by the Project Arboriculturist with any roots under 25mm diameter that may be present cut back with a sharp saw or secateurs.

3.3.24 Encroachments into the RPAs of trees T678 and T692 are more substantial and have to potential to cause root damage. If not mitigated, then root damage may be sufficiently severe to warrant tree removal. However, where practicable, significant adverse impacts shall be avoided through the application of supervision by the Project Arboriculturist, hand excavation and the retention of roots over 25mm diameter. If insufficient, the re-alignment of the cabling and ducts to minimise or avoid encroachment shall also be considered.

3.3.25 It is also possible that a short section of low-quality tree group G731 will need to be removed from its northernmost end. If this occurs, then it will not adversely impact the value of the tree group and can be mitigated by replacement tree planting, if desired. Again, opportunities to realign the cabling and ducts will be considered as a means of avoiding the need to remove trees.

3.3.26 Dependent upon the proposed working area required during construction, temporary ground protection and tree protection fencing shall be employed to protect the RPAs of all retained trees.

Figure 11

3.3.27 No foreseeable adverse arboricultural impacts. Dependent upon the proposed working area

required during construction, tree T674 shall be protected with temporary ground protection and tree protection fencing.

3.4 Tree pruning

3.4.1 Tree pruning may be required in order to provide access during construction. This is known as ‘access facilitation pruning’ and most frequently includes the removal of low branches to provide access beneath the crown of a tree.

3.4.2 The Proposed Scheme does not include any identifiable requirement for access facilitation pruning. However, if previously unforeseen pruning is required, then all work shall be specified in accordance with British Standard BS 3998:2010 *Tree work – recommendations* (British Standards Institution, 2010) (BS 3998). Pruning shall be specified by the Project Arboriculturist and shall be undertaken by competent tree work contractor. This will ensure that pruning is undertaken to an appropriate standard and does not adversely impact the health or appearance of any retained tree.

4. Arboricultural Method Statement

4.1.1 This Arboricultural Method Statement (AMS) describes the tree protection measures that shall be applied during construction. This AMS has been compiled with reference to BS 5837. In instances where deviations from the recommended approach are required, or where some relevant information remains unknown, then adequate tree protection shall be achieved through a combination of supervision by the Project Arboriculturist and adherence to the relevant working methodology.

4.1.2 This AMS is a 'living document.' This means that it shall be reviewed, and where necessary updated, in response to changes to the design and/or construction methodology. It is envisaged that this AMS will be reviewed at the following stages of design and construction:

- Contractor engagement,
- Pre-commencement,
- Prior to the commencement of any construction work in proximity to retained trees, tree groups and hedges.

4.1.3 This AMS must be read in conjunction with **Appendix 3: Tree Retention and Removal Plans**.

4.2 Phasing of tree protection measures

4.2.1 Construction work will be highly mobile and may occur in several locations simultaneously. The phasing of tree protection measures shall take this into account.

4.2.2 Tree protection measures shall therefore be phased in the following manner:

- Undertake agreed tree removals,
- Provide advance notice to the Project Arboriculturist of any construction work which is in proximity to a retained tree,
- Project arboriculturist to attend site and meet with Project Manager and/or Site Manager. Localised amendments to the positioning of ducting and services to be agreed, tree protection measures to be specified and locations marked out,
- Project Arboriculturist to provide a task specific AMS detailing the agreed tree protection measures and design amendments,
- Implement task specific AMS and undertake construction work. Any construction work within, or adjacent to the RPA of any retained tree to be directly supervised by the Project Arboriculturist.

4.3 Arboricultural monitoring and supervision

4.3.1 Arboricultural monitoring and supervision shall be implemented in accordance with the following details.

Nominated Persons

4.3.2 The client/contractor shall appoint a Project Arboriculturist. This person shall be suitably qualified and experienced in the field of trees in relation to construction, and shall be available to:

- Attend pre-commencement meetings and supervisory visits as required.
- Undertake site monitoring.
- Advise on all ad-hoc arboricultural matters which may arise.

4.3.3 The client/contractor shall further nominate a person to be responsible for all arboricultural matters onsite. This person must:

- Be present on site whenever work which has the potential to cause damage to retained trees is being undertaken.
- Be aware of their arboricultural responsibilities.
- Have the authority to stop any work that is causing, or has the potential to cause, harm to any retained tree.
- Be responsible for ensuring that all site operatives are aware of their responsibilities toward retained trees and the consequences of any failure to observe those responsibilities.
- Make immediate contact with the Project Arboriculturist in the event of any tree related problems occurring, whether actual or potential.

4.3.4 Once works commence the Project Arboriculturist will undertake a programme of monitoring. This may include phone and email contact with the Site Manager, regular site visits and the direct supervision of work which has the capacity to cause damage to retained trees. The frequency of any monitoring will be determined by the intensity and proximity of works to trees and will be flexible enough to accommodate changes in the scheduling of tasks as they occur. The requirement for any direct supervision of work shall be identified with the task specific AMS.

4.3.5 The project arboriculturist will maintain a record of the arboricultural monitoring. This will provide a record of compliance with any agreed tree protection measures and will assist in the efficient discharge of planning conditions where required.

4.4 Prohibited activities within RPAs

4.4.1 Unless specified within a task specific AMS, the following activities are prohibited within the RPA of any retained tree:

- The lowering or raising of soil levels.
- Any form of excavation (whether mechanical of using hand tools).
- The storage of plant or materials.
- The storage, handling, or disposal of any chemical (including cement washings).
- Vehicular access.
- Fires or other means of waste disposal.

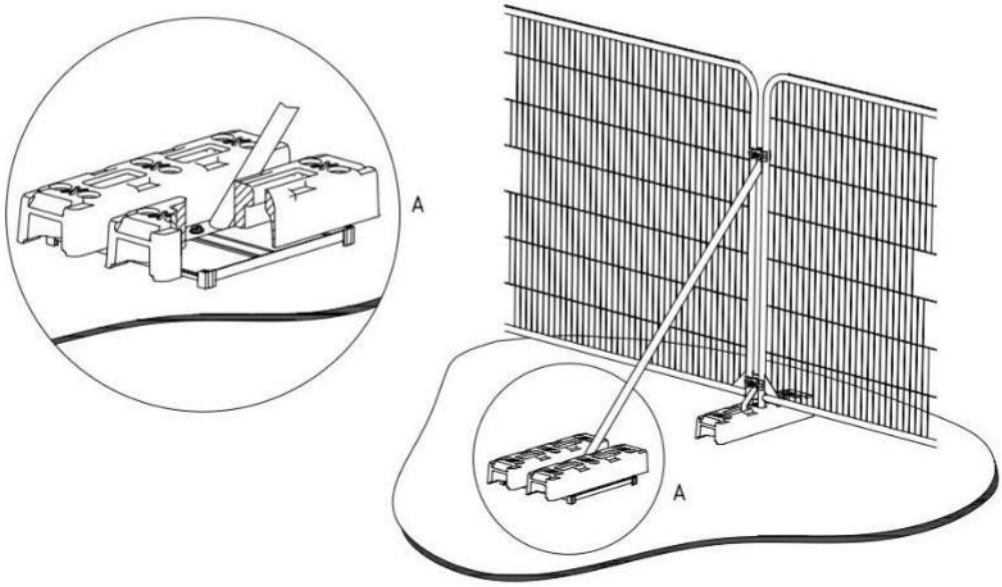
4.5 Tree protection fencing

4.5.1 Tree protection fencing will be erected in order to create a vertical barrier which prevents damage occurring to retained trees. It shall be fit for the purpose of excluding construction activity and appropriate to the degree and proximity of work taking place around the retained tree(s). Tree protection fencing shall be adequately maintained to ensure that it remains rigid and complete.

4.5.2 Once erected, tree protection fencing shall not be altered or removed without the explicit approval from the Project Arboriculturist.

4.5.3 A specification for tree protection fencing shall be provided within the task specific AMS. An example specification for the tree protection fencing which may be employed is provided in **Figure 1**.

Figure 1: Example specification for tree protection fencing (appropriate for mobile, short duration construction work)



Specification:

- 2m high weldmesh panels on rubber feet
- Panels joined by two anti-tamper couplings
- Panels to be supported on the inside by stabilising struts attached to a base plate secured to a block tray (A)

4.6 Ground protection

4.6.1 Temporary ground protection shall be installed in any instance where construction access is required within the RPA of a retained tree. Its purpose is to create a horizontal barrier which prevents rutting or additional compaction of the underlying soil. This will avoid adverse impacts to tree roots and the rooting environment.

4.6.2 Temporary ground protection shall adhere to the specification as advised in BS 5837 paragraph 6.2.3.4. Temporary ground protection must be sufficiently robust so as to avoid distortion when in use.

4.6.3 A specification for temporary ground protection shall be provided within the task specific AMS. As an example, the specification for plant up to a gross weight of 2t may comprise proprietary, inter-linked ground protection boards placed on top of a compression-resistant layer (e.g., 150 mm depth of woodchip), laid onto a geotextile membrane.

4.6.4 In all instances, temporary ground protection shall be retained in-situ until all localised construction work is complete.

4.7 Excavation within RPAs

4.7.1 In all instances excavatory work within, or adjacent to, the RPA of a retained tree will be undertaken in accordance with the following methodology:

Pre-commencement

- All staff involved will receive a task specific briefing which includes this working methodology.
- Prior to undertaking any work, the location of any RPAs and excavations must be determined and shall be marked out using non-toxic marker paint.

Mechanical excavation

- Soil shall be carefully removed using a non-toothed excavator bucket. The leading edge of the bucket shall be angled parallel to the soil surface and the soil removed in thin layers of approximately 25mm depth.
- The Project Arboriculturist shall be present at all times and shall keep watch for the presence of roots. If roots are identified, then the excavator shall stop work and soil surrounding the root shall be excavated by hand.
- On no account shall plant or machinery operate from within the RPAs unless positioned on suitable temporary ground protection.
- The soil surface shall be inspected in between each use of the bucket. Should evidence of tree roots be found then the area shall be carefully excavated by hand as a means of exposing any underlying roots without risk of damage.
- Spoil shall be deposited outside of the RPAs. Topsoil shall be stored separately to subsoil.

4.7.2 If tree roots are uncovered, then they shall be treated in the following manner:

- Roots <25mm diameter shall be cleanly cut back to the edge of the excavation using a sharp saw or pair of secateurs.
- Roots >25mm diameter shall only be severed following approval from the Project Arboriculturist. When severed, roots shall be cleanly cut back to the edge of the excavation using a sharp saw or secateurs.
- Once excavation reaches the desired depth, the final soil surface shall be inspected for the presence of roots which could become damaged during construction. The advice the Project Arboriculturist shall be sought regarding the most suitable means of protecting any roots which may be identified.

Hand excavation

- Soil shall be carefully removed using hand tools only.

  The Project Arboriculturist shall be present at all times and shall keep watch for the presence of roots. If roots are identified, then a trowel shall be used to loosen and remove soil in proximity to roots whilst a brush or compressed air shall be used to remove any soil which may adhere to the outside of any root.

- Spoil shall be deposited outside the RPA. Topsoil shall be stored separately to subsoil.

4.7.3 If tree roots are uncovered, then they shall be treated in the following manner:

- Roots <25mm diameter shall be cleanly cut back to the edge of the excavation using a sharp saw or pair of secateurs.
- Roots >25mm diameter shall only be severed following approval from the Project Arboriculturist. When severed, roots shall be cleanly cut back to the edge of the excavation using a sharp saw or secateurs.
- Once excavation reaches the desired depth, the final soil surface shall be inspected for the presence of roots which could become damaged during construction. The advice the Project Arboriculturist shall be sought regarding the most suitable means of protecting any roots which may be identified.

Installation of ducting and services

4.7.4 Ducting and services shall be installed in a manner which avoids damage to retained tree roots.

4.7.5 In any instance where the excavation is to be left open for more than eight hours then exposed roots shall be covered at the earliest opportunity to protect them from extremes of temperature and desiccation. Roots shall be covered with hessian material, to be wetted if climatic conditions are warm and/or dry.

4.7.6 Backfilling shall be undertaken carefully, and without damage to retained roots. Prior to backfilling any hessian wrappings shall be removed and the roots surrounded with topsoil or uncompacted sharp sand (not builder’s sand).

5. References

British Standards Institution, 2010. *BS 3998:2010 Tree work – Recommendations*. London: BSI.

British Standards Institution, 2012.*BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations*. London: BSI.

Appendix 1: Tree Survey Methodology

Methodology

The tree survey was undertaken in accordance with the following methodology:

- Arboricultural features have been recorded as tree groups where this has been deemed appropriate. Tree groups have been recorded on the basis that they form distinct arboricultural features either aerodynamically, visually or because they contain trees of similar cultural and biodiversity value.
- The trees have been inspected using the Visual Tree Assessment methodology as developed by Mattheck and Breloer .
- The tree survey was carried out from ground level only.
- No tissue samples were taken nor was any internal investigation of the subject trees undertaken.
- Tree heights and crown spreads have been estimated to the nearest 1m.
- Notes have been recorded where they relate to the quality of the arboricultural feature. Management recommendations have been provided where work is necessary for the abatement of a hazard which presents an unacceptable or intolerable level of risk to persons or property.
- Stem diameters have been measured in accordance with Annex C of BS 5837. Diameters of single stem trees on level ground have been measured at 1.5m above ground level. The combined stem diameters for multi-stemmed trees have been calculated in accordance with BS 5837 paragraph 4.6.1.
- By default, RPAs are calculated as an area equivalent to a circle with a radius 12 times the stem diameter and are capped at a distance of 15 metres.

Quality assessment

The quality of arboricultural features has been determined in accordance with BS 5837 Table 1, a summary of which is provided in Table 1. The purpose of the quality assessment is to enable informed decisions to be made regarding site layout, land use and design. The quality assigned to each survey item is recorded within Appendix B: Arboricultural Survey Schedule.

Table 1: BS 5837:2012 Table 1 – Cascade chart for tree quality assessment

Category and definition	Criteria (including subcategories where appropriate)		
Trees unsuitable for retention			
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 the health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality		
	1 Mainly arboricultural qualities	**2 Mainly landscape qualities**	**3 Mainly cultural values, including conservation**
Category A Trees of high quality with an estimated remaining 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 groups or 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 trees or wood-pasture)
Category B Trees of moderate quality with an estimated remaining life expectancy of at least 40 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	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	Trees with material conservation or other cultural value

	storm damage), such that 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	contribution to the wider locality	
Category C Trees of low quality with an estimated remaining life expectancy of at least 40 years	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

Limitations

Arboricultural survey data is typically valid for a period of two years unless otherwise stated. Significant environmental events (such as extreme weather conditions) or changes to the Site may render it invalid within a shorter timescale.

The survey has only been undertaken from land within the client's ownership, from public land or from areas where formal access has been arranged.

The position of arboricultural features not recorded on a topographical survey has been estimated using aerial imagery.

Whilst arboricultural surveys are not seasonally limited it is the case that certain pests and diseases may be more or less evident at different times of the year. This is especially true of certain wood decaying fungi such as the Giant Polypore (*Meripilus giganteus*) where fruiting bodies are short-lived, and the early stages of root decay may not result in other identifiable symptoms. Walkover survey data is therefore based upon observations made at the time of the site visit and may be subject to change should further or more detailed inspections be undertaken.

Health and Safety

This report in no way constitutes a health and safety survey. Where concerns for tree health and safety exist the necessary and appropriate tree inspections should be carried out.

In instances where safety related features are observed during the tree survey, then their significance will be assessed on the basis that all trees will be subject to a normal programme of

tree hazard assessment. Only those safety related features which pose a real and immediate safety concern will be noted and the client/landowner will be made aware at the earliest opportunity.

Wildlife and conservation

Trees have the capacity to provide habitat for species such as bats, birds, and mammals some of which may be protected under UK or European Legislation. It is a statutory offence to injure, kill or disturb any protected species or to damage or destroy their breeding site or resting place. It is also an offence to disturb any nesting bird.

Wildlife and conservation matters are beyond the scope of this report although incidental comments may be made where these are of direct relevant to the arboricultural survey or subsequent assessments. It is advised that specialist ecological advice is sought prior to any tree removal or maintenance activities; this recommendations contained within this report should be reviewed in light of any ecological constraints which may be identified.

Appendix 2: Tree Survey Schedule

Table 2: Key to tree survey schedule

Key:	Description:
Reference Nos	Individual reference number
Type:	**T -** tree; **G -** tree group; **H -** hedge
Species:	Botanical name (common name)
Height:	Overall height (m) – maximum and minimum heights are recorded for tree groups, wooded areas and hedges
DBH:	Stem diameter (mm) - calculated in accordance with BS 5837 paragraph 4.6.1. Maximum and minimum diameters are provided for tree groups, wooded areas, and hedges
Crown Spread:	Spread of crown(m) - based upon the maximum lateral dimension
LCH:	Lowest crown height (m)
LBH:	Height of lowest significant branch (m)
Life Stage:	Young; Semi-Mature; Early Mature; Mature
PC:	Physiological condition - Good, Fair, Poor, Dead
SC:	Structural condition - Good, Fair, Poor
ERC:	Estimated remaining contribution (life expectancy) - <10 years, 10+ years, 20+ years, 40+ years
Category:	BS 5837 Category - **A** (high-quality) **B** (moderate-quality) **C** (low-quality) **U** (very-low quality/unsuitable for retention)
Sub-Category:	BS 5837 Sub-Category - the primary area of value - **1)** Arboricultural **2)** Visual **3)** Cultural/Conservation
Notes:	General observations, particularly where relevant to the assigned BS 5837 category
RPA Radius:	Root Protection Area Radius (m). The radius of the circular Root Protection Area associated with the tree as measured from the centre of the stem. For tree groups, wooded areas and hedges the RPA radius is calculated using the maximum stem diameter.

Table 3: Tree survey schedule

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
1	G	Acer campestre (field maple)	12.0	400	-	-	-	-	-	-	+10	C	-	Third-party tree survey data	4.8
2	G	Acer pseudoplatanus (sycamore)	18.0	580	-	-	-	-	-	-	+10	C	-	Third-party tree survey data	7.0
3	G	Crataegus monogyna (common hawthorn)	5.0	200	-	-	-	-	-	-	+10	C	-	Third-party tree survey data	2.4
4	G	Crape myrtle	7.0	200	-	-	-	-	-	-	+10	C	-	Third-party tree survey data	2.4

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
5	G	Platanus x hispanica (London plane)	16.0	500	-	-	-	-	-	-	20+	B	-	Third-party tree survey data	6.0
7	T	Acer pseudoplatanus (sycamore)	18.0	690	-	-	-	-	-	-	10+	C	-	Third-party tree survey data	8.3
8	T	Acer pseudoplatanus (sycamore)	18.0	800	-	-	-	-	-	-	10+	C	-	Third-party tree survey data	9.6
9	T	Acer pseudoplatanus (sycamore)	18.0	800	-	-	-	-	-	-	10+	C	-	Third-party tree survey data	9.6
10	T	Crataegus monogyna (common hawthorn)	8.0	300	-	-	-	-	-	-	10+	C	-	Third-party tree survey data	3.6

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
11	G	x Cuppressocyparis leylandii (leyland cypress)	13.0	500	-	-	-	-	-	-	+10	C	-	Third-party tree survey data	6.0
11	T	Acer pseudoplatanus (sycamore)	15.0	610	-	-	-	-	-	-	10+	C	-	Third-party tree survey data	7.3
12	G	Acer pseudoplatanus (sycamore)	10.0	100	-	-	-	-	-	-	+10	C	-	Third-party tree survey data	1.2
12	T	Acer pseudoplatanus (sycamore)	18.0	600	-	-	-	-	-	-	10+	C	-	Third-party tree survey data	7.2
13	T	Acer pseudoplatanus (sycamore)	18.0	800	-	-	-	-	-	-	10+	C	-	Third-party tree survey data	9.6

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
14	G	Populus tremula (aspen); Prunus laurocerasus (cherry laurel); Pinus sylvestris (Scots pine)	13.0	300	-	-	-	-	-	-	+10	C	-	Third-party tree survey data	3.6
14	T	Pinus nigra (Austrian pine)	20.0	720	-	-	-	-	-	-	20+	B	-	Third-party tree survey data	8.6
15	G	Prunus laurocerasus (cherry laurel); Alnus glutinosa (common alder); Pinus sylvestris (Scots pine)	8.0	350	-	-	-	-	-	-	+10	C	-	Third-party tree survey data	4.2

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
16	T	Acer pseudoplatanus (sycamore)	12.0	420	-	-	-	-	-	-	10+	C	-	Third-party tree survey data	5.0
17	T	Aesculus hippocastanum (horse chestnut)	14.0	610	-	-	-	-	-	-	10+	C	-	Third-party tree survey data	7.3
18	T	Fagus sylvatica (common beech)	14.0	440	-	-	-	-	-	-	+20	B	-	Third-party tree survey data	5.3
19	T	Acer pseudoplatanus (sycamore)	14.0	500	-	-	-	-	-	-	+20	B	-	Third-party tree survey data	6.0
21	T	Fagus sylvatica 'Purpurea' (purple beech)	15.0	360	-	-	-	-	-	-	+20	B	-	Third-party tree survey data	4.3

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
22	T	Acer pseudoplatanus (sycamore)	14.0	450	-	-	-	-	-	-	+20	B	-	Third-party tree survey data	5.4
23	T	Aesculus hippocastanum (horse chestnut)	14.0	610	-	-	-	-	-	-	10+	C	-	Third-party tree survey data	7.3
24	T	Aesculus hippocastanum (horse chestnut)	14.0	720	-	-	-	-	-	-	10+	C	-	Third-party tree survey data	8.6
25	T	Fagus sylvatica 'Purpurea' (purple beech)	14.0	430	-	-	-	-	-	-	+20	B	-	Third-party tree survey data	5.2
26	T	Acer pseudoplatanus (sycamore)	14.0	520	-	-	-	-	-	-	+20	B	-	Third-party tree survey data	6.2

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
27	T	Aesculus hippocastanum (horse chestnut)	14.0	500	-	-	-	-	-	-	10+	C	-	Third-party tree survey data	6.0
28	T	Fagus sylvatica 'Purpurea' (purple beech)	14.0	470	-	-	-	-	-	-	20+	B	-	Third-party tree survey data	5.6
30	T	Acer pseudoplatanus (sycamore)	14.0	880	-	-	-	-	-	-	20+	B	-	Third-party tree survey data	10.6
31	T	Aesculus hippocastanum (horse chestnut)	14.0	640	-	-	-	-	-	-	+10	C	-	Third-party tree survey data	7.7
34	T	Platanus x hispanica (London plane)	16.0	1000	-	-	-	-	-	-	20+	B	-	Third-party tree survey data	12.0

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
38	T	Pinus nigra (Austrian pine)	18.0	1100	-	-	-	-	-	-	20+	B	-	Third-party tree survey data	13.2
39	T	Pinus nigra (Austrian pine)	16.0	400	-	-	-	-	-	-	10+	C	-	Third-party tree survey data	4.8
40	T	Betula pendula (silver birch)	16.0	310	-	-	-	-	-	-	10+	C	-	Third-party tree survey data	3.7
41	T	Betula pendula (silver birch)	16.0	310	-	-	-	-	-	-	10+	C	-	Third-party tree survey data	3.7
42	T	Acer platanoides (Norway maple)	10.0	280	-	-	-	-	-	-	10+	C	-	Third-party tree survey data	3.4

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
43	T	Acer platanoides (Norway maple)	10.0	400	-	-	-	-	-	-	10+	C	-	Third-party tree survey data	4.8
44	T	Acer platanoides (Norway maple)	10.0	100	-	-	-	-	-	-	10+	C	-	Third-party tree survey data	1.2
45	T	Pinus sylvestris (Scots pine)	16.0	460	-	-	-	-	-	-	10+	C	-	Third-party tree survey data	5.5
46	T	Pinus sylvestris (Scots pine)	16.0	460	-	-	-	-	-	-	10+	C	-	Third-party tree survey data	5.5
47	T	Acer pseudoplatanus (sycamore)	10.0	500	-	-	-	-	-	-	10+	C	-	Third-party tree survey data	6.0

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
48	T	Acer pseudoplatanus (sycamore)	9.0	100	-	-	-	-	-	-	10+	C	-	Third-party tree survey data	1.2
50	T	Pinus sylvestris (Scots pine)	10.0	400	-	-	-	-	-	-	10+	C	-	Third-party tree survey data	4.8
51	T	Poplus x canadensis (hybrid black poplar)	18.0	540	-	-	-	-	-	-	10+	C	-	Third-party tree survey data	6.5
52	T	Cedrus deodara (deodar cedar)	12.0	825	6.0	2.0	3.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	9.9
53	T	Cupressus sp. (cypress)	10.0	800	5.0	2.0	3.0	Mature	Fair	Fair	10+	C	2	Dense ivy to stem and crown	9.6

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
68	T	Acer platanoides (Norway maple)	10.0	300	4.0	3.0	3.0	Early-Mature	Fair	Fair	10+	C	2	-	3.6
76	T	Prunus avium (wild cherry)	7.0	400	4.0	2.0	2.0	Mature	Fair	Fair	10+	C	2	-	4.8
77	T	Acer platanoides (Norway maple)	10.0	300	4.0	3.0	3.0	Early-Mature	Fair	Fair	10+	C	2	-	3.6
78	T	Prunus avium (wild cherry)	7.0	400	4.0	2.0	2.0	Mature	Fair	Fair	10+	C	2	-	4.8
79	T	Pinus sp. (pine)	17.0	1000	6.0	2.0	2.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	12.0
80	T	Pinus sylvestris (Scots pine)	13.0	500	5.0	4.0	4.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	6.0

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
82	T	Pinus sylvestris (Scots pine)	13.0	500	5.0	4.0	4.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	6.0
84	T	Pinus sylvestris (Scots pine)	13.0	500	5.0	4.0	4.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	6.0
85	T	Pinus sylvestris (Scots pine)	13.0	500	5.0	4.0	4.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	6.0
86	T	Pinus sylvestris (Scots pine)	13.0	500	5.0	4.0	4.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	6.0
88	T	Pinus sp. (pine)	17.0	800	5.0	2.0	2.0	Mature	Fair	Fair	10+	C	2	Partially suppressed crown	9.6
93	T	Platanus x hispanica (London plane)	12.0	600	6.0	3.0	3.0	Mature	Good/Fair	Good/Fair	20+	B	2	Dense ivy to stem	7.2

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
331	T	Acer pseudoplatanus (sycamore)	6.0	350	2.0	2.0	2.0	Mature	Poor	Poor	<10	U	-	Dying tree	4.2
333	T	Fraxinus excelsior (common ash)	12.0	550	5.0	3.0	2.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	6.6
342	T	Acer pseudoplatanus (sycamore)	12.0	450	5.0	3.0	2.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	5.4
354	T	Acer pseudoplatanus (sycamore)	12.0	450	5.0	3.0	2.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	5.4
357	T	Acer pseudoplatanus (sycamore)	12.0	550	5.0	3.0	2.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	6.6

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
360	T	Acer pseudoplatanus (sycamore)	12.0	500	5.0	3.0	2.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	6.0
365	T	Aesculus hippocastanum (horse chestnut)	12.0	500	5.0	3.0	2.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	6.0
366	T	Aesculus hippocastanum (horse chestnut)	12.0	450	5.0	3.0	2.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	5.4
373	T	Fraxinus excelsior (common ash)	12.0	400	4.0	4.0	4.0	Early-Mature	Poor	Poor	<10	U	-	Dying tree; Ash dieback class 2/3	4.8
377	T	Fagus sylvatica (common beech)	12.0	350	5.0	3.0	2.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	4.2

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
380	T	Fraxinus excelsior (common ash)	10.0	325	5.0	3.0	2.0	Early-Mature	Fair	Fair	10+	C	2	-	3.9
385	T	Fraxinus excelsior (common ash)	15.0	600	7.0	3.0	3.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	7.2
386	T	Acer platanoides (Norway maple)	12.0	500	5.0	3.0	2.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	6.0
390	T	Acer pseudoplatanus (sycamore)	12.0	300	5.0	3.0	2.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	3.6
393	T	Fraxinus excelsior (common ash)	7.0	150	2.0	3.0	4.0	Semi-Mature	Poor	Poor	<10	U	-	Suppressed; Low vitality	1.8
397	T	Acer pseudoplatanus (sycamore)	12.0	600	5.0	3.0	2.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	7.2

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
399	T	Fraxinus excelsior (common ash)	14.0	650	7.0	2.0	4.0	Mature	Poor	Fair	10+	C	2	Twin-stemmed from 1m; Weak union between stems	7.8
406	T	Aesculus hippocastanum (horse chestnut)	12.0	450	5.0	3.0	2.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	5.4
412	T	Fagus sylvatica (common beech)	12.0	300	5.0	3.0	2.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	3.6
424	T	Acer pseudoplatanus (sycamore)	12.0	500	5.0	3.0	2.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	6.0

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
428	T	Acer pseudoplatanus (sycamore)	12.0	450	5.0	3.0	2.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	5.4
434	T	Aesculus hippocastanum (horse chestnut)	12.0	450	5.0	3.0	2.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	5.4
437	T	Fagus sylvatica (common beech)	9.0	475	5.0	3.0	2.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	5.7
445	T	Acer pseudoplatanus (sycamore)	12.0	450	5.0	3.0	2.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	5.4
450	T	Acer pseudoplatanus (sycamore)	12.0	500	5.0	3.0	2.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	6.0

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
460	T	Tilia sp. (lime)	10.0	450	4.0	2.0	3.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	5.4
463	T	Tilia sp. (lime)	10.0	500	6.0	2.0	3.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	6.0
468	T	Acer pseudoplatanus (sycamore)	10.0	570	5.0	3.0	3.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	6.8
484	T	Aesculus hippocastanum (horse chestnut)	8.0	400	3.0	3.0	3.0	Mature	Fair	Fair	10+	C	2	-	4.8
486	T	Fagus sylvatica (common beech)	9.0	300	2.0	3.0	3.0	Mature	Fair	Fair	10+	C	2	-	3.6
491	T	Acer pseudoplatanus (sycamore)	12.0	600	5.0	3.0	3.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	7.2

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
495	T	Acer pseudoplatanus (sycamore)	12.0	350	3.0	3.0	3.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	4.2
502	T	Aesculus hippocastanum (horse chestnut)	8.0	350	3.0	3.0	3.0	Mature	Poor	Poor	<10	U	-	Major stem decay	4.2
513	T	Acer pseudoplatanus (sycamore)	16.0	625	5.0	3.0	2.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	7.5
519	T	Acer pseudoplatanus (sycamore)	16.0	575	5.0	3.0	2.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	6.9
523	T	Acer pseudoplatanus (sycamore)	16.0	470	4.0	3.0	2.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	5.6

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
536	T	Fagus sylvatica (common beech)	6.5	110	2.0	2.0	2.0	Semi-Mature	Fair	Fair	10+	C	2	-	1.3
540	T	Acer pseudoplatanus (sycamore)	14.0	470	5.0	3.0	2.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	5.6
546	T	Acer pseudoplatanus (sycamore)	15.0	520	5.0	3.0	2.0	Mature	Good/Fair	Good/Fair	20+	B	2	-	6.2
650	G	Acer pseudoplatanus (sycamore), Pinus sylvestris (Scots pine), Populus x canadensis (hybrid black poplar)	14.0-18.0	300-600	5.0	2.0	2.0	Mature	Good/Fair	Good/Fair	20+	B	2	Group of approximately 26 trees	3.6

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
650	G	Acer pseudoplatanus (sycamore), Pinus sylvestris (Scots pine), Populus x canadensis (hybrid black poplar)	14.0-18.0	300-600	5.0	2.0	2.0	Mature	(Good/Fair)	(Good/Fair)		B	2	Group of approximately 26 trees	3.6
651	G	Acer platanoides (Norway maple), Acer pseudoplatanus (sycamore)	12.0-14.0	300-400	4.0	1.0	2.0	Mature	Fair	Fair	10+	C	2	Group of 7 trees	3.6
651	G	Acer platanoides (Norway maple), Acer pseudoplatanus (sycamore)	12.0-14.0	300-400	4.0	1.0	2.0	Mature	Fair	Fair		C	2	Group of 7 trees	3.6

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
655	G	Taxus baccata 'Fastigiata' (Irish yew)	8.0	400-600	3.0	2.0	2.0	Mature	Good/Fair	Good/Fair	20+	B	2	Group of approximately 7 trees	7.2
655	G	Taxus baccata 'Fastigiata' (Irish yew)	8.0	400-600	3.0	2.0	2.0	Mature	(Good/Fair)	(Good/Fair)		B	2	Group of approximately 7 trees	7.2
659	T	Acer platanoides (Norway maple)	9.0	550	5.0	2.5	2.5	Mature	Good	Fair	20+	B	2	Drainage within RPA	6.6
660	T	Poplus x canadensis (hybrid black poplar)	9.0	250	3.5	2.0	2.0	Semi-Mature	Good	Good	10+	C	2	-	3.0
661	T	Poplus x canadensis (hybrid black poplar)	9.0	250	3.5	2.0	2.0	Semi-Mature	Good	Good	10+	C	2	-	3.0

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
662	T	Poplus x canadensis (hybrid black poplar)	9.0	250	3.5	2.0	2.0	Semi-Mature	Good	Good	10+	C	2	-	3.0
663	T	Fraxinus excelsior (common ash)	6.0	250	3.0	1.0	1.5	Semi-Mature	Fair	Fair	10+	C	2	-	3.0
664	T	Chamaecyparis lawsoniana (Lawson cypress)	15.0	600	3.0	2.0	2.0	Mature	Fair	Poor	<10	U	-	Partially collapsed	7.2
665	T	Chamaecyparis lawsoniana (Lawson cypress)	9.0	600	6.0	1.0	1.0	Mature	Fair	Fair	20+	B	2	-	7.2
666	T	Fraxinus excelsior (common ash)	8.0	400	5.0	1.0	1.0	Semi-Mature	Fair	Fair	10+	C	2	-	4.8

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
667	T	Salix caprea (goat willow)	6.0	500	6.0	1.0	1.0	Mature	Fair	Fair	10+	C	2	Multi-stemmed	6.0
668	T	Salix caprea (goat willow)	6.0	500	6.0	1.0	1.0	Mature	Fair	Fair	10+	C	2	Multi-stemmed	6.0
669	T	x Cupressocyparis leylandii (leylandii)	16.0	700	5.0	4.0	4.0	Mature	Fair	Fair	10+	C	2	Pruned roadside	8.4
670	T	x Cupressocyparis leylandii (leylandii)	16.0	700	5.0	4.0	4.0	Mature	Fair	Fair	20+	B	2	-	8.4
671	T	Ulmus sp. (elm)	8.0	500	5.0	1.0	1.0	Early-Mature	Good	Fair	10+	C	2	-	6.0
672	T	Ulmus sp. (elm)	8.0	500	5.0	1.0	1.0	Early-Mature	Good	Fair	10+	C	2	-	6.0

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
673	T	Ulmus sp. (elm)	8.0	500	5.0	1.0	1.0	Early-Mature	Good	Fair	10+	C	2	-	6.0
674	T	Platanus x hispanica (London plane)	8.0	500	5.0	1.0	2.0	Mature	Good	Good	20+	B	2	-	6.0
675	T	Fraxinus excelsior (common ash)	5.0	250	2.0	1.0	1.0	Early-Mature	Fair	Fair	10+	C	2	Regeneration from broken stem	3.0
676	T	Fraxinus excelsior (common ash)	14.0	400	5.0	3.0	3.0	Early-Mature	Fair	Fair	20+	B	2	No obvious sign of infection with ash dieback	4.8

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
677	T	Fraxinus excelsior (common ash)	14.0	400	5.0	3.0	3.0	Early-Mature	Fair	Fair	20+	B	2	No obvious sign of infection with ash dieback	4.8
678	T	Fraxinus excelsior (common ash)	14.0	600	5.0	3.0	3.0	Early-Mature	Fair	Fair	20+	B	2	No obvious sign of infection with ash dieback	7.2
679	T	Sorbus aucuparia (Rowan)	5.0	275	3.0	1.0	2.0	Mature	Fair	Fair	10+	C	2	-	3.3
680	T	Malus sp. (apple)	5.0	300	2.0	1.0	2.0	Mature	Fair	Fair	10+	C	2	-	3.6
681	T	Fraxinus excelsior (common ash)	8.0	600	5.0	2.0	3.0	Mature	Fair	Fair	20+	B	2	No obvious sign of infection with ash dieback	7.2

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
682	T	Fraxinus excelsior (common ash)	10.0	500	4.5	2.0	3.0	Early-Mature	Poor	Fair	<10	U	-	Established infection with ash dieback	6.0
683	T	Fraxinus excelsior (common ash)	10.0	325	4.5	2.0	3.0	Early-Mature	Poor	Fair	<10	U	-	Established infection with ash dieback	3.9
684	T	Fraxinus excelsior (common ash)	7.0	250	2.0	2.0	3.0	Early-Mature	Poor	Fair	<10	U	-	Established infection with ash dieback	3.0
685	T	Fraxinus excelsior (common ash)	10.0	500	4.5	2.0	3.0	Early-Mature	Poor	Fair	<10	U	-	Established infection with ash dieback	6.0
686	T	Acer pseudoplatanus (sycamore)	6.0	225	2.5	0.0	0.5	Semi-Mature	Good	Fair	10+	C	2	-	2.7

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
687	T	Acer campestre (field maple)	6.0	225	2.0	1.0	2.0	Semi-Mature	Good	Fair	10+	C	2	-	2.7
688	T	Fraxinus excelsior (common ash)	11.0	500	4.0	2.0	2.0	Mature	Fair	Fair	10+	C	2	Potential infection with ash dieback (early stage)	6.0
689	T	Fraxinus excelsior (common ash)	11.0	500	5.0	2.0	2.0	Early-Mature	Fair	Fair	20+	B	2	No obvious sign of infection with ash dieback	6.0
690	T	Fraxinus excelsior (common ash)	11.0	500	5.0	2.0	2.0	Early-Mature	Fair	Fair	20+	B	2	No obvious sign of infection with ash dieback	6.0

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
691	T	Fraxinus excelsior (common ash)	8.0	250	3.0	2.0	2.0	Early-Mature	Fair	Fair	10+	C	2	No obvious sign of infection with ash dieback; Multi-stemmed	3.0
692	T	Alnus glutinosa (common alder)	9.0	450	5.0	2.0	3.0	Mature	Good	Fair	20+	B	2	-	5.4
693	T	Acer platanoides (Norway maple)	11.0	300	4.5	2.0	2.5	Early-Mature	Fair	Fair	10+	C	2	-	3.6
694	T	Acer platanoides (Norway maple)	11.0	400	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	4.8
695	T	Acer platanoides (Norway maple)	11.0	400	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	4.8

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
696	T	Acer platanoides (Norway maple)	11.0	300	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	3.6
697	T	Acer platanoides (Norway maple)	11.0	300	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	3.6
698	T	Acer platanoides (Norway maple)	11.0	350	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	4.2
699	T	Acer platanoides (Norway maple)	11.0	300	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	3.6
700	T	Acer platanoides (Norway maple)	11.0	400	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	4.8
701	T	Acer pseudoplatanus (sycamore)	9.0	600	4.5	2.0	2.0	Early-Mature	Fair	Fair	20+	B	2	-	7.2

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
702	T	Acer platanoides (Norway maple)	11.0	300	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	3.6
703	T	Acer platanoides (Norway maple)	11.0	300	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	3.6
704	T	Acer platanoides (Norway maple)	11.0	400	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	4.8
705	T	Acer platanoides (Norway maple)	11.0	400	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	4.8
706	T	Acer platanoides (Norway maple)	11.0	400	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	4.8
707	T	Acer platanoides (Norway maple)	11.0	400	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	4.8

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
708	T	Acer platanoides (Norway maple)	11.0	400	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	4.8
709	T	Acer platanoides (Norway maple)	11.0	400	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	4.8
710	T	Acer platanoides (Norway maple)	11.0	400	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	4.8
711	T	Acer platanoides (Norway maple)	11.0	400	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	4.8
712	T	Acer platanoides (Norway maple)	11.0	400	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	4.8
713	T	Acer platanoides (Norway maple)	11.0	400	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	4.8

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
714	T	Acer platanoides (Norway maple)	11.0	400	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	4.8
715	T	Acer platanoides (Norway maple)	11.0	400	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	4.8
716	T	Acer platanoides (Norway maple)	11.0	200	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	2.4
717	T	Acer pseudoplatanus (sycamore)	11.0	700	5.5	1.0	2.0	Early-Mature	Fair	Fair	20+	B	2	-	8.4
718	T	Acer platanoides (Norway maple)	11.0	400	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	4.8
719	T	Acer platanoides (Norway maple)	11.0	400	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	4.8

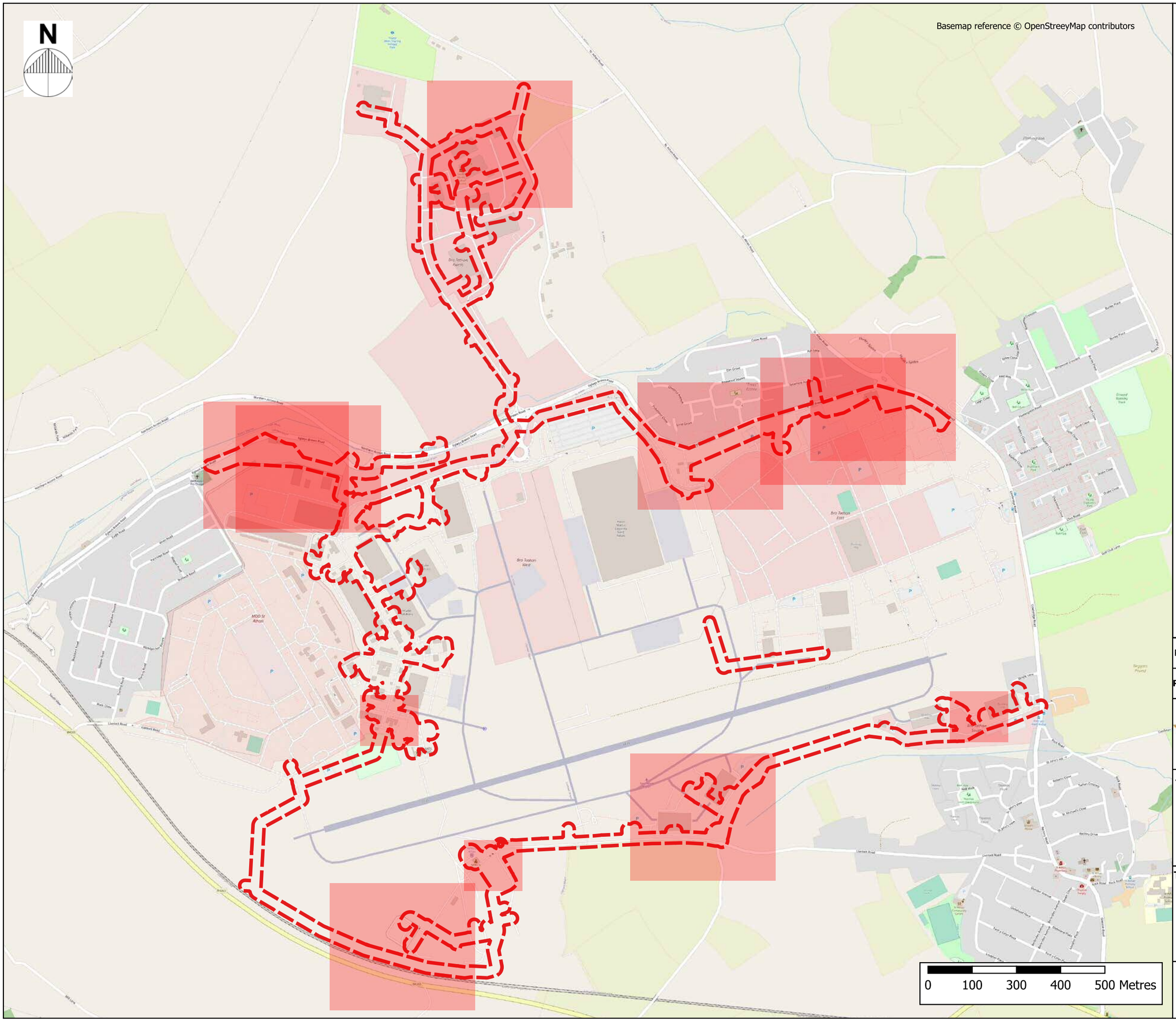
Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
720	T	Acer platanoides (Norway maple)	11.0	400	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	4.8
721	T	Acer platanoides (Norway maple)	11.0	400	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	4.8
722	T	Acer platanoides (Norway maple)	11.0	400	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	4.8
723	T	Acer platanoides (Norway maple)	11.0	400	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	4.8
724	T	Acer platanoides (Norway maple)	11.0	400	4.5	2.0	2.5	Early-Mature	Fair	Fair	20+	B	2	-	4.8

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
725	G	Prunus spinosa (blackthorn),Ulmus sp. (elm)	3.0-5.0	75	2.0	0.0	0.0	Semi-Mature	Fair	Fair	10+	C	2	Dense, natural regeneration; Elm declining with Dutch elm disease	0.9
726	H	Corylus avellana (common hazel)	2.0	75	1.0	0.0	0.0	Early-Mature	Fair	Fair	10+	C	2	Maintained hedge	0.9
727	G	Crataegus monogyna (common hawthorn),Fraxinus excelsior (common ash),Prunus spinosa (blackthorn)	3.0-5.0	75-125	2.0	0.0	0.0	Early-Mature	Fair	Fair	10+	C	2	-	1.5

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
728	G	x Cupressocyparis leylandii (leylandii)	15.0-18.0	300-600	3.0	2.0	2.0	Mature	Fair	Fair	10+	C	2	Some storm damage and branch failures	7.2
729	H	Crataegus monogyna (common hawthorn)	2.0	75	0.5	0.0	0.0	Early-Mature	Good	Fair	10+	C	2	Maintained hedgerow	0.9
730	G	Crataegus monogyna (common hawthorn),Ulmus sp. (elm)	2.0-4.0	75-150	2.0	0.0	0.0	Early-Mature	Fair	Fair	10+	C	2	Some dying/dead elm trees; Limited maintenance evident	1.8
731	G	Crataegus monogyna (common hawthorn)	3.0-5.0	100-150	2.0	1.0	1.0	Mature	Fair	Fair	10+	C	2	-	1.8

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius
732	G	x Cupressocyparis leylandii (leylandii)	10.0-15.0	300-500	3.0	3.0	1.5	Mature	Good	Fair	20+	B	2	-	6.0
733	G	Chamaecyparis lawsoniana (Lawson cypress),Cupressus sp. (cypress),Larix sp. (larch)	8.0-12.0	300-500	4.0	1.0	1.0	Mature	Fair	Fair	10+	C	2	Some low-level screening value	6.0

Appendix 3: Tree Retention and Removal Plans



Key

Other Item

Arboricultural Study Area

REV	DATE	DRAWN BY	CHECKED BY	REVISION COMMENT
P01	13/07/2023	JM	DF	For Issue

ecus part of CuraTerrae
Baleen House
Whale Wharf
Bristol
BS35 1NP
www.ecusltd.co.uk

JOB

Welsh Government
Bro Tathan (Utilities)

TITLE

Arboricultural Study Area and Overview of Figure 1 to Figure 11

BY	DATE	SCALE @ A3	DRG. NO.
JM	04/08/2023	1:500	Figure 12

N

H726

T671

T672

T673

G727

0 20 30 50 60 Metres

Key

BS 5837 Survey

Tree

BS 5837 Category C / Low Quality

Tree Group / Hedge

BS 5837 Category C / Low Quality

Arboricultural Constraints / Impacts

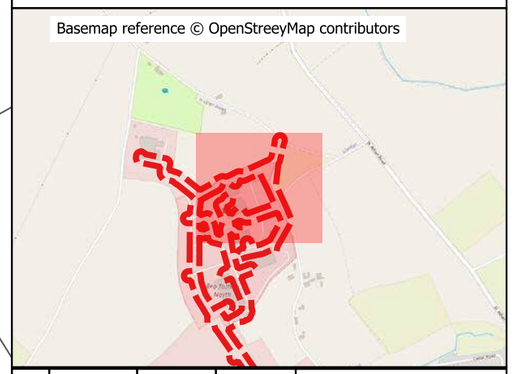
Root Protection Area (Feature Retained)

Crown (Feature Retained)

Other Item

Proposed Service Run / Duct

Arboricultural Study Area



REV	DATE	DRAWN BY	CHECKED BY	REVISION COMMENT
P01	13/07/2023	JM	DF	For Issue

ecus part of CuraTerrae

Baleen House
Whale Wharf
Bristol
BS35 1NP
www.ecusltd.co.uk

JOB

Welsh Government
Bro Tathan (Utilities)

TITLE

Tree Retention and Removal Plan

BY	DATE	SCALE @ A3	DRG. NO.
JM	04/08/2023	1:1250	Figure 1

N

T660
T661
T662
T663
T664
T665
T666
T669
G725
G733

Key

BS 5837 Survey

Tree

- *BS 5837 Category B / Moderate Quality*
- *BS 5837 Category C / Low Quality*
- *BS 5837 Category U / Very-Low Quality*

Tree Group

- *BS 5837 Category C / Low Quality*

Arboricultural Constraints / Impacts

- *Root Protection Area (Feature Retained)*
- *Root Protection Area (Feature Removed)*
- *Crown (Feature Retained)*
- *Crown (Feature Removed)*

Other Item

- *Proposed Service Run / Duct*
- *Arboricultural Study Area*

0 20 30 50 60 Metres

REV	DATE	DRAWN BY	CHECKED BY	REVISION COMMENT
P01	13/07/2023	JM	DF	For Issue

ecus part of CuraTerrae
Baleen House
Whale Wharf
Bristol
BS35 1NP
www.ecusltd.co.uk

JOB

Welsh Government
Bro Tathan (Utilities)

TITLE

Tree Retention and Removal Plan

BY	DATE	SCALE @ A3	DRG. NO.
JM	04/08/2023	1:1250	Figure 2

N

T662
T661
G725
T660
T663
T664
G733
T665
T666
T667
T668
T669
T670
G728

0 20 30 50 60 Metres

Key

BS 5837 Survey

Tree

- *BS 5837 Category B / Moderate Quality*
- *BS 5837 Category C / Low Quality*
- *BS 5837 Category U / Very-Low Quality*

Tree Group

- *BS 5837 Category C / Low Quality*

Tree Group / Hedge

- *BS 5837 Category C / Low Quality*

Arboricultural Constraints / Impacts

- *Root Protection Area (Feature Retained)*
- *Root Protection Area (Feature Removed)*
- *Crown (Feature Retained)*
- *Crown (Feature Removed)*

Other Item

- *Proposed Service Run / Duct*
- *Arboricultural Study Area*

REV	DATE	DRAWN BY	CHECKED BY	REVISION COMMENT
P01	13/07/2023	JM	DF	For Issue

ecus part of CuraTerrae
Baleen House
Whale Wharf
Bristol
BS35 1NP
www.ecusltd.co.uk

JOB

Welsh Government
Bro Tathan (Utilities)

TITLE

Tree Retention and Removal Plan

BY	DATE	SCALE @ A3	DRG. NO.
JM	04/08/2023	1:1250	Figure 3