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1. Introduction

1.1. Instruction

1.1.1. We are instructed by Gary Smith to undertake an Arboricultural Survey at The Mount and produce our findings in a report. We are also instructed to assess the likely impact of development proposals and produce a Method Statement detailing how trees shall be protected from the proposed construction activity.

1.2. Scope and Purpose of the Report

1.2.1. This report is designed to accompany a planning application for development proposals at the above site. Its purpose is to assist and inform the planning process. It is produced according to the guidance and recommendations within BS 5837: 2012 - Trees in Relation to Design, Demolition and Construction.

1.2.2. The Method Statement should be viewed as a Heads of Terms Method Statement which specifies the general principals to be adopted during construction and demolition. However, specific construction activities proposed within Root Protection Areas may need to be agreed in more detail if requested by the local authority at the reserved matters stage.

1.3. References

1.3.1. We have liaised with David Hughes (architect) and Mr Smith throughout the writing of this report in order to attain an adequate understanding of the project to enable us to carry out an accurate assessment of the proposals and to specify suitable tree protection measures.

1.4. Drawings

1.4.1. The tree locations shown on the accompanying plans which are reproduced in Appendix 6 have been plotted according to measurements taken on site.

1.4.2. The Tree Constraints Plan shows the existing layout. For each tree the stem location is indicated and scaled according to its diameter, the canopy is indicated according to measurements taken along the four cardinal points of the compass. Root protection areas are indicated which are calculated according to the guidelines within BS 5837 (2012).

1.4.3. The Tree Removal Plan indicates the tree constraints with the proposals overlaid. Trees to be removed are notated. This plan accompanies the Impact Assessment which is to be found in Section 5.

1.4.4. The Tree Protection Plan shows the protection measures that are to be installed during the construction phase. This plan accompanies the Method Statement which is to be found in Section 6.
2. Site Overview

2.1. Brief Description (Existing Layout)

2.1.1. The site lies within a leafy residential area. The co-ordinates are 51° 44.345'N 1° 5.859'W and the altitude is 122m above sea level. (Co-ordinates may be pasted or typed into the following site: http://maps.google.co.uk/ where maps, satellite imagery and street views may be accessed).

2.1.2. Our survey covered the area indicated in Figure 1.

![Figure 1 Extent of the survey (image is not current).](image)

2.1.3. The site comprises a detached house with gardens to front and rear. The house is set at a higher level than the public highway and is accessed via pedestrian steps and sloping pathways leading through the front garden (see photographs 5 – 7).

2.1.4. Off-road parking is currently available towards the front left side of the property (see Photo 1).

2.1.5. It is proposed to install a garage towards the rear left of the garden and to access it via a new driveway leading from the off-road parking area, alongside the left of the house, to the new garage.

2.1.6. The new driveway shall pass over the rooting zones of trees within the front garden (T5 and T6) and shall pass close to two yew trees located left of the house (T9 and T10). The garage foundations shall be located over the rooting zones of trees on adjacent land (T12, T13 and T15).

2.1.7. The Tree Constraints Plan and Tree Data Schedule should be referred to for descriptions and locations of all trees.

2.1.8. Photographs of the site are included in Section 13.
3. **Tree Survey and Data Schedule**

This section is largely generic. Tree officers and other persons familiar with arboricultural reports may go straight to the next section.

3.1. **Survey Details**

3.1.1. A ground level survey undertaken on 19th February 2013. The survey was conducted by Ivan Button. No climbed inspections or specialist decay detection were undertaken. Only trees with a stem diameter over 75mm were included, which lie within the site boundary or relatively close to it.

3.1.2. Where applicable, trees with significant defects have been highlighted and appropriate remedial works have been recommended. However, this report should not be seen as a substitute for a full Safety Survey or Management Plan which are specifically designed to minimise risk and liability associated with responsibility for trees.

3.1.3. Wherever possible, dimensions are obtained using diameter tapes, logger’s tapes, distometers and clinometers. Where obstacles prevent accurate measurement, dimensions are estimated. Trees on privately owned third party are surveyed from the best available vantage point and observations relating to the condition of these trees should be treated accordingly. All height measurements should be regarded as approximate.

3.2. **Data Schedule**

3.2.1. The findings of the survey are presented in The Tree Data Schedule which is provided as a separate document as well as being appended to the end of this document within Appendix 6.

3.2.2. The Schedule includes scaled tree images based on measurements recorded for stem diameter, crown spread, crown height and overall height. Their purpose is to indicate, at a glance, the relative dimensions of each tree.

3.2.3. A definition of the Retention Categories can be found in Appendix 1. All other terms used within the Tree Data Schedule are defined and explained in Appendix 3.

3.3. **Stem Diameters – Multiple Stems**

3.3.1. Where a tree has more than one stem, the equivalent-single-stem diameter is usually recorded. This is calculated by adding the squares of the stems and then finding the square root of this total. The radius of the Root Protection Area is then calculated by multiplying the equivalent-stem-diameter by 12.

3.3.2. Occasionally this method is not appropriate (e.g. for coppiced specimens where there are numerous stems). In such cases the diameter at ground level may be recorded or a stem diameter which would provide a suitable Root Protection Area calculation. The form of the tree is recorded in the notes section.
4. **Vegetation Overview**

This section summarises all the recommendations within the Tree Data Schedule regardless of whether trees are to be retained, felled or pruned to facilitate the proposed development. It does not specify works that may be required to facilitate the development proposals. The protection status of the trees is also reported in this section.

4.1. **Preliminary Management Recommendations**

4.1.1. T7 is a very low quality apple tree, which has previously been lopped and topped and currently has very poor form. It is recommended for removal due to its poor condition but not considered to be immediately hazardous or likely to cause injury or damage. Its removal is of a low priority.

4.1.2. T19 could not be fully inspected due to the presence of dense ivy or undergrowth. It is recommended that the ivy or undergrowth is removed so that the stem may be better inspected.

4.1.3. All other trees were deemed to be in an acceptable condition.

4.2. **Work Priority and Future Inspections**

4.2.1. The table below suggests a schedule for completing the works recommended in the Tree Data Schedule based on the perceived risk:

<table>
<thead>
<tr>
<th>Work Priority</th>
<th>Definition</th>
<th>Tree Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urgent</td>
<td>As soon as possible</td>
<td>None</td>
</tr>
<tr>
<td>Very High</td>
<td>Within 1 Month</td>
<td>None</td>
</tr>
<tr>
<td>High</td>
<td>Within 3 Months</td>
<td>None</td>
</tr>
<tr>
<td>Moderate</td>
<td>Within 1 year</td>
<td>T19</td>
</tr>
<tr>
<td>Low</td>
<td>Within 3 years</td>
<td>T7</td>
</tr>
</tbody>
</table>

4.2.2. The table below suggests a schedule of future inspections based on the condition and location of each tree:

<table>
<thead>
<tr>
<th>Inspection Frequency (years)</th>
<th>Tree Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>None</td>
</tr>
<tr>
<td>1</td>
<td>T19</td>
</tr>
<tr>
<td>1.5</td>
<td>T18</td>
</tr>
<tr>
<td>3</td>
<td>T1, T2, T3, T4, T5, T6, T8, T9, T10, T11, T12, T13, G14, T15, G16, T17</td>
</tr>
</tbody>
</table>

4.2.3. The trees should be inspected sooner if there is a noticeable decline in their condition, or following extreme weather events.

4.3. **Tree Protection Status– Site Specific**

4.3.1. On 26th February 2013, we were informed, by Julie of Basingstoke and Deane Borough Council that the site is within a Conservation Area, though no Tree Preservation Orders apply to trees within the site.
4.4. **Tree Protection – General Notes**

4.4.1. Where trees are located in a conservation area, works are not permitted without first giving the local authority 6 weeks' notice of intention. During this time the local authority may elect to create a tree preservation order or to inform the applicant that they have no objection to the proposed works. If the local authority does not respond within 6 weeks, then the intended work may be undertaken.

4.4.2. Where planning permission is granted and tree works have been approved as part of the planning consent. No further application is required in respect of protected trees and no further notice is required in respect of trees within a conservation area.

4.5. **Species Present – Additional Information**

4.5.1. The table below contains general information about the tree species that were observed within the survey. It does not contain information about the individual trees surveyed. Its purpose is to assist readers who are unfamiliar with the characteristics of the various species.

<table>
<thead>
<tr>
<th>Species</th>
<th>Typical Height at Maturity</th>
<th>Typical Canopy Spread at Maturity</th>
<th>General Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>6</td>
<td>8</td>
<td>Deciduous tree native across Europe and W. Asia. Hundreds of cultivars available due to its popular fruit. Flowers white, pink or red in spring. Some species will self pollinate. Most species have a relatively untidy habit. Older specimens are susceptible to a variety of rusts, moulds and cankers. Excellent habitat tree. Visit <a href="http://www.pfaf.org/user/Plant.aspx?LatinName=Malus+domestica">http://www.pfaf.org/user/Plant.aspx?LatinName=Malus+domestica</a> for more info.</td>
</tr>
<tr>
<td>Cherry</td>
<td>8</td>
<td>10</td>
<td>Many cultivars available, bred for their abundance of spring flowers, edible cherries or ornamental bark (e.g. Tibetan Cherry). Usually white or pink flowering; often in very early spring. Usually with a single bole to around 2.5m and multi-stemmed thereafter. Most varieties have excellent autumn colour.</td>
</tr>
<tr>
<td>Lawson Cypress</td>
<td>40</td>
<td>10</td>
<td>Erect, narrowly conical evergreen tree native to Southwest Oregon and N. W. California. Introduced to Britain in the 1860's and now a common tree in gardens and parks. Makes an excellent dense hedge. Many varieties are available including golden and miniature varieties. Easily distinguished from Leyland cypress by the presence of small cones. Visit <a href="http://www.pfaf.org/user/Plant.aspx?LatinName=Chamaecyparis+lawsoniana">http://www.pfaf.org/user/Plant.aspx?LatinName=Chamaecyparis+lawsoniana</a> for info.</td>
</tr>
<tr>
<td>Leyland Cypress</td>
<td>40</td>
<td>8</td>
<td>Evergreen tree, cultivated hybrid between Nootka Cypress and Monterey Cypress. Widely planted and widely hated. Excellent hedging species unless it is undermanaged in which case it forms a giant, dense wall of foliage. Very hardy. Size may be managed by regular trimming though if trimmed beyond the live foliage, new growth will occur. Visit <a href="http://www.pfaf.org/user/Plant.aspx?LatinName=Cupressocyparis+leylandii">http://www.pfaf.org/user/Plant.aspx?LatinName=Cupressocyparis+leylandii</a> for more info.</td>
</tr>
<tr>
<td>Norway Spruce</td>
<td>40</td>
<td>10</td>
<td>Evergreen tree native to Europe, often planted as a plantation tree and harvested for timber. Visit <a href="http://www.pfaf.org/user/Plant.aspx?LatinName=Picea+abies">http://www.pfaf.org/user/Plant.aspx?LatinName=Picea+abies</a> for more info.</td>
</tr>
<tr>
<td>Poplar</td>
<td>30</td>
<td>18</td>
<td>Rapidly growing deciduous genus of predominantly large trees. Mostly introduced to Britain, excepting the native Black Poplar. Tolerant of heavy pruning. Timber makes poor firewood. Not suitable for small gardens. Deciduous tree native to S. Europe, widely naturalised in the UK. Often regarded as a weed species due to its invasive nature and ability to tolerate most conditions. Responds well to pruning. Not a good tree to park beneath in summer due to the sticky sap secreted by aphids. Visit <a href="http://www.pfaf.org/user/Plant.aspx?LatinName=Acer+pseudoplatanus">http://www.pfaf.org/user/Plant.aspx?LatinName=Acer+pseudoplatanus</a> for more info.</td>
</tr>
<tr>
<td>Yew</td>
<td>14</td>
<td>12</td>
<td>The figures quoted regarding typical height and canopy spread should be treated as approximate. Actual heights and spreads vary according to several environmental factors such as soil conditions, climate and presence of competing vegetation.</td>
</tr>
</tbody>
</table>
5. Arboricultural Impact Assessment

5.1. Overview of the Development

5.1.1. It is proposed to install a garage towards the rear-left of the garden and to access it via a new driveway leading from the off-road parking area, alongside the left of the house, to the new garage.

5.1.2. The new driveway shall pass over the rooting zones of trees within the front garden (T5 and T6) and shall pass close to two yew trees located left of the house (T9 and T10). The garage foundations shall be located over the rooting zones of trees on adjacent land (T12, T13 & T15).

5.1.3. In order to minimise the impact on trees the driveway shall be porous and installed without any excavation over rooting zones within the front garden; the driveway shall be relatively narrow where it passes the two yew trees to the left of the house, and the garage shall be installed on a shallow foundation.

5.1.4. The table below summarises the potential impact on trees due to various activities.

<table>
<thead>
<tr>
<th>Potential Impact</th>
<th>Trees Potentially Affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree Removal</td>
<td>T7, G14</td>
</tr>
<tr>
<td>Building Close to Tree Canopies</td>
<td>T13, T15</td>
</tr>
<tr>
<td>Foundations</td>
<td>T13, T15, G16</td>
</tr>
<tr>
<td>New Surface</td>
<td>T5, T6, T9, T10, T12, T13</td>
</tr>
<tr>
<td>Underground Services</td>
<td>None</td>
</tr>
<tr>
<td>Change of Ground Levels</td>
<td>None</td>
</tr>
<tr>
<td>Soil Compaction</td>
<td>All trees throughout the site</td>
</tr>
</tbody>
</table>

5.1.5. Other potentially damaging activities often associated with construction sites include demolition or the careless use of plant machinery, hazardous materials, or fires.

5.1.6. All of the above potential impacts are considered in detail throughout this section. Section 6 specifies the measures proposed to minimise all possible potential risks of damage to the retained trees.

5.2. Impact of Tree Removal

5.2.1. All trees to be removed are marked with a red cross on the Tree Removal Plan in Appendix 6 and summarised below:

**Retention Category A:** It is not proposed to remove any Retention Category A trees.

**Retention Category B:** It is not proposed to remove any Retention Category B trees.

**Retention Category C:** It is proposed to remove the following Retention Category C trees: G14. This is a row of young Leyland cypresses (height 3m, diameter 15cm) which are located in the rear garden. They have a low amenity value and are hidden from public vantage points (see Photograph 13). Their removal shall not have a significant impact on the visual amenity of the locality and they are not considered to be a material planning constraint.

**Retention Category U:** It is proposed to remove the following Retention Category U trees: T7. Trees within this category are of such poor condition that they should be removed regardless of development proposals. Consequently the removal of Category U trees is not considered to be a direct impact of the development.

5.2.6. Details specific to each tree can be found in the Tree Data Schedule.
5.3. Impact on Tree Canopies

5.3.1. Only the very lowest hanging foliage of the yew tree, T9, shall require trimming in order to enable vehicular access along the new driveway. Crown lifting to a height of 4m is proposed (see Section 8 and Photo 11). This may be achieved using secatours or a small pruning saw. Such minimal pruning shall not harm or disfigure this tree.

5.4. Impact on Tree Roots

5.4.1. Foundations: The garage foundations shall require excavation within the Root Protection Areas of T12, T13 and T15. The portion of RPAs affected shall be as follows:

<table>
<thead>
<tr>
<th>Tree No</th>
<th>Total RPA (m²)</th>
<th>Area of RPA affected (m²)</th>
<th>% of RPA affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>T12</td>
<td>35</td>
<td>2.5</td>
<td>7</td>
</tr>
<tr>
<td>T13</td>
<td>62</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>T15</td>
<td>49</td>
<td>7.4</td>
<td>14</td>
</tr>
</tbody>
</table>

5.4.2. In order to minimise root severance it is proposed to install a shallow raft foundation with excavation limited to a maximum depth of 150mm. Such a shallow excavation shall ensure that the proportion of rooting volume disturbed shall be very low (no more than 5% for T13 and T15).

5.4.3. Excavation shall be undertaken using hand tools only and roots shall be retained wherever possible.

5.4.4. Tree rooting systems are dynamic and continually respond to changing site conditions by promoting root growth in areas where rooting conditions are favourable; and restricting root growth in areas where conditions are unfavourable or supplies of nutrients and water have been exhausted. Research has shown that healthy trees of most species are able to withstand the loss of some roots (to a maximum of about 20% of the rooting area) with no long term detrimental impact (Helliwell, D.R. and Fordham, S.F. (1992) Tree Roots and Tree Growth. Reading Agricultural Consultants, Didcot, UK). An impact on approximately 5% of the root system is therefore likely to be tolerated by these healthy and vigorous trees without a significant impact on their health. These trees are not currently exhibiting signs of stress and their starch reserves will be high. It is anticipated that they shall re-establish their root:shoot ratio in the first growing season. The impact on T12 shall be even less.

5.4.5. New Surfaces: It is proposed to install a new driveway over the RPAs of T5 and T6. The proportions of the RPAs that shall be affected are as follows:

<table>
<thead>
<tr>
<th>Tree No</th>
<th>Total RPA (m²)</th>
<th>Area of RPA affected (m²)</th>
<th>% of RPA affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>T5</td>
<td>59</td>
<td>7.1</td>
<td>12</td>
</tr>
<tr>
<td>T6</td>
<td>59</td>
<td>11.2</td>
<td>19</td>
</tr>
</tbody>
</table>

5.4.6. These figures do not exceed the 20% maximum suggested in BS 5837 Section 7.4.2. Also, all hard surfacing shall be located in excess of 0.5m from any buttress roots (as recommended in BS 5837 Section 7.4.2.7).

5.4.7. The roots of the spruce, T5, are very close to the surface (see photograph 8). The roots of the sycamore, T6 also extend across the front lawn where it is proposed to install the new driveway. Any excavation in this area could potentially have a significant detrimental impact on the health of these trees. In order to ensure no damage to roots, it is proposed to install the drive using the No-Dig technique as specified in Section 11.1.
5.4.8. Vehicles passing over this area could result in compaction the soils beneath the driveway which would be detrimental to rooting conditions. A load spreading gravel sub-base containing no fine particles shall be incorporated into the design. This shall be contained within a cellular confinement system to ensure that the weight of vehicles will be evenly spread over a wide area. This shall prevent excessive soil compaction and reduce the depth of sub-base required.

5.4.9. A porous surface is proposed which will enable passage of oxygen and water to the soils beneath.

5.4.10. A driveway already exists alongside the house (adjacent to T9). This has a porous surface and shall remain so.

5.4.11. To summarise: The proposed new surface shall be fully compliant with industry best practice when installing new surfaces over tree roots (BS 5837 (2012) Section 7.4, and arboricultural Practice Note 12 'Through the Trees to Development'). So long as the surface is installed as specified in Section 11, there shall be no long term detrimental impact on retained trees.

5.4.12. **Other Soil Compaction:** The majority of tree roots lie within the upper soil horizons. This is because the availability of oxygen decreases with depth and roots need to breathe to stay alive. In addition, nutrients are more readily available in the form of organic matter close to the soil surface.

5.4.13. Healthy soils contain about 25% air space between solid particles. Increased loading of the soils caused by construction activity causes air to be squeezed out as the soil becomes compacted preventing roots from breathing. Even an increase in pedestrian activity will cause some soil compaction.

5.4.14. In order to minimise any negative impact due to soil compaction, or contamination, on the roots of T15, T17 and T18, it is proposed to install ground protection measures throughout the construction phase as specified in Section 10. This shall be fully in accordance with industry best practice as specified in BS 5837 (Section 6.2.3).

5.5. **Impact on Other Trees**

5.5.1. All other trees are located away from the proposals and/or shall be protected from construction activity by existing or purpose-built fencing.

5.6. **Impact of General Construction Activity**

5.6.1. Tree protection measures are specified throughout Section 6 to ensure that the impact of general construction activity shall be minimal. It is imperative that all site personnel, including temporary contractors, are made aware of the Arboricultural Method Statement and the restrictions which apply.

5.6.2. There is ample room for the siting of cabins and storage of materials / spoil during the construction phase without impacting on trees.

5.7. **Impact of Underground Services and Drainage**

5.7.1. It is imperative that the locations of all underground services are approved by the local authority after consultation with the appointed arborist to assess the potential impact on trees.
5.8. **Hazardous Materials**

5.8.1. All hazardous materials (including cement and petrochemical products) are to be controlled as specified in Section 6.22 in order to ensure there is no detrimental impact on trees.

5.9. **Boundary Treatments**

5.9.1. No changes are proposed to the existing boundary features.
6. **Method Statement**

**Section A: Introduction and Overview**

6.1. **Definition of Terms**

6.1.1. Some terms used within the Arboricultural Method Statement have very specific meanings. These are defined below:

6.1.2. **Root Protection Area (RPA).** This is a theoretical area of ground around a tree where the roots are likely to proliferate. Ground disturbance in this area should be minimised in order to avoid significant impact on tree health. RPAs are indicated on all plans accompanying this report as a pink line.

6.1.3. **Construction Exclusion Zone (CEZ).** These zones are created to protect roots and canopies from inadvertent damage by construction activity – see Section 6.7. - *Construction Exclusion Zones.* They are usually fenced off by protective barriers throughout the entire construction phase. Where practicable the entire Root Protection Area and the area beneath the tree canopy shall be treated as a Construction Exclusion Zone. These zones are hatched purple on the Tree Protection Plan.

6.1.4. **Restricted Activity Zone (RAZ).** It is not always possible to create a Construction Exclusion Zone over the entire RPA. This is because access may be required or some works may be proposed within the RPA. In such circumstances a Restricted Activity Zone is created where limitations are placed on construction activity. Ground protection measures may be specified or the Restricted Activity Zone may be fenced off throughout part of the construction phase. See the legend on the Tree Protection Plan to identify these zones.

6.2. **Tree Protection Barriers - Overview**

6.2.1. The Tree Protection Plan indicates the location of all proposed tree protection barriers according to the following legend and overview:

<table>
<thead>
<tr>
<th>Symbol on Tree Protection Plan</th>
<th>Barrier type See Section 9</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In-Ground System or Back-Stay System</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Back-Stay System</td>
<td>Around the Construction Exclusion Zones.</td>
</tr>
<tr>
<td></td>
<td>Barrier Mesh System</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Plywood Boxing</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Cloth and Wire Wrap</td>
<td>N/A</td>
</tr>
</tbody>
</table>

6.2.2. The barriers shall be installed prior to the commencement of any construction activity including soil stripping and delivery of materials. A detailed specification of the barriers can be found in Section 9.
6.2.3. The tree protection plan also indicates where ground protection measures shall be installed as specified in sections 6.9 onwards (Restricted Activity Zones) and Section 10—Ground Protection Measures.

6.3. Planning Status

6.3.1. Tree protection measures specified within this report should be agreed with the local authority so that they may be conditioned upon planning consent.

6.3.2. The site manager must be familiar with all aspects of this Method Statement and should liaise with the author of this report for clarification, or regarding any unforeseen issues where trees may be impacted upon.

6.3.3. A copy of this Method Statement shall be available on-site at all times. All personnel working on the site shall be made aware of any sections appertaining to their work. This includes short term contractors and persons responsible for deliveries and installation of services.

6.4. Overview of Protection Measures

6.4.1. Below is a list of potential arboricultural impacts and a summary of the proposed protection measures:

<table>
<thead>
<tr>
<th>Reference</th>
<th>Comments</th>
<th>Potential Impact</th>
<th>Protection measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>T9</td>
<td>Low foliage over the proposed drive</td>
<td>Damage to branches.</td>
<td>Prior to commencement, pruning to be undertaken as specified in Section 8—Tree Works Schedule.</td>
</tr>
<tr>
<td>T15, T17, T18</td>
<td>Access is required over the Root Protection Area.</td>
<td>Compaction and contamination adjacent to proposed works.</td>
<td>Ground protection measures to be installed before commencement, and maintained throughout the project. Construction exclusion zone to be created over remainder of Root Protection Area.</td>
</tr>
<tr>
<td>T5, T6, T9, T10</td>
<td>Driveway proposed over RPA.</td>
<td>Root severance. Soil compaction. Reduced water and oxygen uptake.</td>
<td>Restricted Activity Zone created. Ground protection measures installed. Excavation limited to existing turf. 3D cellular confinement system incorporated into a ‘no-fines’ sub-base. Hand tools only to be used. Porous finish utilised.</td>
</tr>
<tr>
<td>T12, T13, T15</td>
<td>Foundations installed in RPA.</td>
<td>Root severance.</td>
<td>Excavation limited to a maximum of 150mm and using hand tools only. Roots to be retained wherever possible, otherwise pruned.</td>
</tr>
<tr>
<td>All other retained trees</td>
<td>No works proposed in Root Protection Areas.</td>
<td>Compaction and contamination from general construction activity.</td>
<td>Protective fencing installed as specified in Section 2 and Construction Exclusion Zone created. No works permitted in Exclusion Zone.</td>
</tr>
</tbody>
</table>

6.4.2. The above measures are described in more detail throughout the remainder of this section.
6.5. **Timing of Operations**

6.5.1. Activity within the site shall be phased according to the following chronology:

<table>
<thead>
<tr>
<th>Order</th>
<th>Phase</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st.</td>
<td>Pre-Construction Phase</td>
<td>Detailed design submission for approval (see Section 6.6 below).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Discharge of any planning conditions relating to trees.</td>
</tr>
<tr>
<td>2nd.</td>
<td>Undertake all specified tree removal and pruning (see Section 8 -Tree Works Schedule).</td>
<td></td>
</tr>
<tr>
<td>3rd.</td>
<td>Install the tree protection barriers (see Tree Protection Plan and Section 9 -Tree Protection Barriers).</td>
<td></td>
</tr>
<tr>
<td>4th.</td>
<td>Install ground protection measures (see Tree Protection Plan and Section 10 -Ground Protection Measures).</td>
<td></td>
</tr>
<tr>
<td>5th.</td>
<td>Construction Phase</td>
<td>Demolish existing structures and remove existing surfaces where applicable.</td>
</tr>
<tr>
<td>6th.</td>
<td></td>
<td>Install new buildings, hard surfaces and services taking into account restricted activities as specified in Sections 6.7 onwards</td>
</tr>
<tr>
<td>7th.</td>
<td>Post-Construction Phase</td>
<td>Remove protective barriers (fencing and ground protection measures as applicable).</td>
</tr>
<tr>
<td>8th.</td>
<td></td>
<td>Undertake landscaping operations, including boundary treatments, pedestrian surfaces and any proposed tree planting.</td>
</tr>
</tbody>
</table>

6.6. **Confirming Detailed Proposals (Reserved Matters)**

6.6.1. This Method Statement is a Heads of Terms method statement. This means that it specifies the general principles to be adopted during proposed development works. Often additional input is required from engineers to confirm the exact locations of services or technical specifications which are beyond the scope of an arborist. This is usually provided at the reserved matters stage via planning conditions. The table below highlights where such confirmation is required.

<table>
<thead>
<tr>
<th>Nature of Activity</th>
<th>Areas Potentially Affected</th>
<th>To be Confirmed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Services</td>
<td>Adjacent the garage.</td>
<td>Exact location of all underground services and trenches. Location of any proposed soak-aways. Method of installation where services pass through Root Protection Areas.</td>
</tr>
<tr>
<td>Garage Foundations</td>
<td>Restricted Zone E</td>
<td>Exact specification; foundations including depth of excavation, diameter of piles or location of contiguous piling (where applicable). To be agreed and approved by engineers and the local authority.</td>
</tr>
<tr>
<td>Surfaces</td>
<td>Restricted Zone C</td>
<td>Exact specification; including depth of excavation, sub-base construction and surface type. To be agreed and approved by engineers and the local authority.</td>
</tr>
</tbody>
</table>

6.6.2. The limitations specified within this report need to be considered in detail by building and/or demolition contractors. Any conflicts should be raised at an early stage so that issues may be resolved and agreed with the local authority. This may require the production of a revised Method Statement.
Section B: Restrictions on Activities – Specific Zones

6.7. **Construction Exclusion Zones**

6.7.1. Within Construction Exclusion Zones (shaded purple on the Tree Protection Plan) the following restrictions shall apply:

- Fencing shall be erected and maintained throughout the entire project as indicated on the Tree Protection Plan and specified in Section 9 -Tree Protection Barriers.
- No construction activity whatsoever shall occur.
- No tree works, other than those specified in this report shall be undertaken.
- No alterations of ground levels or conditions.
- No chemicals or cement washings permitted.
- No excavation whatsoever.
- No temporary structures.
- No spoil shall be stored.
- No fires shall be permitted.
- All hazardous materials (including non-essential cement products) shall be forbidden.

6.7.2. Any hard surfaces that require removal shall be removed prior to the installation of the protective fencing or following all other major construction activity and the removal of the fencing. Surfaces shall be removed using hand tools or mechanical excavators operating from outside the Construction Exclusion Zone and marshalled by the appointed arborist.

6.8. **All Restricted Activity Zones**

6.8.1. Within all of these zones (indicated on the Tree Protection Plan) the following restrictions apply:

- Only essential and specified works shall be permitted.
- Operations within these zones shall be supervised as specified within the Inspection Schedule in Section 7.
- All excavation and lifting of surfaces shall be undertaken using hand operated tools. No mechanical excavators shall operate in the restricted zones.
- No materials or spoil shall be stored.
- No fires shall be permitted.
- All hazardous materials (including non-essential cement products) shall be forbidden.

6.8.2. Further restrictions specific to each zone are specified below:

6.9. **Restricted Activity Zone A**

6.9.1. Within this zone (indicated on the Tree Protection Plan) access will be required to facilitate construction of the garage. The following restrictions shall apply:

- Ground protection measures shall be installed as specified in Section 10 –Ground Protection Measures. These shall remain in place throughout the entire construction phase.
- Vehicles or plant machinery in excess of 2 tonnes shall not be permitted in this area.
- Existing ground levels shall be retained undisturbed, except where batter slopes are installed alongside new surfaces or structures. Where applicable, battery slopes shall be installed using granular topsoil (not rich in clay) which shall slope down away from the edge of the structure and shall not exceed 200mm in depth.
- Any new hard surfaces (e.g. pedestrian paving) shall be installed in accordance with the Guidelines in Section 11-New Surfaces.
• Excavation shall be limited to the adjacent foundations and trenches immediately alongside the proposed building foundations (if required for underground services). Such trenches shall be excavated using hand tools.
• No further excavation shall occur in this zone without consulting the appointed arborist and obtaining approval from the local authority.
• If roots are encountered in excess of 25mm diameter, they shall be retained wherever possible and protected with damp sacking during times that they are unearthed. Any roots in excess of 10mm that need to be severed shall be pruned with secateurs.

6.10. Restricted Activity Zone B
6.10.1. This is the area immediately adjacent to the existing parking area. This area shall be left undisturbed. All structures (wall and paving) shall remain undisturbed.

6.11. Restricted Activity Zone C
6.11.1. Within this zone (indicated on the Tree Protection Plan) it will be necessary to install the new driveway.
6.11.2. The following restrictions shall apply:
• No vehicles are to drive, operate or park in this zone until the new driveway is installed unless ground protection measures are installed as specified in Section 10 - Ground Protection Measures, which shall remain in place until the new driveway is installed. (Any existing hard surfacing may be retained in place of ground protection measures.)
• The new driveway shall be installed according to the No-Dig method as specified in Section 11 - Surfaces.
• The installation of the drive shall be overseen by an appointed arborist or the local authority tree officer.
• In order to ensure no excavation whatsoever occurs in this area, it may be necessary to raise ground levels within the existing car parking area.

6.12. Restricted Activity Zone D
6.12.1. Within this zone (indicated on the Tree Protection Plan) it will be necessary to widen the existing path slightly to enable vehicles to pass. This is a raised area very close to the yew trees, T9 and T10. Roots are likely to be abundant in this area so it is imperative that any excavation is kept to an absolute minimum.
6.12.2. The following restrictions shall apply:
• The raised area shall continue to be retained with tanalised timber as it is at present.
• The retaining timbers shall be moved by no more than 200mm in the direction of the yew trees, making a total width for the new driveway equal to 2m.
• If necessary, the new surface shall be raised slightly to ensure that excavation of 200mm into the raised area is sufficient to achieve a drive width of 2m.
• Any excavation into the raised bank shall be overseen by an appointed arborist or the local authority tree officer.
• Roots shall be retained intact wherever possible. Otherwise they shall be neatly pruned using sharp secateurs or a sharp pruning saw.
6.13. Restricted Activity Zone E

6.13.1. Within this zone (indicated on the Tree Protection Plan) it is proposed to install building foundations. Because the foundations are within a Root Protection Area, deep concrete strip foundations shall not be permitted.

6.13.2. Instead it is proposed to install a shallow raft foundation. Detailed restrictions are specified in Section 12.1.
Section C: Restrictions on Activities – Throughout the Site

6.14.1. In order to protect tree canopies outside of Construction Exclusion Zones the following restrictions shall apply:

- No machinery in excess of 3m shall pass beneath the canopy of any tree without being carefully marshalled in order to ensure that no branches are damaged.
- If materials require installation or delivery beneath tree canopies, this shall be done without the use of overhead cranes.
- If materials are to be installed or delivered close to tree canopies (but not beneath them) and a crane is required, they shall be carefully marshalled in order to ensure that branches are not accidentally damaged.

6.15. Site Hoarding
6.15.1. If site hoarding shall be installed over the Root Protection Area of any tree, the following restrictions shall apply:

- Ground levels shall be maintained as existing.
- Post holes shall not exceed 300mm x 300mm.
- No post hole shall be excavated within 1.5m of any tree stem.
- Post holes shall be excavated using hand tools or by a post-hole auger attached to plant machinery sited outside the Root Protection Area(s).
- Roots in excess of 25mm shall be retained wherever possible.
- Roots in excess of 10mm shall be pruned with sharp secateurs.
- Pruning shall be minimal and only undertaken where absolutely necessary to facilitate the site hoarding. It shall be undertaken by a reputable tree surgeon working to BS 3998 (2010).
- Cement products shall be mixed away from Root Protection Areas (see Section 6.22 - Hazardous Materials).

6.15.2. Site hoarding may be installed in place of the specified tree protection measures subject to the approval of the local authority with regard to its location and specification.

6.16. Demolition
6.16.1. No demolition, removal of surfaces, or soil stripping shall commence until the protective fencing and ground protection measures are installed to the satisfaction of the local authority.

6.17. Underground Services
6.17.1. No underground services shall pass through any part of the Construction Exclusion Zones or Restricted Activity Zones unless done so in a manner detailed in a specific Method Statement and approved by the local authority.

6.18. Use of Heavy Plant
6.18.1. All machinery operatives are to be made aware of any Construction Exclusion Zones and Restricted Activity Zones that apply to this site (see the Tree Protection Plan and Section 6.7 onwards).

6.18.2. All machinery operatives are to respect these zones and ensure that no damage occurs to trees due to the careless use of machinery.
6.18.3. Plant machinery shall be limited to a maximum weight of 2 tonnes in Restricted Zones

6.19. **Scaffolding**

6.19.1. If scaffolding is required in areas containing ground protection measures, the protective boards shall need to remain in-situ and be strengthened and stabilised to bear the weight of scaffold poles.

6.19.2. Prior to the installation of any scaffolding within 0.5m of any tree branches, the appointed arborist shall be consulted to specify any pruning works that may be required.

6.20. **Siting of Cabins and Storage of Materials**

6.20.1. Cabins and heavy building materials may be located or stored anywhere outside of Construction Exclusion Zones and Restricted Activity Zones.

6.20.2. Any proposal to install cabins or materials within these zones shall be agreed in writing with the local authority prior to installation.

6.20.3. It may be acceptable to locate site cabins such that they act as a tree protection barrier and replace the specified protective fencing. Where this is being considered, written approval must be sought from the local authority.

6.21. **Pedestrian Paving**

6.21.1. Any pedestrian paving that may be installed over Root Protection Areas, as part of a post construction landscaping scheme, must be installed in a manner sympathetic to tree roots as specified in Section 11.2 -Pedestrian Paving.

6.22. **Hazardous Materials**

6.22.1. Any mixing of cement based materials shall take place outside the Construction Exclusion Zones and Restricted Activity Zones. Where cement is to be mixed at considerable distances from trees and water run-off cannot enter Root Protection Areas, then no further special measures are required. Otherwise, provision shall be made to ensure that the mixing area is contained so that no water run-off enters the Root Protection Area of any trees (see diagram for example). Mixers and barrows shall be cleaned within this area.

6.22.2. All other chemicals hazardous to tree health, including petrol and diesel, shall be stored in suitable containers as specified by current COSHH Regulations, and kept away from Root Protection Areas.
Section D: Post-Construction Phase

6.23. Removal of Tree Protection Barriers

6.23.1. This will be done after all major construction work is complete. Vehicular access will not be permitted within the Construction Exclusion Zones.

6.23.2. The local authority tree officer shall be made aware that the fencing is to be removed.

6.24. Landscaping

6.24.1. No machinery used within landscaping operations shall operate within the Root Protection Areas of retained trees.

6.24.2. Ground levels shall not be altered within Root Protection Areas without consultation and approval from the local authority.

6.25. Tree Planting

6.25.1. Trees planted in poor soils or compacted soils are unlikely to become established, so prior consideration should be given to rooting conditions. Where compaction or contamination is believed to have occurred expert horticultural or arboricultural advice should be sought.

6.25.2. Any new tree planting shall be carried out after completion of all construction activity in the vicinity.
7. Site Inspection

7.1. Inspection Schedule

7.1.1. In order to ensure that the trees are adequately protected it shall be necessary to periodically monitor the works. This will be done by the local authority tree officer or an appointed arborist (see Section 7.2 below) who will provide the tree officer with a copy of inspection details.

7.1.2. The following inspection schedule is suggested though the local authority may specify additional supervision where deemed necessary.

<table>
<thead>
<tr>
<th>Inspection</th>
<th>Attendees</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Start</td>
<td>N/A.</td>
<td>Site manager to study this Method Statement &amp; contact the appointed arborist to agree all protection measures.</td>
</tr>
<tr>
<td>Pre-Construction Meeting</td>
<td>Site manager, appointed arborist and/or local authority tree officer. *</td>
<td>Tree protection fencing locations &amp; specification checked. Additional ground protection measures checked. Further protection measures / restrictions agreed.</td>
</tr>
<tr>
<td>Intermediate Reporting</td>
<td>N/A.</td>
<td>Site manager to liaise with the appointed arborist regarding any issues which may affect trees. General site photos indicating tree protection measures to be provided monthly.</td>
</tr>
<tr>
<td>Excavation in Restricted Zone D, and installation of the new drive.</td>
<td>Site manager, appointed arborist and/or local authority tree officer.</td>
<td>Inspection to occur at commencement of these activities.</td>
</tr>
<tr>
<td>Post-Construction Meeting</td>
<td>Site manager, appointed arborist and/or local authority tree officer.</td>
<td>Retained trees inspected. Further landscaping operations and restrictions to be agreed.</td>
</tr>
</tbody>
</table>

* Where agreed with the L.A. it may be acceptable to supply photographs of the fencing to avoid the necessity for a site visit.

7.2. The Appointed Arborist

7.2.1. The appointed arborist must be acceptable to the local authority. He / she must have a good understanding of the project requirements and be suitably qualified to understand the hazards associated with development near to trees.

7.2.2. The appointed arborist should work closely with the site manager and shall have the authority to insist upon work stoppage until resolution of any major issues arising which could be detrimental to the health of protected or important trees.

7.2.3. The appointed arborist must keep the local authority updated at each of the stages within the inspection schedule and will advise on any unexpected issues arising throughout the project which could impact on trees.
8. **Tree Works Schedule**

8.1. **Tree Works Specification**

8.1.1. The following table specifies the tree works which will be required prior to the commencement of construction activity:

<table>
<thead>
<tr>
<th>Tree Reference</th>
<th>Action Required</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>T7, G14</td>
<td>Remove.</td>
<td>Stumps of trees within the RPAs of retained trees shall be removed with a stump grinder NOT a mechanical excavator.</td>
</tr>
<tr>
<td>T9</td>
<td>Crown lift to 4m on the side overhanging the new drive.</td>
<td>Only very minor pruning using secateurs (or a small manual pruning saw) is necessary.</td>
</tr>
</tbody>
</table>

8.1.2. **Pruning Standards:** All tree work shall be carried out to BS 3998 (2010). Wherever possible pruning cuts shall be made close to the branch collar or a secondary growth point. Cuts to be made with sharp, clean tools. No wound sealants to be used.

8.1.3. **Additional works:** Any recommendations specified in the Tree Data Schedule (but not replicated in the above table) are intended to maintain the tree population in an acceptable condition. They are made for reasons of good arboricultural practice and should be undertaken regardless of development proposals. Where these trees are protected by a tree preservation order or are in a conservation area, consent must be sought from the local authority. The works listed in the table above form part of this planning application and no additional consent is required if planning permission is granted.
9. **Tree Protection Barriers**

9.1.1. The purpose of tree protection barriers is to keep construction activity away from Restricted Activity Zones or Construction Exclusion Zones. They should be appropriate to the nature and proximity of activity within the site. The barriers should be erected prior to the commencement of all activity including demolition, soil stripping and delivery of materials and demolition (except where existing structures require demolition to enable the barriers to be installed). Barrier systems are specified below and should be installed according to the legend on the Tree Protection Plan.

9.2. **The In-Ground System**

9.2.1. This system may be installed where indicated by a solid purple line on the Tree Protection Plan. It should be robust enough to withstand occasional knocks by plant machinery and, once installed, shall remain in place throughout the entire construction phase.

9.2.2. Vertical scaffold poles are driven into the ground, onto which are affixed horizontal scaffold poles and diagonal bracing struts. Weldmesh panels (or similar – e.g. Heras type fencing panels, or 18mm+ plywood boards) are secured to this scaffold framework using sturdy clips e.g. standard scaffold clips. The system is illustrated in the diagram to the right and is based on BS 5837 guidelines.

9.3. **The Back-Stay System**

9.3.1. This system may be installed where indicated by a solid or dashed purple line on the Tree Protection Plan. It is more practical over existing hard surfaces or where the fencing needs to be moved to enable permitted activities within a Restricted Activity Zone. This system should be able to withstand occasional knocks by machinery and should not be relocated except with the consent of the site manager and the approval of the local authority.

9.3.2. Within this system, weldmesh fencing panels (minimum height 2m) are affixed into rubber or concrete feet and clipped together with anti-tamper couplers. Where topography permits, two couplers should be used, spaced at least 1m apart. Alternate panels should be...
attached to a diagonal back stay connected to an additional foot or baseplate secured with ground pins or additional ballast. Where ground pins are not used, the total weight of the foot/plate plus ballast should total not less than 32kg.

9.3.3. Alternatively, timber struts may be used to affix the panels to existing walls using brackets and screws where the fence panels are sufficiently close for this to be effective.

9.3.4. Where it is not possible to install diagonal struts (such as very close to a hedge) then the front feet shall be secured using ground pins or ballast.

9.4. **The Barrier-Mesh System**

9.4.1. Where indicated by a thick red line (solid or dashed) on the Tree Protection Plan, it shall be acceptable to install a less robust system than those specified above. This is because of the nature of construction activity or its distance from tree protection areas. The purpose of such a system shall be to demarcate the protection zone. It is not intended that such fencing will withstand knocks by construction machinery.

9.4.2. In this system, high visibility plastic safety fencing, 1m high, minimum grade 140g/m², is secured onto alternate wooden posts and fencing pins. Wooden posts to be located at 5m intervals, minimum dimensions 75mm.

9.5. **Stem Protection – Timber Boxing**

9.5.1. Where indicated by a turquoise square on the Tree Protection Plan, it shall be necessary to install robust plywood boxing to protect a tree stem. The plywood boxing specification is indicated in the diagram opposite. It shall be affixed in place without securing it to any part of the tree. Instead, it shall be secured to the ground or to adjacent structures. It shall be made firm enough to withstand occasional knocks from construction vehicles.
9.6. **Stem Protection – Cloth and Wire Wrap**

9.6.1. If/Where indicated by a turquoise star on the Tree Protection Plan, it is proposed to protect a tree stem using sturdy cloth and wire. Other tree protection barriers, such as those specified above, are not considered appropriate due to the proximity of the tree stem to proposed activity. Plywood boxing may be installed as an alternative (see the above specification) if the site manager considers it possible.

9.6.2. The tree stem and any low limbs shall be protected from ground level to a height of 2.5m by wrapping them at least three times with a sturdy material such as hessian cloth or similar. Around this, chicken wire with 13mm holes shall be wrapped at least twice around and secured.

9.6.3. The wrappings shall be secured using string, wire or plastic cable clips. They shall not be secured by driving nails or tacks into the tree stem or bark.

9.7. **Notices**

9.7.1. On sites with a high number of contractors, suitable weather-proof notices should be displayed to identify tree protection zones. They should state the purpose of the fencing and that it should not be moved, or traversed, other than by authorised personnel.
10. **Ground Protection Measures**

10.1.1. Where indicated on the Tree Protection Plan (Restricted Activity Zone A), ground protection measures shall need to be installed. Ground protection measures shall need to be installed if it is proposed to drive any vehicle over any Restricted Zone C, unless the new drive has already been installed. The purpose of the ground protection is to prevent soil compaction and contamination where it is not practicable to fence off Root Protection Areas because access is required.

10.1.2. Where vehicles or machinery are required to operate within the Restricted Zone, a geotextile fabric shall be installed followed by a compression resistant layer such as 150mm of compressible material (e.g. woodchip) or a 3D cellular confinement system infilled with 7-40mm angular gravel (e.g. Cellweb™ - see Section 11). Either system shall act to spread the load of any vehicles passing through the restricted zone. Above this load spreading layer, 25mm wooden boards or 12mm road plates shall be secured. Plant machinery shall be limited to 2 tonnes.

10.1.3. If only pedestrian access is required, then 25mm wooden boards, e.g. scaffold boards firmly affixed together and laid directly onto the ground shall suffice. If the ground is uneven, then it shall first be made even using sand or soil to ensure the boards distribute loads over a large area of ground. Boards shall be appropriately weighted or pinned to prevent movement. Alternatively scaffold boards may be supported above ground on a scaffold framework.

10.1.4. Where existing hard surfacing is to be retained throughout the entire project it shall not be necessary to install additional ground protection measures. However the hard surfacing must be firm enough to spread the load of any traffic passing overhead. Paving slabs shall need to be reinforced with scaffold boards or similar if vehicles or machinery are to be used in this area.

10.1.5. The ground protection measures shall be installed and approved before commencement of demolition and construction activity and before the arrival of plant machinery or materials. They shall remain in place until all heavy construction activity is complete or until they are due to be replaced with a new hard surface.
11. New Surfaces

11.1. No-Dig Driveway Installation

11.1.1. This section details the No-Dig Method which is proposed when installing the new driveway over Restricted Activity Zone C.

- **Ground Preparation**: Surface vegetation may be killed using a translocated herbicide such as Glyphosate™. Turf may be lifted to a depth of 50mm using hand tools. Because surface roots are clearly visible within the lawn, it may be deemed preferable to retain the turf and install the new driveway over the top of it. If the turf is removed, levels should be made up using a sandy soil to cover the exposed roots.
- **Mechanical excavators may not be used.**

11.1.2. **Drive Edgings.** Edging solutions (such as kerbstones) requiring further excavation will not be acceptable within Root Protection Areas. Instead, an above ground system shall be installed such as a tanalised timber edge (treated for a 40 year design life) retained by narrow pegs driven into the ground. Alternative above ground systems must be approved by the local authority.

11.1.3. Where required, batter slopes may be installed to tie in with existing ground levels (max 1:3 gradient, maximum 100mm increase in ground level). However, no increase in ground level shall be permitted immediately adjacent to any tree stem or associated buttress roots.

11.1.4. **The sub-base.** Once the edgings are in place, a geotextile membrane shall be laid down to prevent root penetration into the road surface. A thin layer (up to 35mm) of angular gravel or crushed aggregate gravel may then be laid over the membrane and levelled off.

11.1.5. A 3 dimensional cellular confinement system shall then be installed. Either of the two options specified below shall be acceptable from an arboricultural perspective:

11.1.6. 1) **Rigid Cellular System** - A 3 dimensional cellular confinement system shall then be installed with a minimum thickness of 40mm. This may be filled with 7-14mm angular gravel. Example systems are illustrated overleaf:
11.1.7. The entire cellular system shall be laid first and may be pinned in place using ground pins. This shall be followed by the infill, working from one end such that heavy machinery does not pass over any Root Protection Areas until the in-fill is installed.

11.1.8. 2) Flexible Cellular System – see illustration. This will be filled with a no fines angular in-fill (e.g. 7 – 14mm or 20 – 40mm gravel).

11.1.9. I understand that a 100mm deep system should be adequate to cope with the expected loads, though this should be verified with the manufacturer. A limestone based in-fill will not be acceptable. Enough infill should be used to allow for settlement and compaction and no more. If required, the infill may be periodically topped up.

11.1.10. The entire cellular system shall be laid first and may be pinned in place using ground pins. This shall be followed by the infill, working from one end such that heavy machinery does not pass over any Root Protection Areas until the in-fill is installed. The entire system may then be lightly compacted to a degree appropriate for the expected load.

11.1.11. Up to 50mm of 2 - 6mm clean hard grit (no fines) angular granular fill may be overlaid as a laying course.

11.1.12. The Finished Surface. The following surfaces are acceptable over rooting areas:

- **No-Fines gravel.** This option offers the maximum permeability. However, loose gravel should be avoided close to the site entrance as it has a tendency to spill out into the adjacent public footway. Resin bonded gravel may be acceptable if it is shown to be sufficiently porous to enable rainwater to easily pass through to the sub-base below.

- **Block paving.** This is a good alternative as it allows a fair degree of permeability. Blocks with extra wide nibs shall be utilised to enable maximum infiltration of water between the blocks. Blocks shall be jointed with 1mm – 4mm clean hard crushed stone (no fines) brushed over the spaces and settled with the aid of a vibrating plate compactor.
• Porous asphalt to BS EN 13108-7 (previously Pervious Macadam BS 4987 – 1 & 2). This offers a degree of permeability and is preferred over concrete or asphalt containing fines (e.g. Stone Mastic Asphalt (BS EN 13108-5) or Hot Rolled Asphalt (BS EN 13108-4)). This surface may require a porous binder course. Actual specification will vary according to ground conditions and expected load, and should be agreed with a Highways Engineer or Geotechnical engineer.

Over view Diagram – Road Construction Sympathetic to Trees

11.2. Pedestrian Surfaces

11.2.1. If/Where it is proposed to install new pedestrian surfaces over Root Protection Areas, excavation shall be limited to the removal of existing turf/vegetation plus an additional 50mm. Excavation shall be undertaken using hand tools only. Porous materials are preferred but not essential if the new surface covers less than 10% of the Root Protection Area. Paving with a thickness of 50mm bedded on mortar, or sand, bearing directly onto the ground, with a finished surface level with existing ground levels will be acceptable. No retaining kerbs shall be used.
12. Foundation Types

12.1. Raft Foundation

12.1.1. Where a raft foundation is specified over a Root Protection Area (i.e. Restricted Zone E). The following restrictions shall apply:

- Concrete strip foundations shall not be acceptable in this area.
- Excavation for the raft foundation shall be undertaken using hand tools or a carefully marshalled mechanical excavator operating from outside the Root Protection Area and overseen by the local authority tree officer or an approved appointed arborist.
- Excavation shall not exceed 150mm unless approved in writing by the local authority.
- Soil shall be carefully removed in strata of 50mm.
- Roots in excess of 25mm which are located close to the bottom or the edge of the excavation are to be retained intact if possible and covered with wet sacking whilst exposed.
- All roots in excess of 10mm which cannot be retained shall be neatly pruned with secateurs.
13. Photographs

Refer to the Tree Constraints Plan for photo locations.
Photo 13.

Photo 14.
14. **Signature**

This report represents a true and factual account of the trees and potential impact of development along with proposed protection measures at

The Mount  
Keadby  
Guildford  
RG25 3JL

Signed

........................................

Ivan Button N.C.H. (Arb), FDS (Arb), BSc (Hons), P.G.C.E., M. Arbor. A.

on behalf of

Crown Consultants Ltd

Dated

18th March 2013
Appendix 1: BS 5837: 2012 – Guidance Notes

This Standard prescribes the principles to be applied to achieve a satisfactory juxtaposition of trees and structures. It sets out to assist those concerned with trees in relation to design, demolition and construction to form balanced judgements.

It acknowledges the positive contribution trees may offer to a site, as well as the negative aspects of retaining inappropriate trees. It addresses the negative impacts that construction activity may have upon trees and offers mitigation strategies to minimise these impacts.

The Standard suggests a three stage approach to ensure best practice is followed when developing close to trees:

A1.1 Stage 1: Survey of Existing Trees

This identifies the existing trees on and adjacent to the site. Data is recorded for each tree and is presented in a Tree Data Schedule. Each tree is allocated a Retention Category according to its size, amenity value, condition and safe useful life expectancy. The categories are allocated independently of development proposals. Our interpretation of the Retention Categories is explained below:

A1.1.1 Retention Categories

A Category: Trees of high quality and amenity value. Usually, mature trees with a significant life expectancy which would enhance any development. Retention of these trees is strongly encouraged.

B Category: Trees of moderate quality and amenity value. Usually these are maturing trees or younger trees with exceptional form. Retention of these trees is desirable though the removal of occasional specimens may be acceptable.

C Category: Trees of low quality or small specimens with a relatively low amenity value. These trees are not considered to be a material planning constraint and their removal will generally be seen as acceptable in order to facilitate development.

U Category: Trees of such low quality that their removal is recommended regardless of development proposals.

A1.1.2 Occasionally trees are borderline and do not fall neatly into one of the categories A, B or C. In such cases we apply a superscript (+/-) such that:

- C’ Indicates borderline C/B, though Category C is deemed to be most appropriate.
- B’ Indicates borderline C/B, though Category B is deemed to be most appropriate.

A1.1.3 The British Standard suggests that each of the A, B and C categories may be further subdivided (A1, A2, A3, B1, B2, B3 etc) such that subcategory 1 denotes mainly arboricultural values, subcategory 2 denotes mainly landscape values and subcategory 3 denotes mainly cultural values (including conservation). Multiple subcategories may be used.

Our experience suggests that these subdivisions lack clarity and can be confusing. Within this report subcategories are not denoted. Where appropriate, the use of phrases such as ‘Part of a formal group’, or ‘Has a high ecological value’, or ‘Offers good screening to the site’ are incorporated into the observation section of the Tree Data Schedule. We believe this conveys all relevant landscape and cultural information without any confusion.

A1.1.4 Tree Constraints Plan (TCP). This indicates the position, crown spread, Retention Category and Root Protection Area of each tree. It is used to inform where development may proceed without causing damage to trees.
A1.1.5 **Root Protection Area (RPA).** This is the area around each tree likely to contain the majority of roots. It should ideally remain undisturbed to avoid a detrimental impact on tree health. It is calculated according to the formula “radius of RPA” = “12 x stem diameter”. This shape can then be modified to take into account site factors which influence rooting activity, e.g. underground structures. Where development works are proposed within the RPA they should be undertaken in a sympathetic manner to minimise root disturbance.

A1.1.5 **Shade Constraints.** BS 5837 suggests that shade constraints should be indicated on the TCP. This is denoted as a circle-segment drawn northwest to due east with a radius equal to the height of the tree. This does not represent the actual shade pattern which varies through the seasons. Rather, it indicates the area most shaded by the tree throughout the course of the year. Ideally habitable room windows should be located outside of these shade constraints.

A1.2 **Stage 2: Arboricultural Impact Assessment**

After the initial survey and the production of the Tree Constraints Plan, arborists and designers are encouraged to work together to establish a design proposal with minimal impact on the high quality trees. An assessment should be made of all possible impacts including the impact that the trees may have upon the proposal. The arborist may recommend mitigation strategies to minimise these impacts and help achieve a more harmonious juxtaposition between buildings and trees.

A1.3 **Stage 3: Arboricultural Method Statement**

This type of report specifies the measures necessary to protect trees against damage from construction activity. The Method Statement should be written in a manner that it may be conditioned and enforced by the local authority upon granting of planning permission. The site manager should be familiar with all aspects of the Method Statement and should ensure that all persons working on the site are aware of those aspects which pertain to their work. This includes service installation engineers and operators of plant machinery.
Appendix 2: Explanation of Tree Data & Glossary

This section explains the terms used in the **Tree Data Schedule** within Section 3.

### A4.1 General Observations

#### A4.1.1 Numbering System:
Each item of vegetation has its own unique number prefixed by a letter such that T=Tree 1, G=Group 2, H=Hedge 3 and W=Woodland 4, S=Shrub 5.

#### A4.1.2 Age Categories:

- **Young**: Usually less than 10 years old.
- **Semi-Mature**: Full height almost attained. Significant growth may be expected in terms of crown spread (typically 30-60% of life expectancy).
- **Mature**: Full height attained. Crown spread will increase but growth increments will be slight (typically 60% or more of life expectancy).
- **Over Mature**: A level of maturity whereby significant management may be required in order to keep the tree in a safe condition.

#### A4.1.3 Species:
Common names and Latin names are given.

#### A4.1.4 Height:
Measured from ground level to the top of the crown.

#### A4.1.5 Stem Diameter:
Taken at 1.5m above ground level where possible. On multi-stemmed trees this measurement may be taken at ground level, though usually an indication of the number of stems and average diameter is given, e.g. 3 x 30cm.

#### A4.1.6 Crown Height:
Measured from ground level to the height at which the main crown begins. Where the crown is unbalanced it is measured on the side deemed to be most relevant. This is usually the side facing the area of anticipated development.

#### A4.1.7 Tree Diagram:
This scaled drawing is computer generated based on measurements taken for stem diameter, crown height and spread, and overall height. It is designed to help the reader rapidly assess the data. It is not an accurate representation of the form of the tree.

#### A4.1.8 Crown Spread:
Measured N, E, S & W, taken from the centre of the stem and usually rounded up to the nearest metre.

#### A4.1.9 Observations:
If a tree's position is considered to be relevant it will be commented upon (e.g. overhanging a children's play area). Tree form and pruning history are also recorded along with an account of any significant defects. Defects and descriptive terms are dealt with in more detail at the end of this section.

#### A4.1.10 Recommendations:
Usually based on any defects observed and intended to ensure that the tree is in an acceptable condition.

#### A4.1.11 Priority Scale:
Depending upon the threat posed by the tree, and the likelihood of failure, recommendations should be carried out according to the following priority scale:

- **Urgent**: To be carried out as soon as possible.
- **Very High**: To be carried out within 1 month.
- **High**: To be carried out within 3 months.
- **Moderate**: To be carried out within 1 year.
- **Low**: To be carried out within 3 years.

#### A4.1.12 Inspection Frequency:
An interval of 6 months, 1 year, 1.5 years or 3 years is allocated before the next inspection is due. Wherever practical, consideration should be given to seasonal changes so that deciduous trees are not always surveyed in winter when they have no leaves, or in summer when leaves may obscure branches within the upper crown.

#### A4.1.13 Vigour:
An indication of growth rate and the tree's ability to cope with stresses:

- **High**: Having above average vigour.
- **Moderate**: Having average vigour.
- **Low**: Having below average vigour.
- **Very Low**: Tree is struggling to survive and may be dying.

#### A4.1.14 Physiological Condition:

- **Good**: Healthy and with no symptoms of significant disease.
- **Fair**: Disease present or vigour is impaired.
- **Poor**: Significant disease present or vigour is extremely low.
- **Very Poor**: Tree is dying.

#### A4.1.15 Structural Condition:

- **Good**: Having no significant structural defects.
- **Fair**: Some defects observed though no high priority works are required.
- **Poor**: Significant defects found. Tree requires monitoring or remedial works.
- **Very Poor**: Major defects which will usually require significant remedial works or tree removal.

#### A4.1.16 Amenity Value:

- **Very High**: Exceptional specimen, observable by a large number of people.
- **High**: Attractive specimen, observable by a significant number of people.
- **Moderate**: One of the above factors is not applicable.
- **Low**: Unattractive specimen or largely hidden from view.

#### A4.1.17 Life Expectancy:
The estimated number of years before the tree may require removal. Classified as (<10), (10 – 20), (20 – 40), or (40+).

#### A4.1.18 Retention Category:
These are explained in detail in Appendix 1.

### A4.2 Evaluation of Defects

#### A4.2.1 Cavities, wounds, deadwood etc. are all evaluated as follows:

- **Major**: Such that structural integrity is, or will become, compromised and the tree is, or will inevitably become, hazardous.
- **Significant**: A defect that may over time become a major defect, though not necessarily so. This will depend on the vigour of the tree and its ability to deal with decay etc.
- **Minor**: A defect that is not likely to compromise the tree's structural integrity.
## General Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adaptive growth</strong></td>
<td>In tree biomechanics, the process whereby wood formation is influenced both in number and quality by the action of gravitational forces and mechanical stresses on the cambial zone.</td>
</tr>
<tr>
<td><strong>Aerobic</strong></td>
<td>Conditions in which oxygen is freely available, or to biomechanical processes that depend on the presence of oxygen.</td>
</tr>
<tr>
<td><strong>Anaerobic</strong></td>
<td>A condition marked by the absence of oxygen; Generally such areas are unsuitable for normal life and growth of plant tissues.</td>
</tr>
<tr>
<td><strong>Arboriculture</strong></td>
<td>The culture and management of trees as groups and individuals primarily for amenity and other non-forestry purposes.</td>
</tr>
<tr>
<td><strong>Arborist</strong></td>
<td>A person possessing the technical competence through experience and related training to provide management of trees or other woody plants in a landscape setting. Generally involved with the development or management of trees for visual amenity or land management rather than the growth of trees for product or profit.</td>
</tr>
<tr>
<td><strong>Barrier zone</strong></td>
<td>A layer within an annual increment of wood which contains abnormal xylem cells, laid down by the cambium in response to wounding or other trauma.</td>
</tr>
<tr>
<td><strong>Body language</strong></td>
<td>In trees, the outward display of growth responses and or deformation in response to mechanical stress.</td>
</tr>
<tr>
<td><strong>Bole</strong></td>
<td>Or Trunk, the main stem of a tree below its first major branch.</td>
</tr>
<tr>
<td><strong>Bracket</strong></td>
<td>A type of fruiting body produced by various fungal species, plate like to hoof like in shape and often a one sided attachment to the wood or bark.</td>
</tr>
<tr>
<td><strong>Branch bark ridge</strong></td>
<td>A ridged area located at the union of a branch to a trunk or stem.</td>
</tr>
<tr>
<td><strong>Branch Collar</strong></td>
<td>Trunk tissue that forms around the base of a branch between the main stem and the branch, or between a main branch and a lateral branch. As a branch decreases in vigour or begins to die, the collar usually becomes more pronounced and completely encircles the branch.</td>
</tr>
<tr>
<td><strong>Brown Rot</strong></td>
<td>Form of decay where cellulose is degraded, while lignin is only modified.</td>
</tr>
<tr>
<td><strong>Buttress Root</strong></td>
<td>Roots that emerge from the base of the tree stem, normally large and well developed that rapidly reduce in diameter to create the Root Plate this offers structural support for the tree. Buttress roots divide rapidly forming the connection between the stem and the transport roots.</td>
</tr>
<tr>
<td><strong>Cabling Bracing</strong></td>
<td>Installing cables within the crown of a tree to prevent collapse.</td>
</tr>
<tr>
<td><strong>Callus</strong></td>
<td>Undifferentiated cells often formed at the edges of recent injuries. This tissue quickly becomes differentiated, forming cells of the type characteristic of that position on the tree (e.g. forming wood, bark, roots, etc.) see wound response tissue.</td>
</tr>
<tr>
<td><strong>Cambium</strong></td>
<td>A thin layer of actively growing and dividing cells, located between the xylem (sapwood) and bark of a plant; the part responsible for radial growth of a tree stem or branch.</td>
</tr>
<tr>
<td><strong>Canopy</strong></td>
<td>The topmost layer of twigs and foliage in a woodland, tree or group of trees.</td>
</tr>
<tr>
<td><strong>Canker</strong></td>
<td>A localised area of dead bark and cambium on a stem or branch, caused by fungal or bacterial organisms, characterised by woundwood development on the periphery. This may be annual or perennial.</td>
</tr>
<tr>
<td><strong>Cavity</strong></td>
<td>An open and exposed area of wood, where the bark is missing and internal wood has been decayed and dissolved.</td>
</tr>
<tr>
<td><strong>Chlorotic</strong></td>
<td>Also Chlorosis. A condition of the plant marked by yellowing of normally green foliage, often indicating nutrient deficiency or plant dysfunction.</td>
</tr>
<tr>
<td><strong>Clinometer</strong></td>
<td>Devices that measures vertical angles, and provides direct height measurements of objects by triangulation.</td>
</tr>
<tr>
<td><strong>Co-dominant stems/trunk</strong></td>
<td>Are forked branches or trunks of nearly the same size in diameter and lacking a normal branch union.</td>
</tr>
<tr>
<td><strong>Compacted soils</strong></td>
<td>Soils in which the air-space (oxygen space) has been reduced or eliminated, reducing water infiltration and percolation, reducing root presence and inhibiting new root development.</td>
</tr>
<tr>
<td><strong>Compartmentalisation</strong></td>
<td>The physiological process that creates the chemical and mechanical boundaries that act to limit the spread of disease and decay organisms.</td>
</tr>
<tr>
<td><strong>Compression Failure</strong></td>
<td>Localised buckling of fibres and other longitudinal elements produced by compression of wood along the grain; compression failures sometimes develop in standing trees.</td>
</tr>
<tr>
<td><strong>Compression Strength</strong></td>
<td>The ability of a material or structure to resist failure when subjected to compressive loading; measurable in trees using special drilling devices.</td>
</tr>
<tr>
<td><strong>Compression Wood</strong></td>
<td>Abnormal wood formed on the lower side of a branch and curved stems, with physical properties different from normal wood.</td>
</tr>
<tr>
<td><strong>Conservation Area</strong></td>
<td>In Great Britain, designated areas of architectural or historical interest, in which there are special procedures for planning applications. Additionally tree works cannot generally be undertaken prior notification (Currently 6 weeks) to the relevant local planning authority. See also Tree Preservation Orders.</td>
</tr>
<tr>
<td><strong>Core Sample</strong></td>
<td>A sample of wood extracted from a trunk or branch, using an increment borer tool. The resulting core can be analysed for characteristics of growth, wood strength, structure, decay, and for species identification.</td>
</tr>
<tr>
<td><strong>Crotch</strong></td>
<td>The union of two or more branches; the auxiliary zone between branches.</td>
</tr>
<tr>
<td><strong>Crown</strong></td>
<td>The upper canopy of a tree, including upper trunk, scaffold branches, secondary branches, stems and leaves.</td>
</tr>
<tr>
<td><strong>Crown Lift</strong></td>
<td>The removal of the lowest branches, usually to a given height. It allows more residual light and greater clearance underneath for vehicles etc.</td>
</tr>
<tr>
<td><strong>Crown reduction</strong></td>
<td>The reduction of a tree’s height or spread while preserving its natural shape.</td>
</tr>
<tr>
<td><strong>Crowning thinning</strong></td>
<td>The removal of some of the density of a tree’s crown, usually 5-25% allowing more light through its canopy and reducing wind resistance.</td>
</tr>
<tr>
<td><strong>Deadwood (noun)</strong></td>
<td>Deadwood is often present within the crown or on the stems of trees. It may be an indication of ill health, however, it may also indicate natural growth processes. If a target is present beneath the tree, deadwood may fall and cause injury or damage and should be removed, otherwise deadwood can remain intact for conservation purposes (insects, fungi, birds etc.).</td>
</tr>
<tr>
<td><strong>Deadwood (verb)</strong></td>
<td>The removal of dead branches from a tree’s canopy, usually of a specified size (in diameter).</td>
</tr>
<tr>
<td><strong>Decay</strong></td>
<td>Progressive deterioration of organic tissues, usually caused by fungal or bacterial organisms, resulting in loss of cell structure, strength, and function. In wood, the loss of structural strength.</td>
</tr>
<tr>
<td><strong>Decay Detection</strong></td>
<td>The assessment of decay within a tree has been traditionally difficult, but recent advances have made it possible to achieve accurate representations of the internal section of a tree in both 2D and 3D, removing doubt over the condition of the tree and allowing accurate management decisions.</td>
</tr>
<tr>
<td><strong>Decurrent</strong></td>
<td>In trees, a system of branching in which the crown is borne on a number of major widely spreading limbs of similar size. In fungi relates to toadstools whose gills run down the stem and leaves and other plant organs, which extend down the stem.</td>
</tr>
<tr>
<td><strong>Defect</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Defoliation</strong></td>
<td>The losing of plants foliage.</td>
</tr>
<tr>
<td><strong>Dieback</strong></td>
<td>Progressive death of buds, twigs and branch tissues, on individual limbs resulting in Deadwood, or throughout the canopy,</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
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</tr>
<tr>
<td>Dripline</td>
<td>A projected line on the ground that corresponds to the spread of branches in the canopy; the farthest spread of branches.</td>
</tr>
<tr>
<td>Epicormic shoots</td>
<td>Fast growing, weakly attached shoots/branches that often grow as a response to stress factors upon a tree or branch removal.</td>
</tr>
<tr>
<td>Excipient</td>
<td>In trees, a system of branching that a single leader remains dominant, through the control of lateral branches.</td>
</tr>
<tr>
<td>Failure</td>
<td>In connection with tree hazards, a partial or total fracture within the wood tissue or loss of cohesion between roots and soil.</td>
</tr>
<tr>
<td>Feeder Roots</td>
<td>Fine fibrous water and nutrient absorbing roots located in the outer root system.</td>
</tr>
<tr>
<td>Flush Cut</td>
<td>In trees and shrubs, a pruning cut close to the parent stem, which removes the branch bark ridge.</td>
</tr>
<tr>
<td>Foliage</td>
<td>The live leaves or needles of the tree; the plant part primarily responsible for photosynthesis.</td>
</tr>
<tr>
<td>Formative pruning</td>
<td>The trimming of a tree to remove weaknesses and irregularities which may lead to problems. The formative pruning operation is aimed at reducing the potential for future weaknesses or problems within the tree's crown.</td>
</tr>
<tr>
<td>Gall</td>
<td>An abnormal, disorganized growth of plant tissues, caused by parasitic or infectious organisms such as insects, fungi, bacteria, or viruses.</td>
</tr>
<tr>
<td>Girdling</td>
<td>In woody plants, any form of damage that destroys the bark and / or the Cambium all the way around the stem, branch or root, normally resulting in death of the damaged section.</td>
</tr>
<tr>
<td>Girdling Root</td>
<td>In woody plants, a root that grows across the buttress, or across other roots, eventually causing constriction of the radial growth.</td>
</tr>
<tr>
<td>Growth Increment</td>
<td>The incremental growth added as new annual ring develops each season over existing wood. This is seen as (growth) rings in cross-sections of wood.</td>
</tr>
<tr>
<td>Hazard beam</td>
<td>An upwardly curved branch in which strong internal stresses may occur without the compensatory formation of extra wood (longitudinal splitting may occur in some cases).</td>
</tr>
<tr>
<td>Heartwood</td>
<td>Inner non-functioning tissues that provide structural support to trunk.</td>
</tr>
<tr>
<td>Heave</td>
<td>In relation to shrinking clay soils, expansion due to rewetting of a volume of soil previously subjected to the removal or water by plant / trees following felling or root severance. Also in relation to root growth, the lifting of pavements and other structures by radial expansion. Also in relation to tree stability, the lifting of one side of a wind-rotted root plate.</td>
</tr>
<tr>
<td>Herbicide</td>
<td>A chemical compound that causes the death of a plant.</td>
</tr>
<tr>
<td>Included Bark</td>
<td>Bark that becomes embedded in a crotch between branch and trunk or between co-dominant stems, usually found in narrow or tight crotches, and causes a weak structure.</td>
</tr>
<tr>
<td>Increment Borer</td>
<td>A tool that cuts and extracts a narrow cylinder of wood from a tree for analysis of the wood tissue and growth increments.</td>
</tr>
<tr>
<td>Leader</td>
<td>The primary terminal shoot or trunk of a tree.</td>
</tr>
<tr>
<td>Limb</td>
<td>A large lateral branch growing from the main trunk or from another larger branch.</td>
</tr>
<tr>
<td>Lion Tailing</td>
<td>Often the result of poor pruning practices; the main leader or branches are largely devoid of side branches, growth is restricted to the end of branches and is likely to suffer damage through end loading.</td>
</tr>
<tr>
<td>Lopping</td>
<td>In trees, a general term that related to the removal of branches from a tree.</td>
</tr>
<tr>
<td>Monitoring</td>
<td>Due to the relative life span of trees in relation to our own, long-term monitoring provides a valuable insight to the health of trees, identifying decline and or stabilisation and or improvement.</td>
</tr>
<tr>
<td>Mulch</td>
<td>A material laid over the root system of a tree to help conserve moisture within the soil. Additionally it may help control the development of weeds close to the tree.</td>
</tr>
<tr>
<td>Mycelium</td>
<td>A mass of growing filaments (hyphae) formed by fungi.</td>
</tr>
<tr>
<td>Mycorrhiza</td>
<td>The symbiotic relationship between roots and certain beneficial fungi. Mycorrhiza are the combined root / fungal growth.</td>
</tr>
<tr>
<td>Natural Pruning</td>
<td>The shedding of a branch or twig that has died back naturally and has become decayed at or near its base.</td>
</tr>
<tr>
<td>Necrosis</td>
<td>The failure and subsequent death of a branch, leader or tree.</td>
</tr>
<tr>
<td>Negligence</td>
<td>A failure to take reasonable action to deal with a hazard to prevent damage to property or person.</td>
</tr>
<tr>
<td>Nutrient</td>
<td>Substances that are absorbed by living organisms for the maintenance of internal processes.</td>
</tr>
<tr>
<td>Occluding tissue</td>
<td>The general term of wood, cambium and bark that develop around the site of a wound on a woody plant.</td>
</tr>
<tr>
<td>Pathogen</td>
<td>A disease agent that causes diseases within another organism.</td>
</tr>
<tr>
<td>Phloem</td>
<td>The principle conductive tissue that the products of Photosynthesis are transported around the plant.</td>
</tr>
<tr>
<td>Photosynthesis</td>
<td>The process were light energy is used to create energy (Carbohydrate) for use within the plant.</td>
</tr>
<tr>
<td>Pollard</td>
<td>A term for a pollarded tree.</td>
</tr>
<tr>
<td>Pollard head</td>
<td>The swollen section of branch / stem that forms behind the pollarding cut.</td>
</tr>
<tr>
<td>Pollarding</td>
<td>The shedding of a branch or twig that has died back naturally and has become decayed at or near its base.</td>
</tr>
<tr>
<td>Prune or Pruning</td>
<td>Selective removal of woody plant parts of any size, using saws, Loppers, Secateurs, or other pruning tools.</td>
</tr>
<tr>
<td>Reaction Wood</td>
<td>Wood with distinctive anatomical characteristics, formed in parts of leaning or crooked stems and in branches to provide additional strength / support. In hardwoods, tension wood usually forms. In conifers, compression wood is usually found.</td>
</tr>
<tr>
<td>Reaction Zone</td>
<td>A zone normally darker than surrounding wood that denoted the boundary often a defensive one between functional sapwood and dysfunctional or decaying wood.</td>
</tr>
<tr>
<td>Re-grading</td>
<td>The raising or lowering of a soil profile from its original grade.</td>
</tr>
<tr>
<td>Rejuvenation pruning</td>
<td>Where historically or environmentally important trees are to be retained, their life spans can be significantly extended through the adoption of particular pruning regimes.</td>
</tr>
<tr>
<td>Rejuvenation root treatment</td>
<td>Management of the root zone can have a significant positive effect upon the health of trees. Physical, mechanical and biological approaches are available and can be prescribed in accordance within the constraints of individual sites.</td>
</tr>
<tr>
<td>Remedial pruning</td>
<td>The removal of old stubs, deadwood, epicormic growth, rubbing or crossing branches and other unwanted items from the tree's crown.</td>
</tr>
<tr>
<td>Resistograph</td>
<td>In tree body language, a long narrow, axial protuberance which often over lays a crack.</td>
</tr>
<tr>
<td>Ring Barking</td>
<td>Artificial Girdling of the stem, to result in the death of a tree. May be used in habitat creation were the retention of dead standing trees is required.</td>
</tr>
<tr>
<td>Rod Bracing / Bolting</td>
<td>Traditionally, this has relied upon the installation of steel rods or bolts through the stems or limbs, to reduce twisting or splitting of the wood. The installation of such features does require legal interpretation.</td>
</tr>
<tr>
<td>Root Barriers</td>
<td>Both Buildings and services can benefit from the installation of root barriers to protect a soil volume from the ingress of roots.</td>
</tr>
<tr>
<td>Root Collar</td>
<td>The basal area of the tree; transition zone from trunk to root. Also sometimes called trunk flare.</td>
</tr>
<tr>
<td>Root Plate</td>
<td>The primary support area for the tree; an area of the root system close to the base that structurally anchors the tree to the soil.</td>
</tr>
</tbody>
</table>
Root Rot
Either a general term for decay within the wood of the lower stem / buttress roots, or a disease in which the fine roots are killed.

Root System
The portion of the tree containing the root organs, including buttress roots, transport roots, and fine absorbing roots; all underground parts of the tree.

Root Zone
The area and volume of soil around the tree in which roots are expected. May extend to three or more times the branch spread of the tree, or several times the height of the tree.

Soil Area
That area or the tree subjected to wind load.

Sanitation
In plant disease control, the removal of material that could a source of infection by a pathogen. Removal of diseased plant parts, such as fallen leaves and twigs, and pruning of dead and diseased branches. Diseased parts should be burned or buried under soil or active compost.

Sapwood
Xylem wood tissue, usually light in colour, representing the outer growth rings of the wood. Usually living, reactive wood tissue, in a healthy tree. See heartwood

Scaffold Limbs / Scaffold Branches
The branches that from the main network framework of the crown of a tree.

Senescence
A decline in growth and vigour due to age or stress factors.

Shrub
A woody plant that branches at or close to the ground level and so does not have a single stem.

Slime Flux
Relating to a toxic condition from the spreading of bacteria or their products from a source of infection; characterized by malodorous gases, or salt deposits upon the bark. If these products enter the sap stream, localised vessel necrosis can result, usually associated with anaerobic conditions.

Soft Rot
A kind of wood decay, were a fungi degrades cellulose within the cell wall, without causing overall degradation.

Soil Compaction
The compression of soil, causing a reduction of pore space and an increase in the density of the soil. Air is squeezed out and nutrients become locked. Tree roots cannot grow in compacted soil.

Soil Profile
The characteristics of a soil as regards to relative depth; the changes in soil texture and composition that occur with depth.

Soil Texture
The classification of the constituent particles of soil; includes sand, silt and clay particles. Directly related to soil porosity, permeability, and aeration.

Sonic Decay Detection
Non invasive method whereby sound waves are passed through the tree and the speed is measured. Slow speeds indicate decay and a tomography picture representing the inner stem is produced.

Stag Headings
In a tree, a state of dieback were dead branches protrude beyond the current living crown.

Stress
In plant physiology, conditions were one or more physiological functions are not working within normal parameters.

Stump Grinding
The removal of a tree stump using a specialist grinding machine.

Subsidence
In relation to vegetation, the removal of water by plant growth resulting in localised shrinkage in the soil volume.

Sucker
Same as sprout.

Suppressed
Trees which are dominated by surrounding vegetation and whose crown development is restricted from above.

Systemic
Affecting the whole plant or organism. A systemic compound is carried throughout the entire plant to all parts through the vascular system.

Target
Any person or object within reach of a falling tree or part of a tree that may be injured or damaged.

Target Pruning
The pruning of a branch were the wound affects only branch material, often result in a target shaped wound.

Tension Wood
Reaction wood typically formed on the upper side of limbs or curved stems; characterized by lack of cell wall lignifications (higher ratios of cellulose to lignin).

Tight Union / Tight Crotch
Also, narrow crotch. A crotch with a narrow angle between branches, often having included bark.

Tomography
The comparison of sound or stress waves through the tree allows the creation of a 2D or 3D representation of the internal structure of a stem or branch section and highlights areas of damage. Virtually non-injurious.

Topography
The configuration of surface features, including the vertical and horizontal relationships of the ground and other features.

Topping
Cutting large limbs back severely, without regard to form or habit of the tree. Cuts are usually made between later nodes. This practice is extremely injurious to trees, and promotes decay and structural weakness within the crown.

Tree
A woody plant that typically has a single stem, at maturity has a height of at least 4 metres and a stem diameter at breast height of at least 5cm.

Tree Preservation Order
In Great Britain, an order made by the local planning authority, were consent must be gained before undertaking all but exempt works to a tree.

Trunk Flare
The basal area of the trunk that flares or widens, and merges with the main roots. See root collar.

Veteran Tree
Veteran trees are often found in large parks or estates and commonly affected by extensive decay or have been subject to extensive works. These trees are retained for historical importance and often pose greater risk than normal, which is generally justified. They need careful management and often propping or bracing to support them, some require fencing to limit access.

Vigour
Active, healthy growth of plants; ability to respond to stress factors.

Visual Tree Assessment (VTA)
An assessment of the mechanical condition of trees based upon their ‘body language’. Trees are dynamic and respond to faults / decay / environmental factors in various ways, these responses can be indicative of structural integrity.

Wetwood
An infection caused by bacteria living inside the plant tissues. The bacteria ferment the plant fluids, resulting in death of nearby cells, and often causing exudations of fluid from the bark, often referred to as a slime flux.

White Rot
A kind if wood decay were a fungi attacks the lignin within the wood matrix

Wind loading
Forces placed upon tree canopy, branches, trunk and roots of a tree under windy conditions.

Wind Throw
The failure of a tree due to wind loading.

Witches Broom
A deformed or unusual growth of twigs from adventitious buds, caused by insects, disease, or dieback of twigs and buds.

Wood
Secondary Xylem; the main structural support and water conducting tissue of trees and shrubs.

Wound Response Tissue
Also Occluding Tissue, Wound Wood or Callus. Differentiated wood tissue that grows around the margins of a wound or injury.

Wound Wood
Plant tissue with special function of translocation of water and dissolved nutrients.
Appendix 3: Survey Methodology

A2.1 Ground level visual surveys are carried out using the Visual Tree Assessment technique described by Mattheck and Broeler (1994) and endorsed by the Arboricultural Association (LANTRA Professional Tree Inspection course, 2007).

A2.2 Structural condition is assessed by inspecting the stem and scaffold branches from all angles looking for weak branch junctions or symptoms of decay. Particular attention is paid to the stem-base. Cavities are explored using a metal probe in order to assess the extent of any decay. If this is not possible further inspection is recommended in the form of a climbed inspection or using specialist decay detection equipment.

A2.3 The physiological condition is assessed by inspecting the stem, branches and foliage for symptoms of disease. The overall vigour of the tree is also taken into account.

A2.4 Where significant defects are observed, recommendations are made according to a scale of priority in order to reduce the likelihood of structural failure. The position of the tree and its potential targets are taken into account.

A2.5 Measurements are obtained using a diameter tape, clinometer, distometer and loggers tape. Where this is not practical measurements are estimated.

A2.6 Some trees are surveyed as groups, though this is usually avoided close to areas likely to be developed.

A2.7 Finally, a Retention Category is allocated as described in Appendix 1.1.1.

Appendix 4: Author’s Qualifications

Qualifications & Experience of Ivan Button N.C.H. (Arb), FDSc (Arb), BSc (Hons), P.G.C.E., M. Arbor. A.

Construction

Between 1983 and 1995 Ivan worked primarily within the construction industry and received training in a broad range of practical building skills and general construction principles. During this time he obtained a BSc (Hons) at Leeds University followed by a P.G.C.E at The University of Wales.

Arboriculture

He obtained a NCH (Arboriculture) at the University of Lincoln and became a member of the Arboricultural Association. He then worked for an Arboricultural Consultancy for one year before establishing a tree surgery and landscaping business in 1998. In 2005 Ivan commenced full time employment with a leading Arboricultural Association approved consultancy and soon adopted a senior role responsible for five consultants.

He obtained a FDsc in arboriculture at the University of Lancashire, which he passed with distinction and is now a Director and Principal Consultant of Crown Consultants Ltd. He is accredited as a LANTRA Professional Tree Inspector. A qualification produced in association with the Arboricultural Association and generally recognised as appropriate for all levels of tree inspection.

He is a member of the Consulting Arborist Society and is listed within their areas of professional expertise for QTRA and as an expert witness.

Ivan is a professional member of the Arboricultural Association and the International Society of Arboriculture.

He is a licensed Quantified Tree Risk Assessment user.

Ivan has undertaken professional expert witness training and has been registered as a Sweet and Maxwell Checked Expert Witness since 2008.

Throughout 2009 acted as the principal Tree Officer for Barnsley Metropolitan Borough Council.

Ivan has produced several hundred Arboricultural Reports for the purposes of Development, Safety, Management, Mortgage, Subsidence, Mitigation and Litigation.
Appendix 5: Further Information

Building Near Trees – General


NHBC Standards Chapter 4.2., Trees and Buildings.

Horticulture LINK project 212. (University of Cambridge, 2004), Controlling Water Use of Trees to Alleviate Subsidence Risk.

Tree Planting and aftercare

See www.trees.org.uk/leaflets.php# for downloadable leaflets on selecting a garden tree, planting, aftercare and veteran tree management.

British Standards


Permission to do Works to Protected Trees / Tree Law


Communities and Local Government website with numerous downloadable documents from:

http://www.communities.gov.uk/planningandbuilding/planning/treeshighhedges/

Lighting Levels


P. J. Littlefair, Measuring Daylight, BRE Information Paper 23/93 f3.50. (Advises on measuring daylight under the real sky or an artificial sky, allowing for the changing nature of sky light).

High Hedges

Communities and Local Government website with numerous downloadable documents from:

http://www.communities.gov.uk/planningandbuilding/planning/treeshighhedges/

Tree Specific Websites

www.crowntrees.co.uk Crown Consultants site containing useful information

www.trees.org.uk Arboricultural Association

www.rfs.co.uk Royal Forestry Society of England, Wales and N. Ireland

www.treehelp.info The Tree Advice Trust

www.woodland-trust.org.uk The Woodland Trust

www.treecouncil.org.uk The Tree Council
Appendix 6: Tree Data Schedule and Site Plan(s)

The Tree Data Schedule and all plans accompanying this report follow this page. They are also provided as separate documents for ease of printing and referring between when viewing on a screen.