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# Arboricultural Impact Assessment

“BS5837 2012: Trees in Relation to Design, Demolition and Construction”

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Revision: Revision A  
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Client: Xaverian College  
FAO: Kelvin Leung  
Project: Xaverian College (Sunbury Building)  
Site Address: Lower Park Rd, Manchester M14 5RB

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# 1 Introduction

## 1.1 Instruction

Christians Environmental have been instructed by the client to inspect applicable trees within the site boundary and trees in adjacent land that may be affected by the proposed developments, the aim of which is to prepare the following information to accompany a planning submission for the site:

- Schedule of the relevant trees to include basic data and a condition assessment collected on site during a preliminary survey of the site prior to consideration to proposed development works.
- Appraisal of the impact of the proposed development on the trees and any resulting impact that it has on local amenity.
- The Tree Constraints Plan which identifies any arboricultural constraints on site.
- The Tree Retention Plan which identifies trees, groups and hedges that may require pruning or removal to facilitate the proposed development. Those trees, groups and hedges which can be retained alongside the proposed development will also be identified.

## 1.2 Purpose of the Report

This report provides an analysis of the impact of any proposed development on trees, groups and/or hedges and local amenity value they provide. Its primary purpose is for the Local Authority to review any tree related issues associated with the applicable outline planning application, and use as a basis for issuing a planning consent or engaging in further discussions towards that end. During the planning process, this document and accompanying data will be available for inspection by people including the general public; we aim to present the information in a format that is easily understandable to people without a general knowledge of the subject area.

## 1.3 Documents provided by Client

The following plans have been provided:

- Topographical Land Survey: provided in drawing file (.dwg) format.
- Development Proposal Plan: provided in drawing file (.dwg) format.

The above plans act as a visual aid in the planning stage and are also designed to aid and instruct contractors on site. The use of these plans should also be implemented on site visits to check on the location of the protective barrier and area.

## 2 Site Context

### 2.1 Site Overview and Surrounding Area

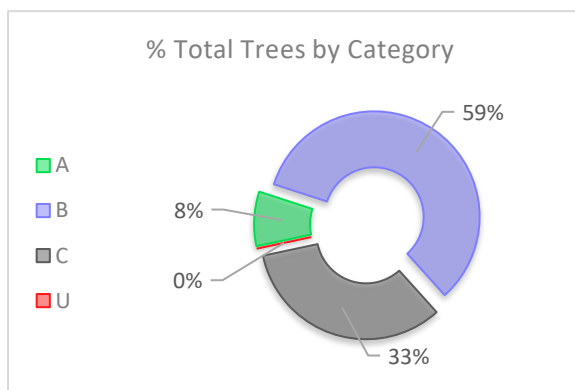
1. The development site currently comprises of a car parking area for service of the college and, the existing 1840s Sunbury Building currently used for education as part of the college campus infrastructure. The surrounding area comprises of further college campus infrastructure and teaching blocks with intermittent green spaces within the wider urbanised context of the Rusholme area.

### 2.1 Proposals

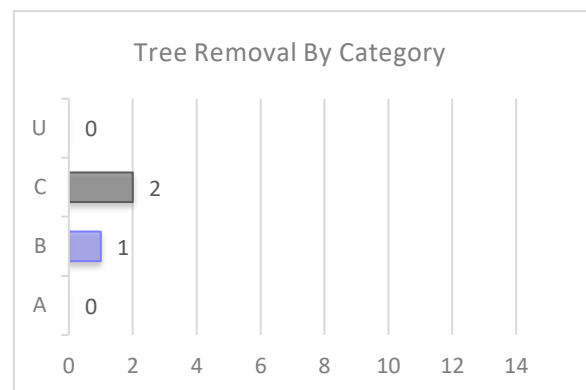
The planning proposals seek demolition of the existing Sunbury Building and development of a new science education teaching block with reconfiguration of the exterior car parking area.

## 3 Arboricultural Impact Assessment

### 3.1 Summary of the Impact on Trees, Groups and Hedges



**Chart 1:** Individual trees by retention category.



**Chart 2:** Quantity of tree removals by retention category.

**Table 1:** Tree removal by number.

| Retention Category | Total | Tree Number |
|--------------------|-------|-------------|
| <b>A</b>           | 0     | -           |
| <b>B</b>           | 1     | T10         |
| <b>C</b>           | 2     | T3 and T4   |
| <b>U</b>           | 0     | -           |

## 3.2 Impact Assessment

*(Please refer to the Tree Constraints and Tree Data Section when reading the below information).*

| Category A trees, groups and hedges. (Trees of high quality)                                  |                                               |                              |
|-----------------------------------------------------------------------------------------------|-----------------------------------------------|------------------------------|
| Removal due to the proposals                                                                  | Potential affects to rooting by the proposals | Pruning due to the proposals |
| -                                                                                             | -                                             | -                            |
| 1. There are no impacts anticipated to any Category A trees due to the proposed developments. |                                               |                              |

| Category B trees, groups, and hedges. (Trees of moderate quality)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                               |                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|------------------------------|
| Removal due to the proposals                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Potential affects to rooting by the proposals | Pruning due to the proposals |
| T10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | T1, T2 and T11                                | -                            |
| <p><b>Tree T10</b></p> <p>1. It is proposed that tree <b>T10</b> is removed due the canopy infringing upon the proposed car parking layout. Due to this tree being a coniferous species, the extent of formative pruning required to facilitate the proposed design would be too severe for the tree to recover and would be of detriment to form and health. Therefore, removal on this occasion would be the best solution with mitigation planting of a suitable species set further back within the grassed area.</p> <p><b>Trees T1, T2 and T11</b></p> <p>2. It is proposed that a potential exists for rooting to be impacted on by proposed car park alterations to trees <b>T1</b>, <b>T2</b> and <b>T11</b>. The potential extents of Root Protection Area (RPA) within the car park have been calculated at 67%, 54%, and 22% respectively. As the RPAs of the above trees are likely to have grown in unison beneath the existing car park, rooting will have adapted to existing conditions. No further incursion is planned, and the existing area will be reused. However, care should be taken when undertaking any resurfacing works that the existing subbase material beneath is not breached and that any changes in level or foundations should be raised to protect the soil level from being broken into where potential root damage could occur.</p> <p>3. Also, it is advised that the entrance to the car park off Thurloe Street is not used as the main entrance for construction traffic for the duration of the development due to the potential for canopy and branch damage to trees <b>T1</b> and <b>T2</b>. It would be better placed to utilise the entrance to the southwest corner of the site off Crescent Range for such purposes.</p> |                                               |                              |

| Category C trees, groups and hedges. (Trees of low quality)                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                               |                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|------------------------------|
| Removal due to the proposals                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Potential affects to rooting by the proposals | Pruning due to the proposals |
| T3 and T4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | -                                             | -                            |
| <p><b>Tree T3 and T4</b></p> <p>1. It is proposed that trees <b>T3</b> and <b>T4</b> are removed due the canopy infringing upon the proposed car parking layout. Due to the extent of formative pruning required to facilitate the proposed design, and the continuing pressures for future pruning, their retention is deemed untenable. Therefore, removal on this occasion would be the best solution with mitigation planting of a suitable species set further back within the grassed area.</p> |                                               |                              |

### 3.3 Impact on Local Amenity

1. The proposals have been designed as far as reasonably practicable to fit within the current building footprint extents therefore resulting in minimal impact to the existing arboricultural features of the site. Although there has been a potential for RPA incursion and root damage identified to three Category B trees (T1, T2 and T11), it is proposed that specialist construction methods and advice can be implemented which will provide a viable means of retaining the existing RPAs thus ensuring the health and longevity of these trees within the landscape. Further advice on appropriate construction traffic routes to site have been proposed within sub-section 3.2 of this report which would further minimise the potential for damage to occur to the above ground structures of trees T1 and T2.
2. Due to the close proximity of tree T1 and T2 to the existing Sunbury Building structure, it is advised that care should be taken when undertaking demolition works as a potential exists for canopy branches to be damaged during this process.
3. The provision of an Arboricultural Method Statement can further detail the car parking construction specification required to ensure minimal disturbance to the RPAs of trees T1, T2 and T11. The provision of a Tree Protection Schedule with Protection Plan can further detail the placement of ground protection, protection fencing, and stem protection where required to ensure the arboricultural features are safe guarded during the construction phases of the site. This will also provide sufficient specification for demolitions works to safe-guard trees T1 and T2 during this process.
4. In accordance with the advice and principles specified within this report, the indicative development proposals should be deemed practicable from an arboricultural perspective. During any future design phases towards the finalisation of the development proposals, it is necessary that the project arboriculturist is consulted regarding any potential amendments to the layout to ensure the health and longevity of retained trees.

## 4 Interpretation of BS5837:2012 (Tree Constraints Plan)

### 4.1 Retention Category of Trees

1. A retention category is assigned to each tree surveyed with the purpose of identifying the quality of trees on site principally in respect of the amenity value they provide to the surrounding area. Under BS5837:2012, these are split in to four general categories: A, B, C and U.
2. Category A trees are generally defined as trees of exemplary condition for the species, conferring a high amount of amenity value to the site and surrounding area. Therefore, such trees are usually mature and large in form, display very little defects and are of such a physiological and structural condition where they have and estimated life expectancy within the landscape of at least 40-years. Category A trees should be afforded the highest level of consideration when designing a development proposal and should only be considered for removal in exceptional circumstances. The canopy and stem of category A trees are displayed in the colour green on the tree constraints plan.

Nb. Veteran and ancient trees will by default will be assigned the retention category of A; as veteran and ancient trees are considered irreplaceable habitats and features within the landscape under the National Planning Policy Framework, these trees should never be considered for removal, with strict guidelines when such removal may only be appropriate with suitable compensation made.

3. Category B trees are generally defined as conferring a moderate level of amenity value to the site and surrounding area. Therefore, such trees are usually semi-mature to mature in size but where their form maybe irregular and display some defects; these trees generally have and estimated life expectancy within the landscape of at least 20-years. Category B trees maybe considered for removal when designing a development proposal however, caution should be paid to the extent and numbers of removals where a combined loss could be of detriment to the site; suitable mitigatory replacement planting on or off site should also be considered. The canopy and stem of category B trees are displayed in the colour Blue on the tree constraints plan.
4. Category C trees are generally defined as conferring a low level of amenity value to the site and surrounding area. Therefore, such trees are usually juvenile to mature in size but where their form maybe irregular, display defects and are in a suppressed physiological state to where they may not have the potential to increase amenity value through future growth; these trees generally have and estimated life expectancy within the landscape of at least 10-years. Category C trees maybe considered for removal when designing a development proposal and should be met with least resistance when determining a planning decision. The canopy and stem of category C trees are displayed in the colour Blue on the tree constraints plan.

5. Category U is reserved for trees that are considered to have an estimated life expectancy within the landscape of at less than 10-years due to declining form and health; this category may also be reserved for trees which are dead or present a unacceptable level of risk to the site and surrounding land. Generally, removal of category U trees should not prevent a development proposal from being approved however, their retention may have to be considered under certain circumstances; this would be assessed against the condition of tree, likely longevity within the landscape and potential conservation value in accordance with the site context and use. The canopy and stem of category U trees are displayed in the colour Blue on the tree constraints plan.

## 4.2 Spatial Dimensions of Trees

1. The following data is collected in accordance with BS5837:2012:
  - Tree height (meters);
  - Canopy height (meters);
  - First order branch [FOB] height (meters) and orientation [to one of eight cardinal points i.e. northwest];
  - Diameter at breast height (1.5-meters) of stem(s) and;
  - Canopy dimensions to 4 cardinal points (north, east, south, and west).

## 4.3 Root Protection Area of Trees

1. The Root Protection Area (RPA) within BS5837:2012 is defined as...

*“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”.*

2. Within section 4.6 of BS5837:2012, it is recommended that the stem diameter of a tree be taken at ‘breast height’ (DBH) or 1.5-meters; the DBH measurement is then used to calculate the RPA.
3. The default RPA shape for a tree (that has an unimpeded rooting area) takes the form of a circle. The calculation applied to create a circular RPA radius is 12 times the stem diameter. So, a single stem tree that has a diameter of 10-centimeters (when measured at 1.5-meters in height above ground level) would have an RPA radius of 1.2-meters when using the following calculation:  $0.12 * 10 = 1.2$ -meters. When obstacles such as kerbs, highways and walls are present within the rooting area, the RPA may take the form of an asymmetrical shape to account for potential diversions of root growth created by these obstacles.

4. This RPA can be interpreted to identify any design constraints to the site. Once site design has taken place, this data can be used to form the basis of any exclusion zone and position of protective barriers/fencing.

Nb. It may be the case (under appropriate circumstances) that incursion into the RPA may be acceptable providing that the tree is in a condition to adapt and offset potential root loss without detriment to physiological health and structural integrity. This will be determined by the project arboriculturist as to whether this is possible, to what extent and with factors such as age of the tree, existing physiological health, structural condition, available soil volume for continued rooting to take place, obstacles to root formation, species of tree and rate of growth and proximity of incursion within the RPA and to tree stem.

## 5 Appendices

APPENDIX A: TREE AND GROUP DATA

APPENDIX B: TREE CONSTRAINTS PLAN

APPENDIX C: TREE RETENTION PLAN

APPENDIX D: GLOSSARY OF ARBORICULTURAL TERMS

Within this section is the tree and group survey data. Also included is a chart explaining how trees are classed when carrying out a BS 5837:2012 *Trees in Relation to Design demolition and Construction – Recommendations* report. Within the appendix is also a glossary of arboricultural terms. **N.b.** Where group survey data is discussed, measurement variables of height, crown clearance and canopy spread are discussed as an average.

|                   |                                                                                                                                                                                            |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Category A</b> | <i>Those of high quality and value: in such a condition as to be able to make a substantial contribution (a minimum of 40 years is suggested)</i>                                          |
| <b>Category B</b> | <i>Those trees of moderate quality and value: those in such a condition as to make a significant contribution (a minimum of 20 years is suggested)</i>                                     |
| <b>Category C</b> | <i>Those trees of low quality and value: currently in adequate condition to remain until new planting could be established (a minimum of 10 years is suggested)</i>                        |
| <b>Category U</b> | <i>Those in such a condition that any existing value would be lost within 10 years and which should, in the current context, be removed for reasons of sound arboricultural management</i> |

## KEY:

### Tree Numbers/Tags

*Individual tree = T + number*

*Group of trees = G + number*

### Species

*Common and or scientific names where appropriate*

### Height

*Overall tree height*

### Crown Clearance

*Distance between lowest point of canopy and ground level*

### Diameter at breast height

*Measurement of tree stem*

### Canopy spread

*Extents of tree branches taken in compass points.*

### Age Class

*(Y=Young) (SM=Semi Mature) (M=Mature) (OM=Over Mature) (V=Veteran)*

### Tree Condition

*Comments on trees overall health etc...*

### Comments

*Any further details that may be of importance*

### Management recs

*List of urgent works or further investigation that may be needed*

### Life Expectancy (years)

*How long the tree will offer a contribution*

### Category Rating

*See opposite table*

| Tree no. | Species              | Height (m) | Crown clearance (m) | No. of stems | DBH (cm) | N (m) | E (m) | S (m) | W (m) | Age Class | Physiological Condition | Structural Condition | Condition comments                                                                                                                                                                                                                 | Preliminary management recommendations | Life Expectancy (years) | Category |
|----------|----------------------|------------|---------------------|--------------|----------|-------|-------|-------|-------|-----------|-------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-------------------------|----------|
| 1        | <i>Tilia cordata</i> | 14         | 5                   | 1            | 49       | 3     | 4     | 5     | 4     | M         | Moderate                | Good                 | Restricted rooting area.<br>Minor deadwood.<br>Stem lean.<br>Unbalanced canopy.<br>Pruning wounds.<br>Unbalanced canopy.<br>Car park within RPA.<br>Basal area within close proximity to boundary wall.<br>FOB = west at 4-meters. | Null                                   | 21-30                   | B.2      |

| Tree no. | Species                         | Height (m) | Crown clearance (m) | No. of stems | DBH (cm) | N (m) | E (m) | S (m) | W (m) | Age Class | Physiological Condition | Structural Condition | Condition comments                                                                                                                                                                                                                                                                                                                  | Preliminary management recommendations | Life Expectancy (years) | Category |
|----------|---------------------------------|------------|---------------------|--------------|----------|-------|-------|-------|-------|-----------|-------------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-------------------------|----------|
| 2        | <i>Aesculus hippocastanum</i>   | 9          | 4                   | 1            | 65       | 6     | 7     | 5     | 3     | M         | Moderate                | Good                 | Restricted rooting area.<br>Minor deadwood.<br>Unbalanced canopy.<br>Pruning wounds.<br>Unbalanced canopy.<br>Car park within RPA.<br>Lower stem impact damage<br>Basal cavity [occluding with slow decay progression].<br>Root protrudance and tarmac disturbance.<br>within close proximity to boundary<br>FOB = east at 4-meters | Null                                   | 21-30                   | B.2      |
| 3        | <i>Chamaecyparis lawsoniana</i> | 6          | 1                   | 1            | 23       | 1     | 1     | 1     | 1     | M         | Good                    | Good                 | Restricted rooting area.<br>Minor deadwood.<br>Pruning wounds.<br>Car park within RPA.<br>400V utility box and wire in close proximity.<br>Basal area of tree within close proximity to boundary wall.                                                                                                                              | Null                                   | 11-20                   | C.2      |
| 4        | <i>Aesculus hippocastanum</i>   | 6          | 3                   | 1            | 20       | 3     | 2     | 2     | 2     | SM        | Moderate                | Good                 | Restricted rooting area.<br>Minor deadwood.<br>Pruning wounds.<br>Car park within RPA.<br>Basal area of tree within close proximity to boundary wall.<br>Suppressed.                                                                                                                                                                | Null                                   | 11-20                   | C.2      |
| 5        | <i>Fraxinus ornus</i>           | 7          | 3                   | 1            | 26       | 3     | 2     | 3     | 3     | SM        | Moderate                | Good                 | Restricted rooting area.<br>Minor deadwood.<br>Unbalanced canopy.<br>Pruning wounds.<br>Unbalanced canopy.<br>Car park within RPA.<br>Stem base abutting boundary wall.<br>Close proximity to BT lines.<br>Suppressed.<br>FOB = west at 2.5-meters.                                                                                 | Null                                   | 11-20                   | C.2      |

| Tree no. | Species                         | Height (m) | Crown clearance (m) | No. of stems | DBH (cm)  | N (m) | E (m) | S (m) | W (m) | Age Class | Physiological Condition | Structural Condition | Condition comments                                                                                                                                                                            | Preliminary management recommendations | Life Expectancy (years) | Category |
|----------|---------------------------------|------------|---------------------|--------------|-----------|-------|-------|-------|-------|-----------|-------------------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-------------------------|----------|
| 6        | <i>Acer pseudoplatanus</i>      | 9          | 2                   | 1            | 30        | 4     | 3     | 4     | 4     | SM        | Moderate                | Good                 | Minor deadwood.<br>Unbalanced canopy.<br>Pruning wounds.<br>Unbalanced canopy.<br>Car park within RPA.<br>Lower stem damages.<br>Close proximity to BT pole.<br>FOB = southwest at 2.3-meters | Null                                   | 21-30                   | B.2      |
| 7        | <i>Aesculus hippocastanum</i>   | 7          | 2                   | 1            | 21        | 4     | 3     | 5     | 2     | SM        | Moderate                | Good                 | Minor deadwood.<br>Unbalanced canopy.<br>Pruning wounds.<br>Unbalanced canopy.<br>Grafted root stock.<br>Canopy touching BT pole.<br>FOB = east at 1.8-meters.                                | Null                                   | 11-20                   | C.2      |
| 8        | <i>Betula pubescens</i>         | 15         | 5                   | 1            | 48        | 5     | 7     | 5     | 6     | M         | Good                    | Good                 | Minor deadwood.<br>Unbalanced canopy.<br>Pruning wounds.<br>Base of tree in close proximity to wall.<br>BT lines within canopy.                                                               | Null                                   | 21-30                   | A.2      |
| 9        | <i>Betula pendula</i>           | 11         | 2                   | 1            | 34        | 5     | 4     | 3     | 3     | M         | Good                    | Good                 | Minor deadwood.<br>Pruning wounds.<br>BT lines within canopy.<br>FOB = south at 3.5-meters                                                                                                    | Null                                   | 21-30                   | B.2      |
| 10       | <i>Chamaecyparis lawsoniana</i> | 10         | 1                   | 2            | 21;<br>32 | 2     | 1     | 2     | 2     | M         | Good                    | Good                 | Minor deadwood.<br>Pruning wounds.<br>BT lines within canopy.<br>Car park within RPA<br>FOB = north at 1.8-meters                                                                             | Null                                   | 21-30                   | B.2      |
| 11       | <i>Chamaecyparis lawsoniana</i> | 7          | 1                   | 1            | 15;<br>26 | 2     | 1     | 1     | 1     | M         | Good                    | Good                 | Minor deadwood.<br>Pruning wounds.<br>BT lines within canopy.<br>Car park within RPA<br>FOB = west at 1.9-meters                                                                              | Null                                   | 21-30                   | B.2      |
| 12       | <i>Betula ermanii</i>           | 11         | 1                   | 1            | 24        | 3     | 3     | 4     | 3     | M         | Good                    | Good                 | Minor deadwood.<br>BT lines within canopy.<br>Car park within RPA.<br>Stem lean.<br>Post occluding at base.<br>FOB = east at 3.8-meters.                                                      | Null                                   | 21-30                   | B.2      |



Estates

Proposed Three-Storey  
Science Block

CRESCENT RANGE

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- KEY:
- Retained Tree
  - Tree to be Removed Due to the Proposal
  - Tree to be Removed Due to Overall Poor Condition
  - Retained Group
  - Group to be Removed Due to the Proposal
  - Group to be Removed Due to Poor Overall Condition
  - Building and/or Topographical Feature
  - Retained tree - extents of root protection area (RPA)
  - Potential for RPA Incursion

Ref. 1 *Tilia cordata*

Ref. 2 *Aesculus hippocastanum*

Ref. 3 *Chamaecyparis lawsoniana*

Ref. 4 *Aesculus hippocastanum*

Ref. 11 *Chamaecyparis lawsoniana*

Ref. 12 *Betula pendula*

Ref. 10 *Chamaecyparis lawsoniana*

Ref. 6 *Acer pseudoplatanus*

Ref. 5 *Fraxinus ornus*

Ref. 7 *Aesculus hippocastanum*

Ref. 9 *Betula pubescens*

Ref. 8 *Betula ermanii*

A Apr 2023 Tree Retention Plan CEL-RC

rev date description by

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**Abscission.** The shedding of a leaf or other short-lived part of a woody plant, involving the formation of a corky layer across its base; in some tree species twigs can be shed in this way

**Abiotic.** Pertaining to non-living agents; e.g. environmental factors

**Absorptive roots.** Non-woody, short-lived roots, generally having a diameter of less than one millimetre, the primary function of which is uptake of water and nutrients

**Adaptive growth.** In tree biomechanics, the process whereby the rate of wood formation in the cambial zone, as well as wood quality, responds to gravity and other forces acting on the cambium. This helps to maintain a uniform distribution of mechanical stress

**Adaptive roots.** The adaptive growth of existing roots; or the production of new roots in response to damage, decay or altered mechanical loading

**Adventitious shoots.** Shoots that develop other than from apical, axillary or dormant buds; see also 'epicormic'

**Anchorage.** The system whereby a tree is fixed within the soil, involving cohesion between roots and soil and the development of a branched system of roots which withstands wind and gravitational forces transmitted from the aerial parts of the tree

**Architecture.** In a tree, a term describing the pattern of branching of the crown or root system

**Ascomycota (Ascomycetes).** One of the major taxonomic groups of fungi; their spores are borne on microscopic structures called asci, which in many types are in turn borne upon the fruit body of the fungus usually taking the form of a crust or cup. These fungi have particular importance in arboriculture, as some can cause significant decay and dysfunction in the live tissue of trees.

**Axil.** The place where a bud is borne between a leaf and its parent shoot

**Bacteria.** Microscopic single-celled organisms, many species of which break down dead organic matter, and some of which cause diseases in other organisms

**Bark.** A term usually applied to all the tissues of a woody plant lying outside the vascular cambium, thus including the phloem, cortex and periderm; occasionally applied only to the periderm or the phellem

**Bark included union [BI].** When two or more branches or stems are held static or where normal movement is inhibited causing a weak branch attachment. This is usually caused by a 'natural-brace' or artificial structure above the point to where the branch attach to the stem.

**Basidiomycota (Basidiomycetes).** One of the major taxonomic groups of fungi; their spores are borne on microscopic peg-like structures (basidia), which in many types are in turn borne on or within conspicuous fruit bodies, such as brackets or toadstools. Most of the principal decay fungi in standing trees are basidiomycetes

**Bolling.** A term sometimes used to describe pollard heads

**Bottle-butt.** A broadening of the stem base and buttresses of a tree, in excess of normal and sometimes denoting a growth response to weakening in that region, especially due to decay involving selective delignification

**Bracing.** The use of rods or cables to restrain the movement between parts of a tree

**Branch:**

- **Primary.** A first order branch arising from a stem
- **Lateral.** A second order branch, subordinate to a primary branch or stem and bearing sub-lateral branches
- **Sub-lateral.** A third order branch, subordinate to a lateral or primary branch, or stem and usually bearing only twigs

**Branch bark ridge.** The raised arc of bark tissues that forms within the acute angle between a branch and its parent stem

**Branch collar.** A visible swelling formed at the base of a branch whose diameter growth has been disproportionately slow compared to that of the parent stem; a term sometimes applied also to the pattern of growth of the cells of the parent stem around the branch base

**Brown-rot.** A type of wood decay in which cellulose is degraded, while lignin is only modified

**Buckling.** An irreversible deformation of a structure subjected to a bending load

**Buttress zone.** 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 the junctions

**Cambium.** Layer of dividing cells producing xylem (woody) tissue internally and phloem (bark) tissue externally

**Canker.** A persistent lesion formed by the death of bark and cambium due to colonisation by fungi or bacteria

**Canopy species.** Tree species that mature to form a closed woodland canopy

**Cleaning out.** The removal of dead, crossing, weak, and damaged branches, where this will not damage or spoil the overall appearance of the tree

**Compartmentalization.** The confinement of disease, decay or other dysfunction within an anatomically discrete region of plant tissue, due to passive and/or active defences operating at the boundaries of the affected region

**Compression strength.** The ability of a material or structure to resist failure when subjected to compressive loading; measurable in trees with special drilling devices

**Compressive loading.** Mechanical loading which exerts a positive pressure; the opposite to tensile loading

**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

**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 lifting.** The removal of limbs and small branches to a specified height above ground level

**Crown thinning.** The removal of a proportion of secondary branch growth throughout the crown to produce an even density of foliage around a well-balanced branch structure

**Crown reduction/shaping.** A specified reduction in crown size whilst preserving, as far as possible, the natural tree shape

**Crown reduction/thinning.** Reduction of the canopy volume by thinning to remove dominant branches whilst preserving, as far as possible the natural tree shape

**Deadwood.** Dead branch wood

**Decurrent.** In trees, a system of branching in which there is a well-defined central main stem, bearing branches which are limited in their length, diameter and secondary branching (cf. excurrent). In fungi with toadstools as fruit bodies, the description of gills which run some distance down the stem, rather than terminating abruptly

**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

**Delamination.** The separation of wood layers along their length, visible as longitudinal splitting

**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

**Distal.** In the direction away from the main body of a tree or subject organism (cf. proximal)

**Dominance.** In trees, the tendency for a leading shoot to grow faster or more vigorously than the lateral shoots; also, the tendency of a tree to maintain a taller crown than its neighbours

**Dormant bud.** An axial bud which does not develop into a shoot until after the formation of two or more annual wood increments; many such buds persist through the life of a tree and develop only if stimulated to do so

**Dysfunction.** In woody tissues, the loss of physiological function, especially water conduction, in sapwood

**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 metres 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

**Endophytes.** Micro-organisms which live inside plant tissues without causing overt disease, but in some cases capable of causing disease if the tissues become physiologically stressed, for example by lack of moisture

**Epicormic shoot.** A shoot having developed from a dormant or adventitious bud and not having developed from a first-year shoot

**Excrecence.** Any abnormal outgrowth on the surface of tree or other organism

**Excurrent.** In trees, a system of branching in which the crown is borne on a number of major widely-spreading and secondarily branched limbs (cf. excurrent)

**Felling licence.** In the UK, a permit to fell trees in excess of a stipulated number of stems or volume of timber

**Flush-cut.** A pruning cut which removes part of the branch bark ridge and or branch-collar

**Girdling root.** A root which circles and constricts the stem or roots possibly causing death of phloem and/or cambial tissue

**Guying** a form of artificial support with cables for trees with a temporarily inadequate anchorage

**Habit.** The overall growth characteristics, shape of the tree and branch structure

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

**Heartwood/false-heartwood/ripe wood.** Sapwood that has become dysfunctional as part of the natural aging processes

**Heave.** A term mainly applicable to a shrinkable clay soil which expands due to re-wetting after the felling of a tree which was previously extracting moisture from the deeper layers; also, the lifting of pavements and other structures by root diameter expansion; also the lifting of one side of a wind-rocked root-plate

**High canopy tree species.** Tree species having potential to contribute to the closed canopy of a mature woodland or forest

**Incipient failure.** In wood tissues, a mechanical failure which results only in deformation or cracking, and not in the fall or detachment of the affected part

**Increment borer.** A hollow auger, which can be used for the extraction of wood cores for counting or measuring wood increments or for inspecting the condition of the wood

**Infection.** The establishment of a parasitic micro-organism in the tissues of a tree or other organism

**Internode.** The part of a stem between two nodes; not to be confused with a length of stem which bear nodes but no branches

**Lever arm.** A mechanical term denoting the length of the lever represented by a structure that is free to move at one end, such as a tree or an individual branch

**Lignin.** The hard, cement-like constituent of wood cells; deposition of lignin within the matrix of cellulose microfibrils in the cell wall is termed Lignification

**Lions tailing.** A term applied to a branch of a tree that has few if any side-branches except at its end, and is thus liable to snap due to end loading

**Loading.** A mechanical term describing the force acting on a structure from a particular source; e.g. the weight of the structure itself or wind pressure

**Longitudinal.** Along the length (of a stem, root or branch)

**Lopping.** A term often used to describe the removal of large branches from a tree, but also used to describe other forms of cutting

**Mature Heights** (approximate):

- **Low maturing** – less than 8 metres high
- **Moderately high maturing** – 8 – 12 metres high
- **High maturing** – greater than 12 metres high

**Micro drill.** An electronic rotating steel probe, which when inserted into woody tissue provides a measure of tissue density

**Minor deadwood.** Deadwood of a diameter less than 25mm and or unlikely to cause significant harm or damage upon impact with a target beneath the tree

**Mulch.** Material laid down over the rooting area of a tree or other plant to help conserve moisture; a mulch may consist of organic matter or a sheet of plastic or other artificial material

**Mycelium.** The body of a fungus, consisting of branched filaments (hyphae)

**Natural brace.** This feature can be defined as where two or more branches or stems connect, join, rub, fuse or entwine in the canopy of the tree. This can restrict normal movement lower down the branch which inhibits movement at the point of where the branch attaches to the stem of the tree; this is commonly known as the union, but also the junction or fork. As the tree grows and thickens, this will cause a bark included union due to the branch being tied up. If the rubbing branches are removed or die-back, this can open the union up to excessive stress and possibly cause the branch to fail. This is because the union has not been able to produce the necessary adaptive (or strengthening) growth through natural movement.

**Occluding tissues.** A general term for the roll of wood, cambium and bark that forms around a wound on a woody plant (cf. wound wood)

**Occlusion.** The process whereby a wound is progressively closed by the formation of new wood and bark around it

**Pathogen.** A micro-organism which causes disease in another organism

**Photosynthesis.** The process whereby plants use light energy to split hydrogen from water molecules, and combine it with carbon dioxide to form the molecular building blocks for synthesizing carbohydrates and other biochemical products.

**Phytotoxic.** Toxic to plants

**Pollarding.** 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

**Primary root zone.** The soil volume most likely to contain roots that are critical to the health and stability of the tree and normally defined by reference to Table 1 of BS5837 (1991) Guide for Trees in Relation to Construction.

**Priority.** Works may be prioritised, 1. = high, 5. = low

**Probability.** A statistical measure of the likelihood that a particular event might occur.

**Proximal.** In the direction towards from the main body of a tree or other living organism (cf. distal)

**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

**Radial.** In the plane or direction of the radius of a circular object such as a tree stem

**Rams-horn.** In connection with wounds on trees, a roll of occluding tissues which has a spiral structure as seen in cross-section

**Rays.** Strips of radially elongated parenchyma cells within wood and bark. The functions of rays include food storage, radial translocation and contributing to the strength of wood

**Red-rot.** A form of decay in which reddish pigments are present but which is biochemically a white-rot; not to be confused with brown-rots which sometimes also have a reddish-brown colour

**Reactive Growth/Reaction Wood.** Production of woody tissue in response to altered mechanical loading; often in response to internal defect or decay and associated strength loss (cf. adaptive growth)

**Removal of dead wood.** Unless otherwise specified, this refers to the removal of all accessible dead, dying and diseased branch wood and broken snags

**Removal of major dead wood.** The removal of, dead, dying and diseased branch wood above a specified size

**Respacing.** Selective removal of trees from a group or woodland to provide space and resources for the development of retained trees.

**Residual wall.** The wall of non-decayed wood remaining following decay of internal stem, branch or root tissues

**Root-collar.** The transitional area between the stem/s and roots

**Root-collar examination.** Excavation of surfacing and soils around the root-collar to assess the structural integrity of roots and/or stem

**Root protection area.** An area of ground surrounding a tree that contains sufficient rooting volume to ensure the tree's survival. Calculated with reference to Table 2 of BS5837 (2005) and shown in plan form in square metres

**Root zone.** Area of soils containing absorptive roots of the tree/s described microscopic and dispersed in air or water. The **Primary** root zone is that which we consider of primary importance to the physiological well-being of the tree

**Sapwood.** Living xylem tissues

**Secondary branch.** A branch, generally having a basal diameter of less than 0.25 x stem diameter

**Selective delignification.** A kind of wood decay (white-rot) in which lignin is degraded faster than cellulose

**Shedding.** In woody plants, the normal abscission, rotting off or sloughing of leaves, floral parts, twigs, fine roots and bark scales

**Silvicultural thinning.** Removal of selected trees to favour the development of retained specimens to achieve a management objective

**Simultaneous white-rot.** A kind of wood decay in which lignin and cellulose are degraded at about the same rate

**Snag.** In woody plants, a portion of a cut or broken stem, branch or root which extends beyond any growing-point or dormant bud; a snag usually tends to die back to the nearest growing point

**Soft-rot.** A kind of wood decay in which a fungus degrades cellulose within the cell walls, without any general degradation of the wall as a whole

**Spores.** Propagules of fungi and many other life-forms; most spores are **Shrub species.** Woody perennial species forming the lowest level of woody plants in a woodland and not normally considered to be trees **Sporophore.** The spore bearing structure of fungi

**Sprouts.** Adventitious shoot growth erupting from beneath the bark

**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

**Stress.** In mechanics, the application of a force to an object

**Stringy white-rot.** The kind of wood decay produced by selective delignification

**Storm.** A layer of tissue which supports the fruit bodies of some types of fungi, mainly ascomycetes

**Structural roots.** Roots, generally having a diameter greater than ten millimetres, and contributing significantly to the structural support and stability of the tree

**Subsidence.** In relation to soil or structures resting in or on soil, a sinking due to shrinkage when certain types of clay soil dry out, sometimes due to extraction of moisture by tree roots

**Subsidence.** In relation to branches of trees, a term that can be used to describe a progressive downward bending due to increasing weight

**Taper.** In stems and branches, the degree of change in girth along a given length

**Target canker.** A kind of perennial canker, containing concentric rings of dead occluding tissues

**Targets.** In tree risk assessment (with slight misuse of normal meaning) persons or property or other things of value which might be harmed by mechanical failure of the tree or by objects falling from it

**Topping.** In arboriculture, the removal of the crown of a tree, or of a major proportion of it

**Torsional stress.** Mechanical stress applied by a twisting force

**Translocation.** In plant physiology, the movement of water and dissolved materials through the body of the plant

**Transpiration.** The evaporation of moisture from the surface of a plant, especially via the stomata of leaves; it exerts a suction which draws water up from the roots and through the intervening xylem cells

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

**Understory tree species.** Tree species not having potential to attain a size at which they can contribute to the closed high canopy of a woodland **Vascular wilt.** A type of plant disease in which water-conducting cells become dysfunctional

**Vessels.** Water-conducting cells in plants, usually wide and long for hydraulic efficiency; generally, not present in coniferous trees

**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

**White-rot.** A range of kinds of wood decay in which lignin, usually together with cellulose and other wood constituents, is degraded

**Wind exposure.** The degree to which a tree or other object is exposed to wind, both in terms of duration and velocity

**Wind pressure.** The force exerted by a wind on a particular object

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

**Wound dressing.** A general term for sealants and other materials used to cover wounds in the hope of protecting them against desiccation and infection; only of proven value against fresh wound parasites

**Wound wood.** Wood with atypical anatomical features, formed in the vicinity of a wound'