Arboricultural Report
& Method Statement

For planning purposes at

16 Daleham Gardens
London
NW3 5DA

Dated
1st August 2011

CROWN Consultants

Tree consultants throughout England and Wales

Contents

1. Introduction

1.1. Instruction

1.1.1. We are instructed by Marcel Rahm of Milk:studio architects to undertake an Arboricultural Survey at 16 Daleham Gardens and produce our findings in a report. We are also instructed to 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: 2005 - Trees in Relation to Construction.*

1.2.2. Where applicable, the Method Statement addresses the following:

- Necessary tree works and tree removal.
- Tree protection fencing - specification and location.
- Special ground protection measures.
- Demolition.
- Changes to ground levels and surfaces.
- Excavation for foundations, services or driveways.
- Ground compaction and use of heavy plant.
- Storage of materials, siting of cabins and facilities.
- Use of materials hazardous to tree health.
- Boundary treatments.

1.3. References

1.3.1. We have liaised with Mr Rahm throughout the writing of this report in order to attain an adequate understanding of the project to enable us to specify workable tree protection measures.

1.4. Drawings

1.4.1. The tree locations shown on the plans 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 as a circle around each tree with a radius equal to 12 times the stem diameter.

1.4.3. The **Tree Removal Plan** indicates the tree constraints with the proposals overlaid. Trees to be removed prior to commencement of the proposal are notated.

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 5.

2. Site Overview

2.1. Location

2.1.1. The site lies within a moderately populated residential area. The co-ordinates are, 51°32'55.05"N 0°10'25.91"W the OS reference is: TQ 2671884884 and the altitude is 73m above sea level.

2.1.2. Our survey was limited to trees within the front and rear gardens along with those trees in adjacent gardens which are relatively close to the boundary.

2.2. Site Description

2.2.1. The site comprises a detached house and rear garden. A garage is situated towards the front / south side of the property. Vehicular access exists from the adjacent road known as Daleham Gardens.

2.2.2. The only significant vegetation within the front garden is an espalier lime hedge. Behind this is a plum tree, a lilac and large shrubs (buddleja and camelia). The retention of the lime hedge is considered to be desirable as it is a characteristic of the neighbourhood.

2.3. Proposals Overview

2.3.1. It is proposed to install a basement beneath the existing house and to extend this into the rear garden. The ground levels within part of the rear garden will be lowered. Two walk-on rooflights shall be excavated within the front garden to serve the basement.

2.3.2. The garage shall be demolished and the existing building extended into the area immediately behind the existing garage. These proposals are indicated on the plans in Appendix 6.

3. Tree Data Schedule

3.1. Survey Details

3.1.1. The Tree Data Schedule following this page contains information gathered for each tree during a ground level survey undertaken on 26th July 2011 during clear, dry weather conditions. 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 were obtained using diameter tapes, loggers tapes, distometers and clinometers. Where obstacles prevented accurate measurement, dimensions were estimated. Trees on privately owned third party land (T4 and a small topped lime tree) were 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. Scaled Images

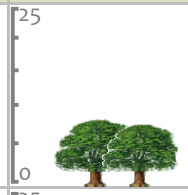
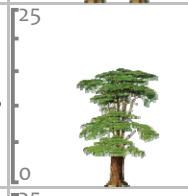
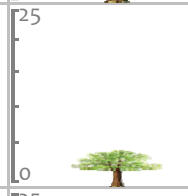
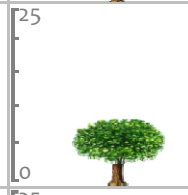
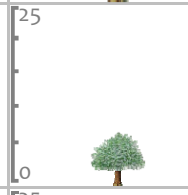
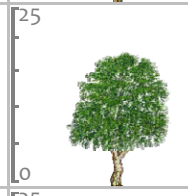
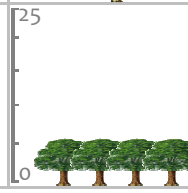
3.2.1. The Schedule includes scaled tree images based on measurements recorded for stem diameter, crown spread, crown height and overall height. Their purpose is to indicate, at a glance, the relative dimensions of each tree.

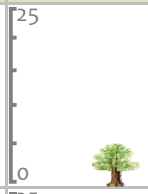
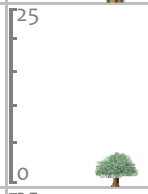
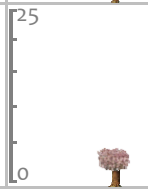
3.3. Tree Removal to Facilitate the Development

3.3.1. All observations and recommendations were made independently of development proposals. Where trees are subsequently recommended for removal to facilitate the development the corresponding reference number is highlighted in grey.

3.4. Supporting Information

3.4.1. 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.

Reference (G = Group, H = Hedge)	Age & Species	Height (m)	Crown Ht (m)	Diameter (cm)	Crown Spread (m) N / W / E / S	Scaled Tree Diagram (m)	Notes	Recommendations: Priority	Recommendations: Inspect Freq (yrs)	Vigour: Physiological Condition / Structural Condition	Amenity Value: Life Expectancy (yrs) / Retention Category
G1	Early-Mature **Lime** Tilia sp.	av 7.5	av 2.5	av 35	av 4.5 / 1 4 each		Position: Adjacent south boundary, overhanging the boundary. Form: Single and twin-stemmed, vertical with poorly formed crowns. History: Previously topped at 3m, multiple pruning wounds. **Defects: Ivy on one stem.** Other: Remnants of espalier hedge.	Crown clean & monitor. Moderate	1	Moderate Fair Poor	Low 10-20 C -
T2	Semi-Mature **Scots Pine** Pinus sylvestris.	16	4	av 39	3 3.5 / 2.5 3		Position: Adjacent south boundary, overhanging the boundary. Form: Single stemmed and vertical with a balanced crown. History: No evidence of significant pruning. **Defects: No significant defects.**	No action required. n/a	3	High Good Fair	Moderate 40+ B
T3	Semi-Mature **Lilac** Syringa vulgaris.	3	1.5	20 @ Base	3 4 / 3 2		Position: Adjacent south boundary. Form: Multiple stemmed. History: Occasional pruning wounds due to crown lifting. **Defects: No significant defects observed.**	No action required. n/a	1	Low Poor Poor	Low <10 C -
T4	Early-Mature **Elder** Sambucus nigra.	8	3	30 @ Base	5 2 / 4 3		Position: Situated on third party land, overhanging the boundary. Form: Twin-stemmed at ground level with a balanced crown. History: Occasional pruning wounds due to crown lifting (healing slowly). **Defects: Minor deadwood to lower crown.**	No action required. n/a	1.5	Moderate Fair Poor	Moderate <10 C
T5	Young **Pear** Pyrus sp.	6	2	av 11	2 1 / 2 2		Position: In rear garden. Form: Single stemmed and vertical with a narrow upright habit. Co-dominant stem at 1.5m. History: No evidence of significant pruning. **Defects: No significant defects.**	No action required. n/a	3	High Good Fair	Low 10-20 C
T6	Mature **Silver Birch** Betula pendula.	18	5	av 36	4.5 4 / 4 4		Position: Adjacent north boundary, overhanging the boundary. Form: Single stemmed with a slight lean and a well-formed crown. History: No evidence of significant pruning. **Defects: No significant defects.**	No action required. n/a	3	High Good Good	Moderate 20-40 B +
H7	Semi-Mature **Lime** Tilia sp.	5	1.5	av 19	2 2 / 2 2		Position: Adjacent front boundary. Form: Espalier hedge. History: Regularly maintained until recently. **Defects: No significant defects.**	Maintain as a hedge ht 4m. Moderate	3	High Good Good	Moderate 40+ B

Reference (G = Group, H = Hedge)	Age & Species	Height (m)	Crown Ht (m)	Diameter (cm)	Crown Spread (m) W / N / E / S	Scaled Tree Diagram (m)	Notes	Recommendations: Priority	Recommendations: Inspect Freq (yrs)	Vigour: Physiological Condition / Structural Condition	Amenity Value: Life Expectancy (yrs) / Retention Category
T8	Early-Mature **Lilac** Syringa vulgaris.	4	2	25 @ Base	W 0 / N 2 / E 4 / S 0		Position: Adjacent front boundary. Form: Twin-stemmed at 0.5m with a very unbalanced crown. History: One leader is dead. **Defects: Very poor specimen.**	Remove to open up the garden. Low	N/A	Low Poor Poor	Low <10 C -
T9	Young **Plum** Prunus domestica.	3	1	9 @ Base	W 3 / N 1 / E 0 / S 1		Position: Situated within the front garden. Form: Multi-stemmed at 1.5m with an unbalanced crown. History: No evidence of significant pruning. **Defects: No significant defects.**	No action required. n/a	3	Moderate Good Fair	Low 20-40 C
T10	Semi-Mature **Cherry** Prunus sp.	4	2	18 @ Base	W 1.5 / N 1 / E 2.5 / S 2		Position: Situated within the rear garden. Form: Multi-stemmed at 0.5m with a poorly formed crown. History: Previously topped at 2m. **Defects: No significant defects.** Other: Poor specimen.	No action required. n/a	3	**Very Low** Poor Poor	Low <10 C -

4. Vegetation Overview

This section summarises the recommendations within the Tree Data Schedule and explains the protection status of the trees. It does not specify works that may be required to facilitate the development proposals.

4.1. Tree Condition and Recommendations

4.1.1. T8 is a lilac bush with poor form. It is suppressed by the adjacent lime hedge and is growing over a sizeable portion of the front garden making the garden relatively inaccessible. It is recommended that this shrub is removed in order to open up the front garden. This shall also enable light to reach the light wells which will serve the proposed basement.

4.1.2. If G1 were to be retained they would benefit from crown cleaning to remove deadwood and defective branches.

4.1.3. The espalier lime hedge at the front of the property (H7) has not been trimmed for several months. This should be reduced to a height of 4m and regularly maintained at this size.

4.1.4. 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:

Work Priority	Definition	Tree Number
Urgent	As soon as possible	None
Very High	Within 1 Month	None
High	Within 3 Months	None
Moderate	Within 1 year	G1, H7
Low	Within 3 years	T8

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

Inspection Frequency (years)	Tree Number
0.5	None
1	G1, T3
1.5	T4
3	T2, T5, T6, H7, T9, T10

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 5th January 2011, we were informed, by Rebecca Kelly - Customer Services of London Borough of Camden that:

- The site is within Fitzjohn Netherhall Conservation Area.
- There are no Tree Preservation Orders affecting trees within the site.

4.4. Tree Protection – General Notes

4.4.1. Heavy fines exist for carrying out unauthorised works to protected trees so we advise that further checks are made in case new Orders have been created since January 2011.

4.4.2. Before undertaking works to trees protected by a Tree Preservation Order, consent needs to be obtained from the local authority which will provide application forms and advice to potential applicants. The removal of dead wood is exempt.

4.4.3. Where the works are proposed for reasons of safety or ill health, a report from a suitably qualified arborist will usually be required. Trees that are dead, dangerous or dying are technically exempt from protection, though it would be prudent to give the local authority 5 days notice of intention and take photographs before undertaking works without prior consent being granted. Fines of up to £20 000 per tree exist for unauthorised works to protected trees.

4.4.4. 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.

4.4.5. 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.

5. Method Statement

5.1. Status

5.1.1. Tree protection measures specified within this report have been agreed with our client. They should also be agreed with the local authority so that they may be conditioned upon planning consent. If necessary this Method Statement should be updated to reflect the agreed protection measures.

5.1.2. The site manager must be familiar with all aspects of the Method Statement and shall liaise with the appointed arborist (See Section 6.2) to clarify any issues within, or regarding any unforeseen issues where trees may be impacted upon.

5.1.3. 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.

5.2. Definition of Terms

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

5.2.2. **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 in Appendix 6.

5.2.3. **Construction Exclusion Zone (CEZ).** These zones are created to protect roots and canopies form inadvertent damage by construction activity – see 5.10. They are usually fenced off by protective fencing throughout the entire construction phase. No works are permitted in these zones other than minor landscaping works (such as removal of hard surfaces and replacement with soft landscaping). 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 marked on the Tree Protection Plan.

5.2.4. **Restricted Activity Zone (RAZ).** It is not always practicable 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.

5.3. Timing of Operations

5.3.1. Activity within the site shall be phased according to the following schedule:

- **Phase 1.** Undertake all specified tree works, including tree removal.
- **Phase 2.** Install the tree protection fencing and ground protection measures.
- **Phase 3.** Demolition and construction phase.
- **Phase 4.** Remove protective fencing and ground protection measures. Undertake landscaping operations including tree planting.

Pre-Construction Phase

5.4. Tree Works

5.4.1. The following table specifies the tree works which will be required prior to the erection of protective fencing:

Tree Reference	Action Required	Notes
G1, T6, T8, T9, T10 and shrubs marked with a red cross on the Tree Removal Plan in Appendix 6	Fell to ground level.	Stumps of trees within the RPAs of retained trees shall be removed with a stump grinder NOT a mechanical excavator.
H7	Reduce to 4m and trim laterally.	

5.4.2. **Note:** Woodchip may be left on site to facilitate the ground protection measures specified in Section 5.8. The local authority tree officer shall be informed of the intended date of works and invited to inspect the works following completion.

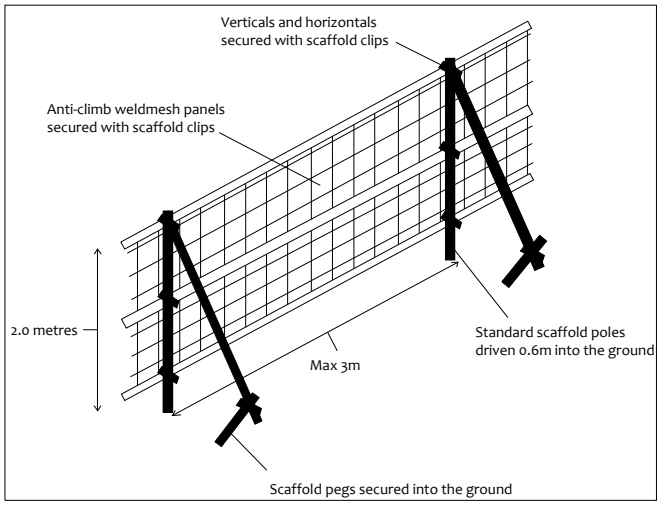
5.4.3. Additional works are also be specified in Section 3 in order to maintain the tree population in an acceptable condition.

5.5. Tree Protection Fencing

5.5.1. Fencing needs to be installed according to the positions indicated on the Tree Protection Plan (TPP) within Appendix 6. A sturdy *In-Ground System, or Back-Stay System,* shall be installed where indicated by a solid purple line. Both systems are specified below:

5.5.2. The In-Ground System

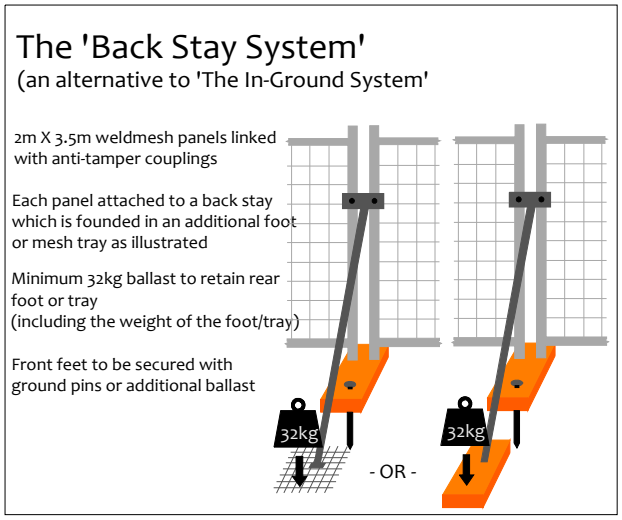
5.5.3. This system involves driving scaffold poles into the ground, onto which are affixed horizontal scaffold poles and diagonal bracing struts. Anti-climb weldmesh panels are secured to this scaffold framework using standard scaffold clips. The system is illustrated in the diagram to the right and is based on BS 5837 guidelines. This kind of system is robust enough to withstand occasional knocks by plant machinery.



5.5.4. The Back-Stay System

5.5.5. This system is robust and may be installed as an alternative to the In-Ground System. It is also more practical over hard surfaces.

5.5.6. Within this system, each anti-climb panel (minimum height 2m) is attached to a diagonal back stay connected to an additional foot or tray with additional ballast. The total weight of the foot/tray plus ballast should total not less than 32kg.



5.5.7. The panel should be secured in the edge holes of the front foot and one foot per two panels should be further secured using ground pins. This system will withstand occasional knocks by machinery and is not easily relocated.

5.6. Site Cabins

5.6.1. Site cabins may be installed within the Construction Exclusion Zones, and/or Restricted Zones so long as no excavation is required for foundations or services. The cabins may effectively replace a section of protective fencing.

5.6.2. The location and method of installation must be agreed with the local authority before cabins are installed in these areas.

5.7. Limitations on Construction Activity

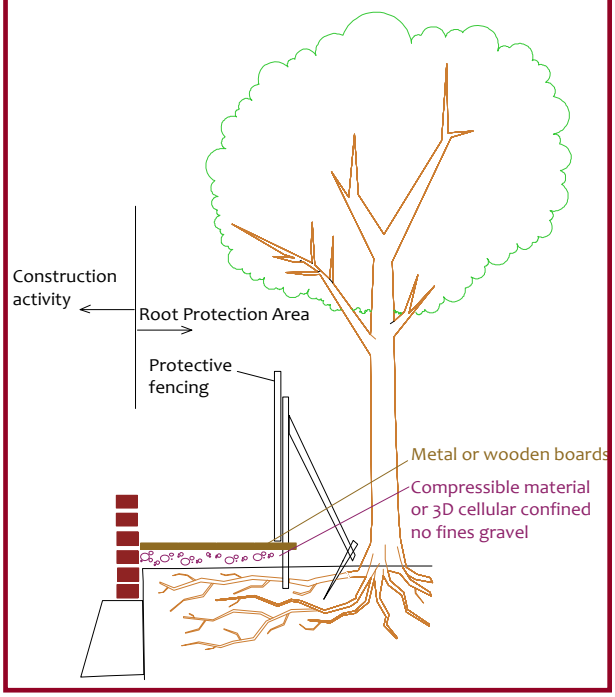
5.7.1. The Tree Protection Plan indicates zones where all construction activity shall be forbidden (areas shaded purple). Around these areas, notices will be attached to the fencing displaying the words *"Construction Exclusion Zone"* and listing forbidden activities (see Section 5.10).

5.7.2. Also indicated are *Restricted Activity Zones* where limitations apply to construction activity as detailed in Sections 5.11 and 5.12

5.8. Ground Protection Measures

5.8.1. Within Restricted Zone A (shaded orange on the Tree Protection Plan), ground protection measures shall need to be installed over any soft landscaping. 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 or works are proposed.

Ground protection where Root Protection Areas are outside the Construction Exclusion Zone



5.8.2. In these areas a 3D cellular confinement system shall be installed and filled with 7 – 40mm angular gravel. (see Section 5.13). Alternatively, 100mm of a compressible material (e.g. woodchip) shall be evenly distributed. 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.

5.8.3. Existing hard surfacing may be retained or removed and replaced with the ground protection measures.

5.8.4. These ground protection measures shall be timetabled 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.

5.9. Pre-Commencement Inspection

5.9.1. Once the above works are completed, the *appointed arborist* (see Section 6.2) shall be invited to inspect the tree protection measures and tree works.

5.9.2. No work shall commence until the protection measures satisfy the specifications within this report. The local authority shall be informed that this is the case according to the *Inspection and Reporting Schedule* within Section 6.

Construction Phase

5.10. Construction Exclusion Zones

5.10.1. The fenced off areas (and any other areas shaded purple on the Tree Protection Plan) shall be treated as *Construction Exclusion Zones* and the following restrictions shall apply:

- No construction activity whatsoever must occur within these areas.
- No tree works, other than those specified in this report.
- No alterations of ground levels or conditions.
- No chemicals or cement washings permitted.
- No excavation.
- No temporary structures.
- No storage of soil, rubble or other materials.
- No vehicles or machinery to be used or parked.
- No fixtures (lighting, signs etc) to be attached to trees.
- No fires within 10 metres of the canopies of any tree or hedge.

5.10.2. 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.

5.11. Restricted Activity Zone A

5.11.1. Within this zone (areas shaded orange on the Tree Protection Plan) pedestrian and vehicular access will be required to facilitate construction. The following restrictions shall apply:

- No building works shall be permitted.
- Ground protection measures shall be installed as specified in Section 5.8. And shall remain in place throughout the entire construction phase.
- Finished ground levels shall be as existing.
- Storage of materials shall be limited to that which is required for the task in hand. Heavy materials that require storage for more than two days shall be stored outside the Restricted Zone.
- No spoil shall be stored.
- No fires shall be permitted.
- All hazardous materials (including non-essential cement products) shall be forbidden.
- No machinery in excess of 4m tall shall pass through or operate in this zone without being carefully marshalled beneath trees.
- If a permanent driveway is to be installed, it shall be installed using the Minimum Dig technique outlined in Section 5.13.

5.12. Restricted Activity Zone B

5.12.1. Within this zone (see Tree Protection Plan) it is proposed to excavate the corner of the basement. The following restrictions shall apply:

- Excavation shall be undertaken using hand tools.
- Roots in excess of 25mm which are located close to the edge of the trench are to be retained intact if possible.
- Roots in excess of 10mm which cannot be retained shall be pruned using sharp secateurs or a saw.

5.13. Minimum-Dig Driveway Installation

5.13.1. This section details the Minimum-Dig Method which will be adopted if installing a new driveway within Restricted Zone A.

5.13.2. Ground Preparation.

5.13.3. All excavation shall take place using hand tools. Soil shall be removed to a maximum depth of 200mm. Roots in excess of 25mm shall be retained where possible. Roots in excess of 10mm which cannot be retained shall be pruned with sharp secateurs.

5.13.4. **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.

5.13.5. 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.

5.13.6. **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.

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

5.13.8. **1) Rigid Cellular System** - A 3 dimensional cellular confinement system shall then be installed with a minimum depth of 40mm. This may be filled with 7-14mm angular gravel. Example systems are illustrated below:

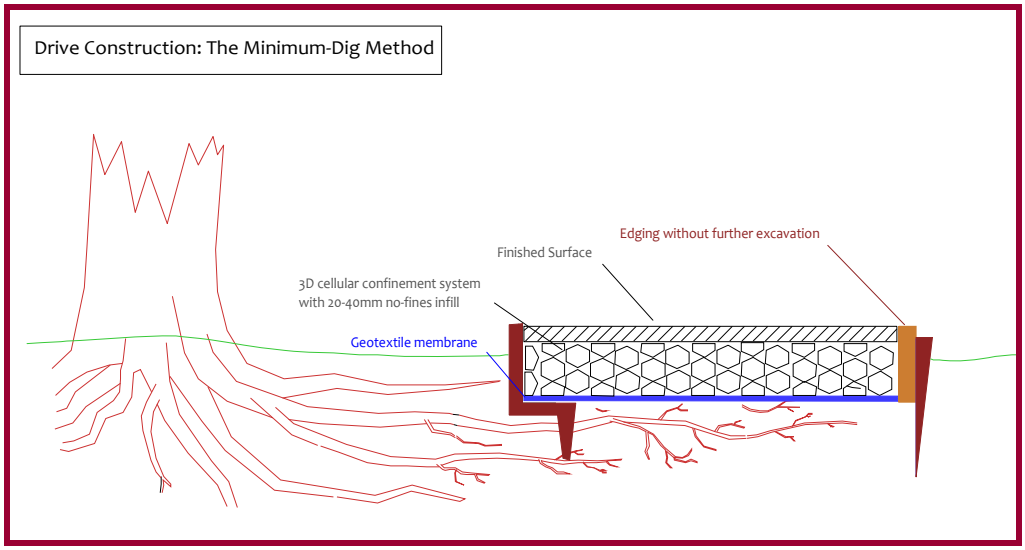
5.13.9. The entire cellular system shall be laid first and may be pinned in place using ground pins. This shall be followed by the infill, working from one end such that heavy machinery does not pass over any Root Protection Areas until the in-fill is installed.

5.13.10. **2) Flexible Cellular System** – see illustration below. This will be filled with a 20-40mm (no fines) angular in-fill.

5.13.11. 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.

5.13.12. 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.

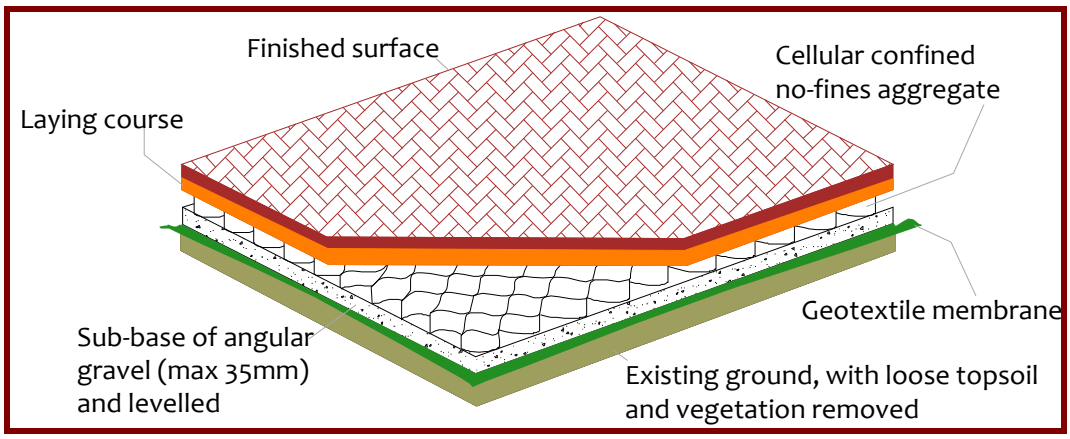
5.13.13. Up to 50mmmm of 2 - 6mm clean hard grit (no fines) angular granular fill may be overlaid as a laying course.



5.13.14. **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.
- **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

5.13.15. **Drainage.** No drains or gullies shall be excavated to the side of the drive where it passes over Root Protection Areas.

5.14. Demolition

5.14.1. The following restrictions shall apply during the demolition of the existing structures:

- Demolition shall not commence until the protective fencing and ground protection measures are installed to the satisfaction of the appointed arborist and the local authority.
- No significant masonry or timber shall be permitted to fall outside of buildings towards adjacent trees.

5.15. Underground Services

5.15.1. No services shall pass through the Restricted Activity Zone or the Construction Exclusion Zone.

5.16. Canopy Protection

5.16.1. 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. This includes the use of piling rigs.
- 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 are to be carefully marshalled in order to ensure that branches are not accidentally damaged.

5.17. Boundary Treatments / Permanent Fencing

5.17.1. If fencing is to be installed within Root Protection Areas, the following restrictions shall apply:

- All post holes shall be excavated by hand and kept as narrow as possible (maximum diameter 300mm).
- Exploratory post holes shall be dug before committing to post / panel positions. If any roots in excess of 25mm are encountered they are to remain intact and the post hole shall be relocated slightly. The fencing system must permit such flexibility (i.e. where fixed panel widths are used, all post holes must be excavated before committing to the final location)
- Any roots in excess of 10mm which are severed shall be neatly pruned back with secateurs. This will encourage healing and reduce the likelihood of infection.

5.17.2. Walls shall be avoided over Root Protection Areas unless their foundations may be spanned over roots using a beam system.

5.17.3. Hedges may be planted within Root Protection Areas using hand tools to minimise excavation.

5.18. Use of Heavy Plant

5.18.1. All machinery operatives are to be made aware of the Construction Exclusion Zones and Restricted Zones.

5.18.2. All machinery operatives are to respect these zones and ensure that no damage occurs to trees due to the careless use of machinery.

5.19. Siting of Cabins and Storage of Materials

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

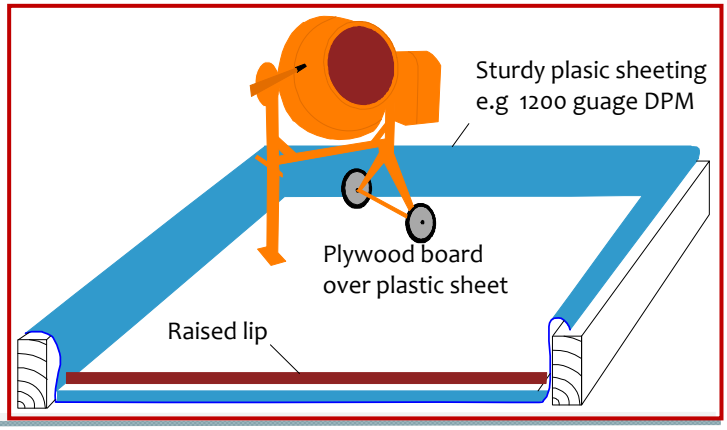
5.19.2. Any proposal to install cabins or materials within Restricted Activity Zones or Exclusion Zones shall be agreed in writing with the local authority prior to installation.

5.20. Pedestrian Paving

5.20.1. Any pedestrian paving or patios that may be installed over Root Protection Areas, as part of a post construction landscaping scheme, shall be installed in a manner sympathetic to tree roots. Excavation shall be limited to 100mm. 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.

5.21. Hazardous Materials

5.21.1. Any mixing of cement based materials shall take place outside the Construction Exclusion Zones and Restricted Zones. 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.

5.21.2. Cleaning water shall be removed from site.

5.21.3. 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.

Post-Construction Phase

5.22. Removal of Fencing

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

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

5.23. Landscaping

5.23.1. No machinery used within landscaping operations is to operate within the Root Protection Areas of retained trees.

5.24. Tree Works

5.24.1. It is anticipated that no remedial works will be required if the Arboricultural Method Statement is implemented since the trees shall be well protected. However, the local authority tree officer shall be invited to inspect the trees, in case any unforeseen damage has occurred and remedial works are required.

6. Inspection and Reporting

6.1. General

6.1.1. 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 appointed arborist (see Section 6.2 below) who will provide the tree officer with a copy of the inspection details. At each stage of inspection the tree officer will be invited to attend.

6.1.2. The following inspection schedule shall be kept on site and available to interested parties at all times.

Inspection	Attendees	Comments
Pre-Construction Meeting To occur after tree works are completed and fences and ground protection measures are installed, but before commencement of any other activity, including demolition or soil stripping.	Site manager and appointed arborist to attend. Tree officer to be invited.	Tree protection fencing locations & specification checked. Additional ground protection measures checked. Further protection measures / restrictions agreed.

6.2. The Appointed Arborist

6.2.1. 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.

6.2.2. 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.

6.2.3. The appointed arborist must keep the local authority updated at each of the stages within the inspection schedule and will report any unexpected issues arising throughout the project which could impact on trees.

6.2.4. Crown Consultants are able to offer these services or to nominate suitably qualified persons.

7. Signature

This report represents a true and factual account of the trees and proposed protection measures at

16 Daleham Gardens
London
NW3 5DA

Signed

.....

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

on behalf of

Crown Consultants Ltd

Dated

1st August 2011

CROWN Consultants
Tree consultants throughout England and Wales

Appendix 1: BS 5837: 2005 – 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 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.

R 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 appertain to their work. This includes service installation engineers and operators of plant machinery.

Appendix 2: Explanation of Tree Data and 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 T1=Tree 1, G2=Group 2, H3=Hedge 3 and W4=Woodland 4, S5=Shrub 5.

A4.1.2 **Age Categories:**

Young	Usually less than 10 years old.
Semi-Mature	Significant future growth to be expected, both in height and crown spread (typically below 30% of life expectancy).
Early-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).
Veteran	A level of maturity whereby significant management may be required in order to keep the tree in a safe condition.
Over Mature	As for veteran except management is not considered worthwhile.

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

Adaptive growth	In tree biomechanics, the process whereby wood formation is influenced both in quantity and quality by the action of gravitational forces and mechanical stresses on the cambial zone.
Aerobic	Conditions in which oxygen is freely available, or to biomechanical processes that depend on the presence of oxygen.
Anaerobic	A condition marked by the absence of oxygen; Generally such areas are unsuitable for normal life and growth of plant tissues. These sites tend to be populated by bacteria capable of surviving low oxygen conditions often associated with Slime Flux.
Arboriculture	The culture and management of trees as groups and individuals primarily for amenity and other non-forestry purposes.
Arborist	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.
Barrier zone	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.
Body language	In trees, the outward display of growth responses and or deformation in response to mechanical stress.
Bole	Or Trunk, the main stem of a tree below its first major branch.
Bracket	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.
Branch bark ridge	A ridged area located at the union of a branch to a trunk or stem.
Branch Collar	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.
Brown Rot	Form of decay where cellulose is degraded, while lignin is only modified.
Buttress Root	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.
Cabling Bracing	Installing cables within the crown of a tree to prevent collapse.
Callus	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.
Cambium	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.
Canopy	The topmost layer of twigs and foliage in a woodland, tree or group of trees.
Canker	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.
Cavity	An open and exposed area of wood, where the bark is missing and internal wood has been decayed and dissolved.
Chlorotic	Also Chlorosis. A condition of the plant marked by yellowing of normally green foliage, often indicating nutrient deficiency or plant dysfunction.
Clinometer	Devices that measures vertical angles, and provides direct height measurements of objects by triangulation.
Co-dominant stems/trunk	Are forked branches or trunks of nearly the same size in diameter and lacking a normal branch union.
Compacted soils	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.
Compartmentalisation	The physiological process that creates the chemical and mechanical boundaries that act to limit the spread of disease and decay organisms.
Compression Failure	Localized buckling of fibres and other longitudinal elements produced by compression of wood along the grain; compression failures sometimes develop in standing trees.
Compression Strength	The ability of a material or structure to resist failure when subjected to compressive loading; measurable in trees using special drilling devices
Compression Wood	Abnormal wood formed on the lower side of branches and curved stems, with physical properties different from normal wood.
Conservation Area	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 without prior notification (Currently 6 weeks) to the relevant local planning authority. See also Tree Preservation Orders.
Core Sample	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.
Crotch	The union of two or more branches; the auxiliary zone between branches.
Crown	The upper canopy of a tree, including upper trunk, scaffold branches, secondary branches, stems and leaves.
Crown lifting / raising	Crown Lift The removal of the lowest branches, usually to a given height. It allows more residual light and greater clearance underneath for vehicles etc.
Crown reduction	The reduction of a tree's height or spread while preserving its natural shape.
Crown thinning	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.
Deadwood (noun)	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.).
Deadwood (verb)	The removal of dead branches from a tree's canopy, usually of a specified size (in diameter).
Decay	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.
Decay Detection	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.
Decurrent	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.
Defect	In relation to tree hazards, any feature of a tree which detracts from the uniform distribution of mechanical stress, or which makes the tree mechanically unsuited to its environment.
Defoliation	The losing of plants foliage.
Dieback	Progressive death of buds, twigs and branch tissues, on individual limbs resulting in Deadwood, or throughout the canopy,

	extreme cases can result in Stag Heading.
Dripline	A projected line on the ground that corresponds to the spread of branches in the canopy; the farthest spread of branches.
Epicormic shoots	Fast growing, weakly attached shoots/branches that often grow as a response to stress factors upon a tree or branch removal.
Excurrent	In trees, a system of branching that a single leader remains dominant, through the control of lateral branches.
Failure	In connection with tree hazards, a partial or total fracture within the wood tissue or loss of cohesion between roots and soil. (In total failure affected parts will snap or tear away completely, Partial failure there is a crack or deformation, which results in an altered distribution of mechanical stress.
Feeder Roots	Fine fibrous Water and nutrient absorbing roots located in the outer root system.
Flush-Cut	In trees and shrubs, a pruning cut close to the parent stem, which removes the branch bark ridge.
Foliage	The live leaves or needles of the tree; the plant part primarily responsible for photosynthesis.
Formative pruning	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.
Gall	An abnormal, disorganized growth of plant tissues, caused by parasitic or infectious organisms such as insects, fungi, bacteria, or viruses.
Girdling	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.
Girdling Root	In woody plants, a root that grows across the buttress, or across other roots, eventually causing constriction of the radial growth.
Growth Increment	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.
Hazard beam	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).
Heartwood	Inner non functioning tissues that provide structural support to trunk.
Heave	In relation to shrinkable 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 rocked root plate.
Herbicide	A chemical compound that causes the death of a plant.
Included Bark	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.
Increment Borer	A tool that cuts and extracts a narrow cylinder of wood from a tree for analysis of the wood tissue and growth increments.
Leader	The primary terminal shoot or trunk of a tree.
Limb	A large lateral branch growing from the main trunk or from another larger branch.
Lion Tailing	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.
Lopping	In trees, a general term that related to the removal of branches from a tree.
Monitoring	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.
Mulch	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.
Mycelium	A mass of growing filaments (hyphae) formed by fungi.
Mycorrhizae	The symbiotic relationship between roots and certain beneficial fungi. Mycorrhizae are the combined root / fungal growth.
Natural Pruning	The shedding of a branch or twig that has died back naturally and has become decayed at or near its base.
Necrosis	The failure and subsequent death of a branch, leader or tree.
Negligence	A failure to take reasonable action to deal with a hazard to prevent damage to property or person.
Nutrient	Substances that are absorbed by living organisms for the maintenance of internal processes.
Occluding tissue	The general tern of wood, cambium and bark that develop around the site of a wound on a woody plant
Pathogen	A microorganism that causes diseases within another organism.
Phloem	The principle conductive tissue that the products of Photosynthesis are transported around the plant
Photosynthesis	The process were light energy is used to create energy (Carbohydrate) for use within the plant.
Pollard	A term for a pollarded tree.
Pollard head	The swollen section of branch / stem that forms behind the pollarding cut.
Pollarding	The complete or partial removal of the crown of a young tree so as to encourage the development of numerous branches either for amenity or historically as fodder, repeated management is required cyclically to maintain the feature
Prune or Pruning	Selective removal of woody plant parts of any size, using saws, Loppers, Secateurs, or other pruning tools.
Reaction Wood	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.
Reaction Zone	A zone normally darker than surrounding wood that denoted the boundary often a defensive one between functional sapwood and dysfunctional or decaying wood.
Re-grading	The raising or lowering of a soil profile from its original grade.
Rejuvenation pruning	Where historically or environmentally important trees are to be retained, their life spans can be significantly extended through the adoption of particular pruning regimes.
Rejuvenation root treatment	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.
Remedial pruning	The removal of old stubs, deadwood, epicormic growth, rubbing or crossing branches and other unwanted items from the tree's crown.
Resistograph	Invasive decay detection technique whereby the resistance offered by the timber to a spinning probe is measured and plotted.
Rib	In tree body language, a long narrow, axial protuberance which often over lays a crack.
Ring Barking	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.
Rod Bracing / Bolting	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.
Root Barriers	Both Buildings and services can benefit from the installation of root barriers to protect a soil volume from the ingress of roots.
Root Collar	The basal area of the tree; transition zone from trunk to root. Also sometimes called trunk flare.

Root Plate	**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.**
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.**
Sail 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.**
Senescent	**A decline in growth and vigour due to age or stress factors.**
Shrub	**A woody plat 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 Heading	**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 lateral branch 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 a least 4 metres and a stem diameter at breast height of at least 75mm.**
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	**Wood with atypical features, formed in the vicinity of a wound and a term to describe the occluding tissues around a wound**
Xylem	**Plant tissues 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 iss 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

National Joint Utilities Group publication # 10 (1995), *Guidelines for the Planning, Installation and Maintenance of Utility Services in Proximity to Trees. Downloadable at www.njug.demon.co.uk/pdf/NJUG%20Publication10.pdf*

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

BS 5837: 2005. Trees in Relation to Construction – Recommendations.
Bs 3998: 1989. Recommendations for Tree Work.
BS 3936: 1992. Nursery Stock. Part 1: Specification for Trees and Shrubs.
BS 3936: 1992. Nursery Stock. Part 10: Specification for Groundcover Plants.
BS 4043: 1989. Transplanting Root-balled Trees.
BS 8004: 1986. Foundations.
BS 8103: 1995. Structural design of Low-Rise Buildings.
BS 8206: 1992. Lighting for Buildings.
BS 3882: 2007. Topsoil.
BS 4428: 1989. General Landscaping Operations (excluding hard surfaces).

Permission to do Works to Protected Trees / Tree Law

Forestry Commission (Edinburgh, 2003), *Tree Felling – Getting Permission.* Country Services Division - Forestry Commission. Downloadable at www.forestry.gov.uk/website/pdf.nsf/pdf/wgsfell.pdf/$FILE/wgsfell.pdf

Transport and the Regions (Department of the Environment, 2000), *Tree Preservation Orders, A Guide to the Law and Good Practice*. Downloadable at www.communities.gov.uk/publications/planningandbuilding/tposguide

C. Mynors, *The Law of Trees, Forests and Hedgerows* (Sweet and Maxwell, London, 2002)

Communities and Local Government website with numerous downloadable documents, from: http://www.communities.gov.uk/planningandbuilding/planning/treeshighhedges/

Lighting Levels

P.J. Littlefair, *B.R.E. 209: Site layout planning for daylight and sunlight A guide to good practice.* B.R.E. Bookshop, London.

British Standards Institution. Code of practice for day lighting. *British Standard* BS 8206: Part 2 (1992).

Chartered Institution of Building Services Engineers. *Applications manual: Window Design* (London, 1987).

NBA Tectonics. A study of passive solar housing estate layout. *ETSU Report* S-1126. Harwell, Energy Technology Support Unit (1988).

I.P. Duncan; D. Hawkes, Passive solar design in non-domestic buildings. *ETSU Report* S-1110. Harwell, Energy Technology.

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

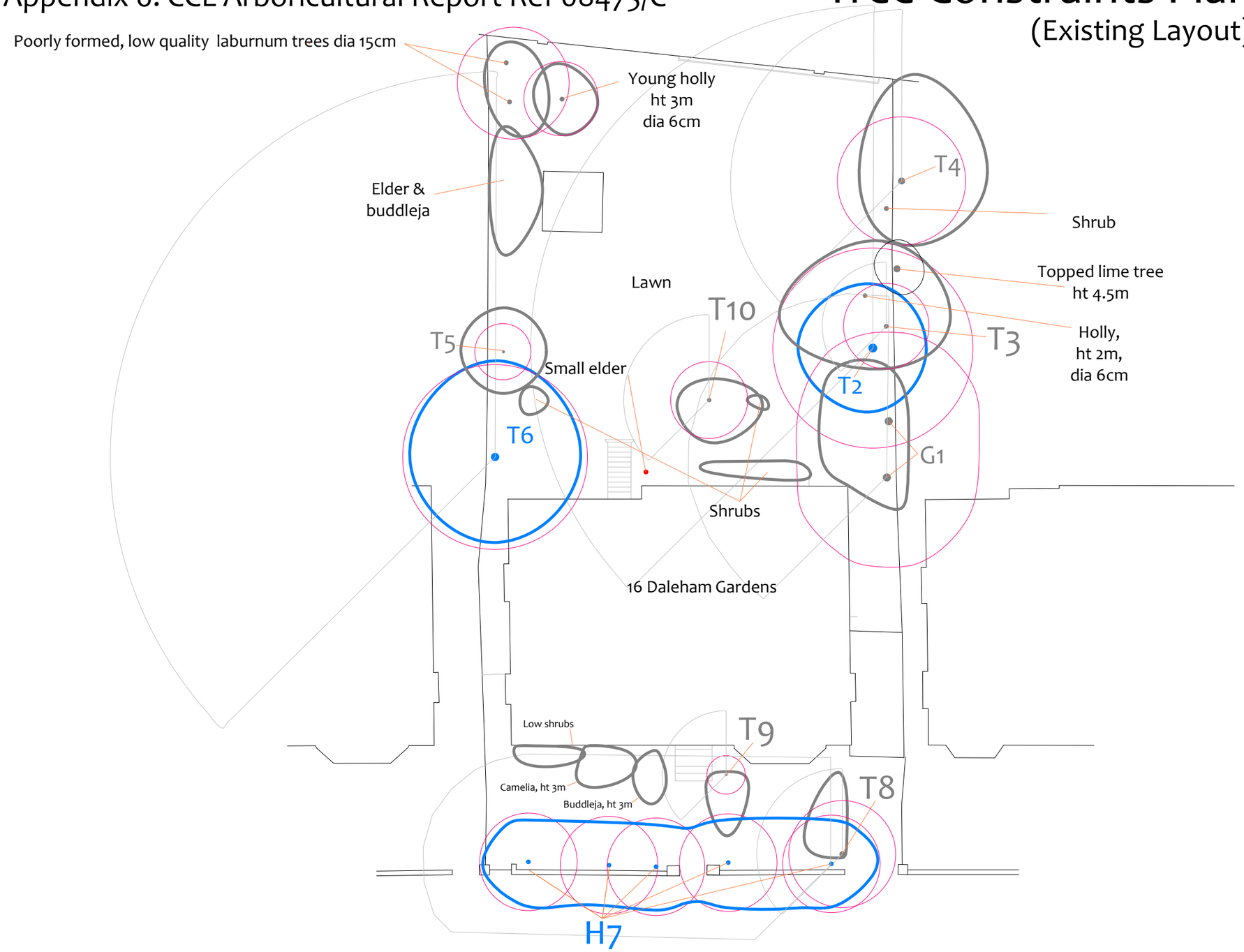
www.crowntrees.co.uk	Crown Consultants site containing useful information
www.trees.org.uk	Arboricultural Association
www.rfs.co.uk	Royal Forestry Society of England, Wales and N. Ireland
www.treehelp.Info	The Tree Advice Trust
www.woodland-trust.org.uk	The Woodland Trust
www.treecouncil.org.uk	The Tree Council

Appendix 6: Site Plan(s)

The plan(s) referred to within the report follow this page.

Appendix 6: CCL Arboricultural Report Ref 08475/C

Tree Constraints Plan
(Existing Layout)



CROWN Arboricultural Consultants 01422 316660	Site: 16 Daleham Gardens Ref No: 08475C/TCP Scale: 1:200 Paper Size: A3		BS 5837 Shade Pattern		
			BS 5837 Root Protection Area		Stem & canopy of Category A tree
		T1	Tree number 1		Stem & canopy of Category B tree
		G2	Group number 2		Stem & canopy of Category C tree
		H3	Hedge number 3		Stem & canopy of Category R tree

0 5 10m

BS 5837 Retention Categories

Category A:

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

Category B:

Trees of moderate quality and amenity. Usually mature trees, or younger trees with exceptional form. Retention of these trees is desirable though the removal of occasional specimens may be acceptable.

Category C:

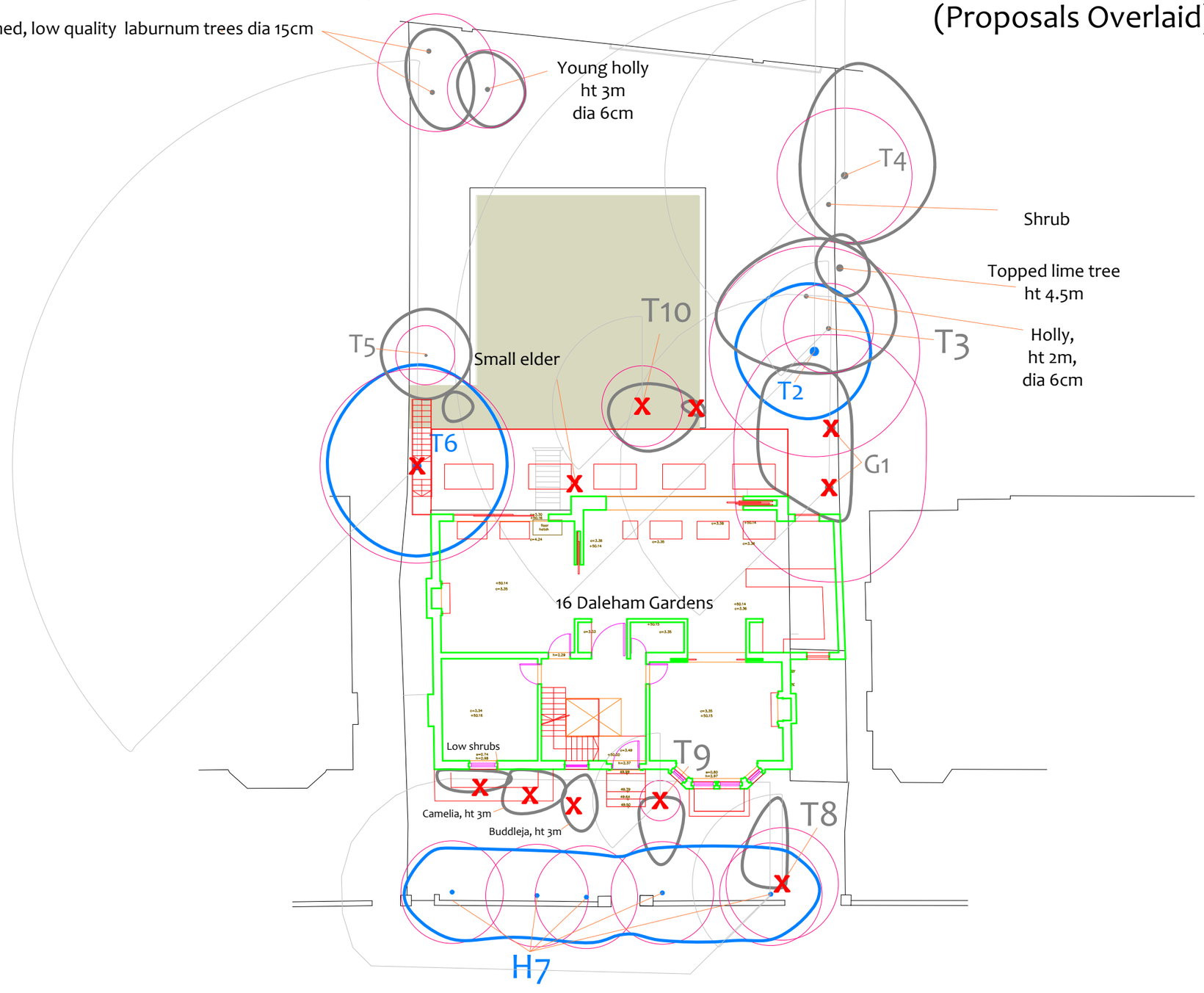
Trees of low quality and amenity. The removal of these trees should generally be seen as acceptable in order to facilitate development.

Category R:

Trees whose structural condition is such that they should be removed if development is to proceed.

Appendix 6: CCL Arboricultural Report Ref 08475/C

Tree Removal Plan
(Proposals Overlaid)



CROWN
Arboricultural Consultants
01422 316660

Site:
16 Daleham Gardens

Ref No: 08475C/TRP
Scale: 1:200
Paper Size: A3

	BS 5837 Shade Pattern
	BS 5837 Root Protection Area
T1	Tree number 1
G2	Group number 2
H3	Hedge number 3

X	Tree to be removed
	Stem & canopy of Category A tree
	Stem & canopy of Category B tree
	Stem & canopy of Category C tree
	Stem & canopy of Category R tree

0 5 10m

BS 5837 Retention Categories

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

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

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Category R:
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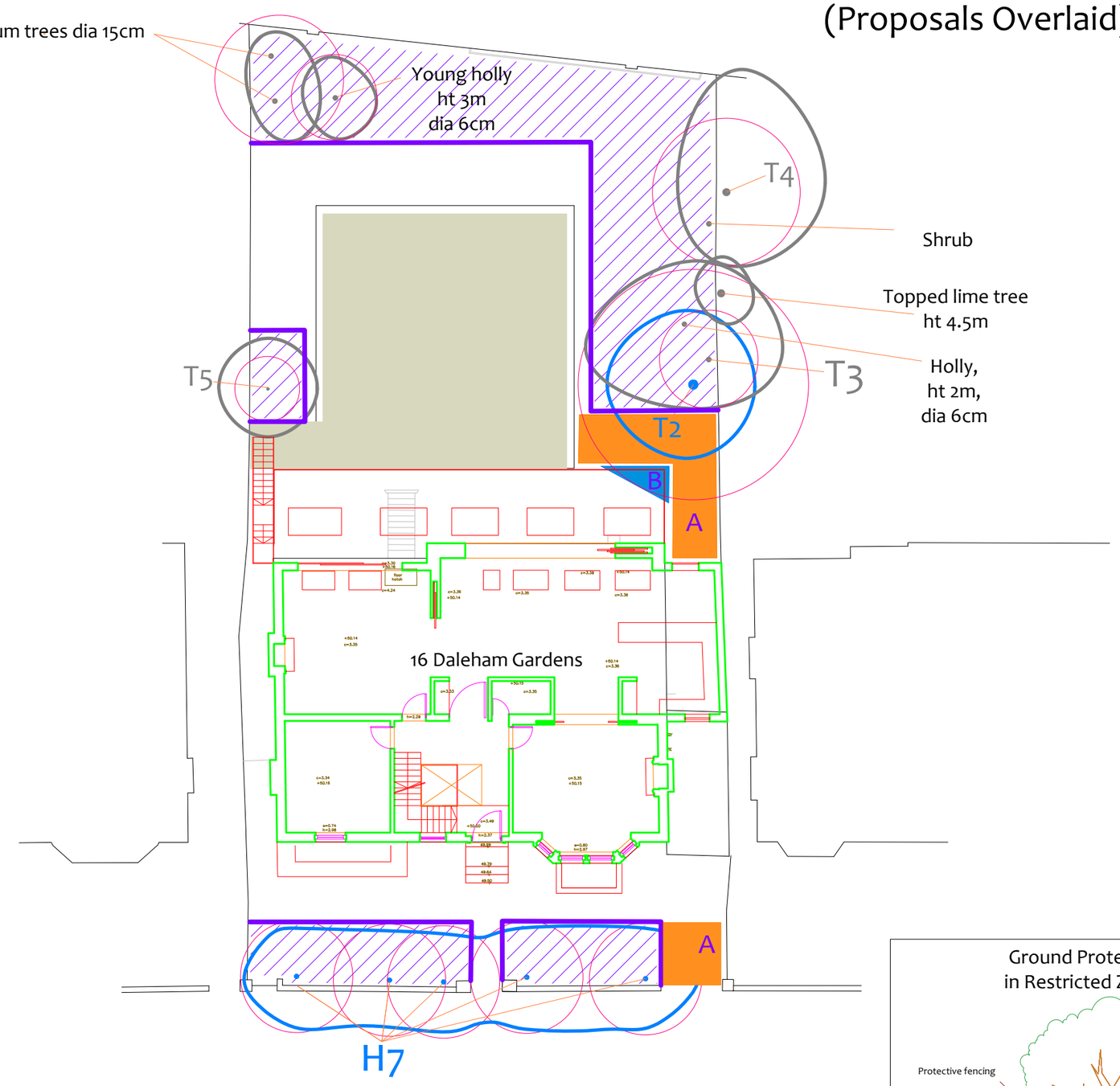
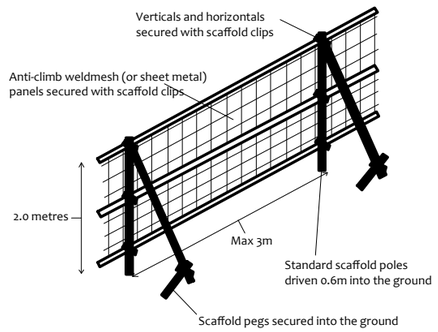
Appendix 6: CCL Arboricultural Report Ref 08475/C

Tree Protection Plan
(Proposals Overlaid)



Tree Protection Fencing
The 'In-Ground' System



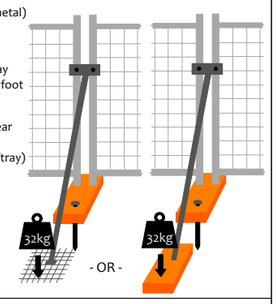
The 'Back Stay System'
(an alternative to 'The In-Ground System'

2m X 3.5m weldmesh (or sheet metal) panels linked with anti-tamper couplings

Each panel attached to a back stay which is founded in an additional foot or mesh tray as illustrated

Minimum 32kg ballast to retain rear foot or tray (including the weight of the foot/tray)

Front feet to be secured with ground pins or additional ballast



Construction Exclusion Zone

Within this area the following restrictions shall apply:

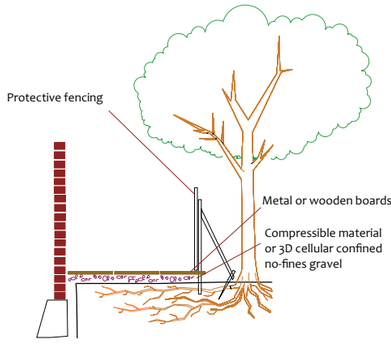
No excavation or land regrading whatsoever.
No storage of materials, rubble, soil or spoil.
No fires within the exclusion zone or within 10m of any tree canopy.
No site cabins or other temporary structures.
No discaharge of polluted water, cement or chemicals of any kind.
No use of any machinery, or passage or parking of vehicles.
No tree works without council consent.

Restricted Activity Zones A and B

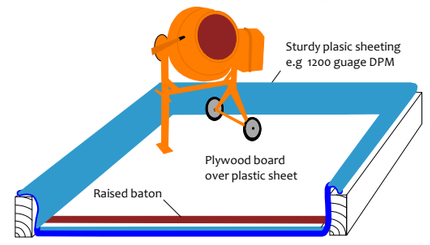
A
B

Within these zones construction activity is restricted. Restrictions are detailed within the accompanying Method Statement Report (Sections 5.11 and 5.12)

Ground Protection in Restricted Zone A



Dedicated Mixing and Cleaning Area



CROWN
Arboricultural Consultants
01422 316660

Site:
16 Daleham Gardens

Ref No: 08475C/TPP
Scale: 1:200
Paper Size: A3

	BS 5837 Root Protection Area
T1	Tree number 1
G2	Group number 2
H3	Hedge number 3
	Stem & canopy of Category A tree
	Stem & canopy of Category B tree
	Stem & canopy of Category C tree
	Stem & canopy of Category R tree
	Fixed protective fencing The 'In-Ground System' or the 'Backstay System' To remain in place for all construction activity
	Restricted Activity Zones
	Construction Exclusion Zones

0 5 10m