



## Arboricultural Impact Assessment

**Warrender School  
Old Hatch Manor, Ruislip**

**On Behalf of:**

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## Summary

An arboricultural survey has been carried out, and this report prepared to support a planning application for the provision of an extension at Warrender School, Old hatch manor, Ruislip.

All trees that could be affected by the proposals were identified and inspected, with their details listed in Appendix 2.

This report seeks to provide information in accordance with British Standard *BS 5837:2012, Trees in relation to design, demolition and construction*.

***Three tree groups (G2, G4, G6) and one section of tree group (G1) of moderate quality and value will require removal to accommodate the proposed development layout.***

Provided precautions to protect the identified trees are specified and implemented through the measures included in this report, the development proposal will have little impact on the retained trees or their wider contribution to amenity and character.

If the recommendations made within this report are followed, the development should be achievable in arboricultural terms and should be acceptable to the local planning authority.

## Contents

Summary .....	2
1.0 Introduction .....	4
2.0 Site Visit and Observations .....	6
3.0 Arboricultural Impact Assessment .....	7
4.0 Preliminary Arboricultural Method Statement .....	9
5.0 Conclusions .....	11
6.0 Recommendations .....	12
Appendix 1 - Survey and Background Information .....	13
Appendix 2 - Key to Tree Survey Sheets .....	16
Appendix 3 - Tree Survey Sheets .....	18
Appendix 4 - Tree Survey Plan and Tree Protection Plan (TSP/TPP) .....	21
Appendix 5 - Tree Protection Barriers & Ground Protection .....	23
Appendix 6 - Methods of Work Close to Trees .....	28
Appendix 7 - Tree Work Schedule .....	32
Appendix 8 - Specific Report Caveats .....	34

## 1.0 Introduction

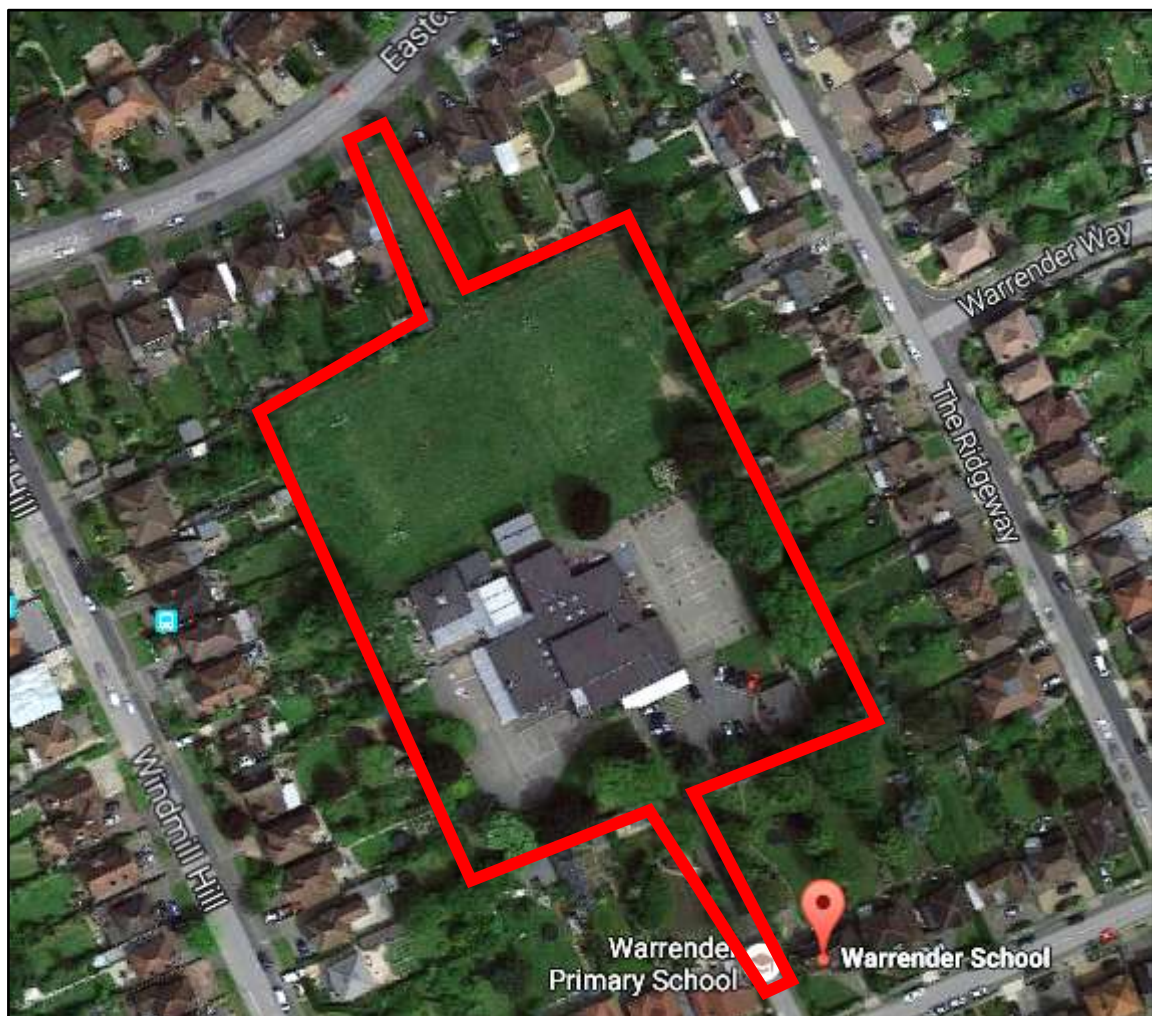
### 1.1 Instruction

Southern Ecological Solutions Ltd has been instructed to produce an Arboricultural Impact Assessment for the provision of an extension at Warrender School, Old hatch manor, Ruislip. It has been produced in accordance with the principles of British Standard *BS 5837:2012, Trees in relation to design, demolition and construction - Recommendations* and includes the following information to accompany a planning application:

- *details of significant trees including an assessment of condition using BS 5837 categorisation;*
- *a plan showing tree survey information, retention categorisation and root protection areas;*
- *an assessment of the impact of the proposal on trees and any wider impact that has on local amenity and any impact trees may have on the proposed development;*
- *an arboricultural method statement dealing with the protection and management of the trees to be retained; and*
- *a schedule of tree works to facilitate construction.*

### 1.2 The proposal

The proposal is for the provision of an extension at Warrender School, Old hatch manor, Ruislip.



**Image 1:** Extent of development envelope.

### 1.3 Scope and purpose of this report

This report covers trees on the site and those adjacent to the site which could be affected by any development. It is concerned with the impact the development may have on trees and the effect retained trees may have on the development. Its purpose is to allow the Local Planning Authority to assess the tree information as part of the planning submission.

### 1.4 Legal constraints

A search undertaken with the London Borough of Hillingdon identified that none of the trees are the subject of Tree Preservation Orders (TPOs), or is within a Conservation Area (CA).

***Anyone wishing to undertake works to prune or remove a tree with a Tree Preservation Order or within a Conservation Area will require written authorisation from the Local Planning Authority before any works can proceed.***

### 1.5 Other information included in this report

The following information is included in Appendix 1:

- *documents and information provided;*
- *legal constraints and liabilities;*
- *survey methodology;*
- *contacts; and*
- *reference documents.*

## **2.0 Site Visit and Observations**

### **2.1 Site description**

The proposal site comprises a Primary school with surrounding areas of hard play. Beyond these a large area of green open space situated in the north of the site. Due to the nature of the site the trees were situated along and beyond the peripheries and were found to be in a number of tree groups which presented between low and moderate arboricultural value.

### **2.2 The subject trees**

A total of nine individual trees and seven tree groups were identified as the subject of this report. These comprise 4 'B' category individual trees 4 'B' category tree groups, 5 'C' category individual trees, 3 'C' category tree groups and were identified in accordance with section 4.5 and table 1 of BS3837:2012 'Trees in relation to design, demolition and construction – Recommendations' (see Appendix 1).

### **3.0 Arboricultural Impact Assessment**

#### **3.1 Generic summary of the impact on trees**

Development can adversely impact on trees by causing them to be removed to facilitate the development, or in the future, by adversely affecting their potential for retention through disturbance in Root Protection Areas (RPAs)<sup>1</sup> or through post development pressures to prune or remove.

At the design stage, disturbance within the RPA should be avoided. If unavoidable, (which may need demonstrating), consideration must be given to any construction activity such as demolition, including removal of existing hard surfaces, changing soil levels and the provision of services where within RPAs, as well as new surfaces and structures.

Construction of hard surfaces and other construction may be acceptable within RPAs providing specialist methods of design and construction are used. This will often result in the use of minimal or no-dig methods which result in higher finished levels which must be allowed for during design due to the effect on access thresholds and structure heights etc.

The ability of trees to tolerate some disturbance depends on individual circumstances including prevailing site conditions, tree species, age and condition and this will be assessed by the project arboriculturist.

Protection measures, usually a combination of barriers and ground protection must be in place before any works, including site clearance, begin, and stay in place for as long as a risk of damage remains (Please refer to the Tree Protection Plan - TPP). The protection of trees must take account of the buildability of the proposal, including services, and ensure that all activities such as storage of materials, parking and the use of plant and vehicles can be accommodated outside of RPAs. Particular care and planning is necessary in the operation of excavators, lifting machinery and cranes to ensure all vehicle movement and lifting operations will not impact on retained trees. It is common practice for an Arboricultural Method Statement (AMS) to be produced following planning consent to address these issues, and may form part of planning conditions in relation to trees.

#### **3.2 Tree survey plan (TSP)**

The plan found at appendix 4 shows the existing trees numbered and categorised in accordance with BS 5837. Below ground constraints are represented by the RPA. The above ground constraints are represented by the trees crown spread and height where appropriate. The survey plan is an aid to design and should not be used post consent on site; the tree protection plan is to be used for this purpose.

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<sup>1</sup> *Root Protection Area (RPA) - A layout design tool indicating the minimum area surrounding the tree that contains sufficient rooting volume to maintain the tree's viability, and where the protection of the roots and soil structure is treated as a priority. Assessed according to the recommendations set out in clause 4.6 of BS 5837. It is calculated by multiplying the radius squared by 3.142. Clause 4.6.2 of BS 5837 states that the RPA may be changed in shape, taking into account local site factors, species tolerance, condition and root morphology.*

### **3.3 Tree protection plan (TPP)**

Stems and crown spreads are coloured based on their categories for trees to be retained whilst trees to be removed have red hatched/shaded. Tree protection is shown as barriers and/or ground protection defining the Construction Exclusion Zone (CEZ)<sup>2</sup> and any areas requiring non-standard methods of demolition or construction are shown.

### **3.4 Trees to be removed**

With the proposed design layout provided by the client it is indicated that 1 'B' category tree group (G4) 2 'C' category groups (G2 & G6) and 1 section of 'B' Category tree group (G1) will require removal to accommodate the proposals.

### **3.5 Protection of retained trees**

Protective barrier fencing, ground protection, or a combination of both will be required in order to protect all of the trees throughout the site during construction.

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<sup>2</sup> Construction Exclusion Zone. An area based on the RPA in m<sup>2</sup> identified by an arboriculturist, to be protected during development, including demolition and construction work, by the use of barriers and/or ground protection fit for purpose to ensure the successful long-term retention of a tree.



## **4.0 Preliminary Arboricultural Method Statement**

### **4.1 Introduction**

This section is a preliminary arboricultural method statement specifying the methodology to be used for the protection of trees and works close to trees that have the potential to result in the loss of or damage to a tree. It includes details of site management and supervision required for successful tree retention.

### **4.2 Site clearance and set-up**

#### **4.2.1 Site clearance**

Damage can easily be caused to trees to be retained during initial site clearance, therefore tree protection barriers must be in place before site clearance to protect trees identified in Section 3.

#### **4.2.2 Site and fuel storage, cement mixing and washing points**

All site storage areas, cement mixing and washing points for equipment and vehicles and fuel storage must be outside RPAs. No discharge of potential contaminants should occur within 10m of a retained tree stem or where there is a risk of run-off into RPAs.

#### **4.2.3 Tree protection barriers**

Appendix 7 includes guidance for protective barriers based on BS 5837:2012. The approximate location of the barriers and the CEZs is shown on the TPP. The precise location of the barriers and other protective measures should be confirmed at the pre-commencement meeting before any demolition or construction activities, including site clearance, start.

### **4.3 Ground protection**

In areas where it is not possible to erect protective barriers, ground protection must be used to protect the CEZ of trees. Where it has been agreed during the design stage that vehicular or pedestrian access for the construction operation may take place within the CEZ, the possible effects of construction activity should be addressed by a combination of barriers and ground protection. The position of the barrier may be within the CEZ at the edge of the agreed working zone but the soil structure beyond the barrier to the edge of the CEZ should be protected with ground protection.

### **4.4 Precautions when working in CEZs**

Only work agreed with the local planning authority can be carried out within CEZs. Any works must be carried out in accordance with the details as set out in Appendix 6 which are summarised below.

#### **4.4.1 Removal of existing surfacing**

The site comprises areas of hardstanding therefore care must be taken to minimise the impact on all trees for retention if these surfaces are to be removed which will include machinery positioned outside RPAs and the use of hand tools in sensitive areas.

#### **4.4.2 Installation of new surfacing**

Full details of the new surfacing proposed is not known at the time of writing. However, if resurfacing is required within the RPAs of any trees it will be necessary to use non-standard methods of construction, ideally new substrates and finished surfaces should be of a porous design to allow water and air passage in and out.

#### 4.4.3 **Installation of new services**

The exact location of services is often difficult to establish until construction is in progress. Where existing services within RPAs require upgrading or new services have to be installed in RPAs, conventional excavation techniques are unacceptable and great care must be taken to minimise any disturbance. Trenchless installation should be the preferred option but if that is not feasible, any excavation must be carried out by hand or using a compressed air lance. Methodology must comply with *NJUG Volume 4: Guidelines for the Planning, installation and Maintenance of Utility Apparatus in Proximity to Trees*.

#### 4.4.4 **Tree works**

Recommendations for tree works can be found in the tree works schedule in Appendix 6. All works shall be in accordance with British Standard *BS 3998:2010 Tree work: Recommendations*, or in accordance with current best practice. The use of a competent tree surgery contractor is necessary to comply with this (follow link for a list of Arboricultural Association approved contractors [Directory of Tree Surgeons - Arboricultural Association](#)). The main contractor and tree surgery contractor must ensure that any necessary consents have been received from the local authority regarding planning constraints in regards to trees, and that no protected species or habitats are harmed whilst carrying out site clearance or tree surgery works.

## **5.0 Conclusions**

- 5.1** Due to the nature of the site the trees were situated along and beyond the peripheries of the site, and comprised both individual trees and tree groups of low to moderate amenity value.
- 5.2** The proposed design layout provided by the client it is indicated that 1 'B' category tree group (G4), 2 'C' category groups (G2 & G6) and 1 section of 'B' Category tree group (G1) will require removal to accommodate the proposals. The layout will not have a detrimental impact to the tree cover on, or adjacent to the site, and proposals for structured tree planting will be undertaken as part of the design to suitably mitigate for any tree losses.

## **6.0 Recommendations**

- 6.1** The trees identified for retention should be protected during the development phase in accordance with BS 5837:2012 'Trees in Relation to design, demolition and construction – recommendations' (Figure 2) to exclude construction activity within the root protection areas. Barrier fencing, ground protection or a combination of both should be used (see Tree Protection Plan in Appendix 2).
- 6.2** G2, G4, G6 and a section of G1 should be removed to facilitate the proposed layout.
- 6.3** Provided tree protection and methods of work close to trees outlined in this report are followed, the impacts on the remaining trees will be negligible.
- 6.4** If the recommendations made within this report are followed this scheme should be achievable in arboricultural terms and should be broadly acceptable to the local planning authority.

**Appendix 1 - Survey and Background Information**

## 1.0 Limitations

1.0.1 A detailed topographical plan showing the locations of individual trees was provided by the client, and used for the tree survey, so the positions of the trees was understood to be accurate and SES Ltd accepts no liability for the accuracy of any tree survey drawings based on the topographical plan supplied by the client.

1.0.2 Trees are living organisms whose health and condition can change rapidly and all trees, even healthy ones, are at risk from unpredictable climatic and manmade events. The assessment of risk for any tree is based upon factors evident at the time of the inspection and the interpretation of those factors by suitably qualified inspectors. The health, condition and safety of trees should be checked on a basis commensurate with the level of risk and preferably on an annual basis.

### 1.0.3 Methodology

The trees were surveyed from ground level without detailed investigations. All trees with a trunk diameter of 75mm or above<sup>3</sup> were surveyed. All dimensions were estimated unless otherwise indicated. Obvious hedges and shrub masses were identified where appropriate. Information collected is in accordance with recommendations in subsection 4.4.2.5 of BS 5837 and includes species, height, diameter, branch spread, crown clearance, age class, physiological condition, structural condition and remaining contribution. Each tree was then allocated one of four categories (U, A, B or C) to reflect its suitability as a material constraint on development.

## 1.1 Documents and information received

- *Topographical plan*
- *Proposed plan*

## 1.2 Contacts

Name	Company/organisation	Tel. no.
Tim Martin	LB Hillingdon	-
Adam Dayman	Southern Ecological Solutions Ltd	01268 711021

## 1.3 Reference documents

- *British Standards Institution (2012) BS 5837: Trees in relation to design, demolition and construction – Recommendations;*
- *British Standards Institute (2010) BS 3998: Tree work – Recommendations;*
- *DETR Tree Preservation Orders – A Guide to the Law and Good Practice;*
- *National Joint Utilities Group (2007) Volume 4, Issue 2: Guidelines for the planning, installation and maintenance of utility apparatus in proximity to trees;*
- *DTLR (2001) Principles of Tree Hazard Assessment and Management - David Lonsdale.*

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<sup>3</sup> BS 5837 recommends that in most circumstances all trees over 75mm stem diameter should be included in a pre-planning land and tree survey

## 1.4 Legal Constraints and Liabilities

- 1.4.1 **Tree Preservations Orders/ Conservation Areas:** A search undertaken with the London Borough of Hillingdon identified that none of the trees are the subject of Tree Preservation Orders (TPOs), or is the part of a local Conservation Area (CA).
- 1.4.2 **Occupiers Liability 1957 and 1984:** The Occupiers Liability Act places a duty of care to ensure that no reasonably foreseeable harm takes place due to tree defects. Therefore, this report includes recommendations within the tree tables for work required for safety reasons. 'Common sense risk management of trees (National Tree Safety Group 2012)' states that *'the owner of the land on which a tree stands, together with any party who has control over the tree's management, owes a duty of care at common law to all people who might be injured by the tree. The duty of care is to take reasonable care to avoid acts or omissions that cause a reasonably foreseeable risk of injury to persons or property.'*
- 1.4.3 **Common Law:** This enables pruning back of the crown and roots of trees on adjacent land where they overhang neighbouring property, providing the work is reasonable and does not cause harm. This right does not override TPO and CA legislation.
- 1.4.4 **Ecological Constraints:** The Wildlife and Countryside Act 1981, as amended, The Conservation of Habitats and Species Regulations 2010 and the Countryside and Rights of Way Act 2000, provide statutory protection to species of flora and fauna including birds, bats and other species that are associated with trees. These could impose significant constraints on the use and timing of access to the site. It is the responsibility of the main contractor and tree surgery contractor to ensure that no protected species are harmed whilst carrying out site clearance or tree surgery works. Unless competent to do so, the advice of an ecologist must be sought.

**Appendix 2 - Key to Tree Survey Sheets**



## 2.0 Tree Survey Schedule - Key to terms

T = Tree G = Tree Group H = Hedge W = Woodland

### Age Class:

<b>NP</b>	Newly planted
<b>Y</b>	Young - an establishing tree that could be easily transplanted
<b>SM</b>	Semi-mature - an established tree still to reach its ultimate height and spread and with considerable growth potential
<b>EM</b>	Early mature - a tree reaching its ultimate height and whose growth is slowing however it will still increase considerably in stem diameter and crown spread
<b>M</b>	Mature - a tree with limited potential for further significant increase in size although likely to have a considerable safe useful life expectancy
<b>OM</b>	Over mature - a senescent or moribund tree with a limited useful life expectancy
<b>V</b>	Veteran - a tree older than typical for the species and of great ecological, cultural or aesthetic value

### Abbreviation:

<b>Dia</b>	Diameter of stem in millimetres at 1.5m above ground level for single-stemmed trees or in accordance with Annex C of BS 5837 for multi-stemmed trees or trees with low forks or irregular stems
<b>Stems</b>	Numbers of stems or M/S = multi-stemmed
<b>Ht</b>	Height in metres
<b>Crown clear</b>	Height of first significant branch above ground level and direction of growth
<b>NSEW</b>	Crown spread at the four cardinal points. $\emptyset$ = average crown radius
<b>Cond</b>	Physiological condition. G = good; F = fair; P = poor; D = dead
<b>Life exp</b>	Estimated remaining contribution in years
<b>RPR</b>	Root protection radius in metres based on stem diameter
<b>RPA</b>	Root protection area. A layout design tool indicating the minimum area surrounding the tree that contains sufficient rooting volume to maintain the tree's viability, and where the protection of the roots and soil structure is treated as a priority. Assessed according to the recommendations set out in clause 4.6 of BS 5837. It is calculated by multiplying the radius squared by 3.142. Clause 4.6.2 of BS 5837 states that the RPA may be changed in shape, taking into account local site factors, species tolerance, condition and root morphology
<b>CEZ</b>	Construction exclusion zone. An area based on the RPA in m <sup>2</sup> identified by an arboriculturist, to be protected during development, including site clearance, demolition and construction work, by the use of barriers and/or ground protection fit for purpose to ensure the successful long-term retention of a tree

**BS cat:** Category in accordance with Table 1 and section 4.5 of BS 5837.

<b>A</b>	High quality and value (non-fiscal) with at least 40 years remaining life expectancy
<b>B</b>	Moderate quality and value with at least 20 years remaining life expectancy
<b>C</b>	Low quality and value with at least 10 years remaining life expectancy, or young trees with a stem diameter below 150 mm
<b>U</b>	Unsuitable for retention. Existing condition is such that they cannot be realistically retained as living trees in the context of the current land use for longer than 10 years. Note, category U trees can have existing or potential conservation value which it might be desirable to preserve

**A, B and C** category trees are additionally graded into: **1)** Mainly arboricultural values; **2)** Mainly landscape values; **3)** Mainly cultural values including conservation.

## Appendix 3 - Tree Survey Sheets

Warrender													Date: 27.07.15		
Tree Ref. No.	Species	Height (m)	DBH (mm)	RPR (m)	RPA (m)	Canopy Spread				Ht of 1st sig branch / canopy	Life Stage	General Observations		Estimated remaining contribution (BS 5837)	BS Cat
						N	E	S	W			Physiological	Structural		
G1	Silver Maple, Norway Maple, Alder, Cherry, Whitebeam	14	450	5.4	92	As on Plan				3/4	EM	F	Mixed belt/screen planting with raised play area beneath. Compression fork and occluded bark in Silver Maple	40+	B
T1	Sycamore	12	360	4.32	59	5	5	5	5	0/0	EM	F	Self set tree on boundary, growing through fence. No significant defects	40+	C2
T2	Ash	8	200	2.4	18	3	3	3	3	1/1	SM	F	Self set tree growing through fence on boundary	40+	C1
T3	White Poplar	20	960	11.52	417	6.5	6.5	6.5	6.5	4.5/4.5	M	F	Off site tree. No access possible but no indication of significant defect.	20+	B
G2	Purple Norway Maple, Midland Thorn	10	340	4.08	52	As on Plan				2/2	EM	F	Trees of typical form and condition	40+	B
			160	1.92	12									10+	C
T4	White Poplar	16	500	6	113	5	5	5	5	4/2	EM	F	Ivy on stem. Off site tree. No significant defects	40+	B
T5	Ash	16	500	6	113	6	6	6	6	3/4	EM	F	Off site tree. No access possible	40+	B
G3	Beech, Pear	11	360	4.32	59	As on Plan				0/0	EM	F	Off site trees ... over site to 4m	40+	C
G4	Silver Maple, Purple Norway Maple	14	550	6.6	137	As on Plan				4/3	EM	F	Large linear trees. Bark damage on Silver Maple. Occluded bark. Compression fork	40+	B/C
G5	Purple Norway Maple, V Norway Maple	11	360	4.32	59	As on Plan				4/4	SM	F	Exposed shallow roots caused by erosion	40+	B
T6	False Acacia	7	120	1.44	7	1.5	1.5	1.5	1.5	2/2	Y	F	Tree of typical form and condition	40+	C

Warrender														Date: 27.07.15	
						Canopy Spread						General Observations			
Tree Ref. No.	Species	Height (m)	DBH (mm)	RPR (m)	RPA (m)	N	E	S	W	Ht of 1st sig branch / canopy	Life Stage	Physiological	Structural	Estimated remaining contribution (BS 5837)	BS Cat
T7	Norway Maple	10	320	3.84	46	4	4	4	4	3/3.5	SM	F	Shallow roots. Tree of typical form and condition	40+	C
G6	Midland Thorn	5	190	2.28	16	As on Plan				3/3	SM	F	Tree of typical form and condition	40+	C
T8	Pine	11	340	4.08	52	3	3	3	3	5/4	SM	F	Damage to roots from road alignment. Tree of typical form and condition	40+	B
G7	Almond, Cherry	8	360	4.32	59	As on plan				2/2	EM	Physiological	Sparse crown, chlorosis, dead wood in Almond	10+	C
T9	Ash	10	360	4.32	59	4	4	4	4	4/4	SM	Physiological	Small diameter dead wood throughout. Sparse crown	10+	C

## **Appendix 4 - Tree Survey Plan and Tree Protection Plan (TSP/TPP)**

**See attached plan**

## Appendix 5 - Tree Protection Barriers & Ground Protection

## 5.0 Design of welded mesh, Heras type tree protection barrier

Barriers should be fit for the purpose of excluding construction activity and appropriate to the degree and proximity of work taking place. The default specification should be in accordance with 6.2.2.2 of BS 5837, as set out below.

- 5.0.1 **Specifications:** Barrier shall be a minimum 2 m high. It shall consist of a vertical and horizontal scaffold framework, well braced to resist impacts, as illustrated below. The vertical tubes should be spaced at a minimum interval of 3 m and driven securely into the ground. Onto this framework, welded mesh panels should be securely fixed. See Figure 2 overleaf.
- 5.0.2 Where site circumstances and associated risk of damaging incursions into the RPA do not necessitate the default level of protection, an alternative specification may be used if agreed with the local authority. An example would be 'Heras' type welded mesh panels on rubber or concrete feet. The panels should be joined together using a minimum of two anti-tamper couplers, installed so that they can only be removed from inside the fence. The panels should be supported on the inner side by stabiliser struts. See Figure 3 overleaf. All-weather notices should be attached to the barrier with words such as 'TREE PROTECTION ZONE - NO ACCESS'.
- 5.0.2 **Location:** Barriers shall be positioned on the perimeter of the Root Protection Area to define the Construction Exclusion Zone or as specified in the Tree Protection Plan.

**Shown on the Tree Protection Plan by a dashed black line**

Figure 1 Example of welded mesh barriers in use





Figure 2 Default specification for protective barrier

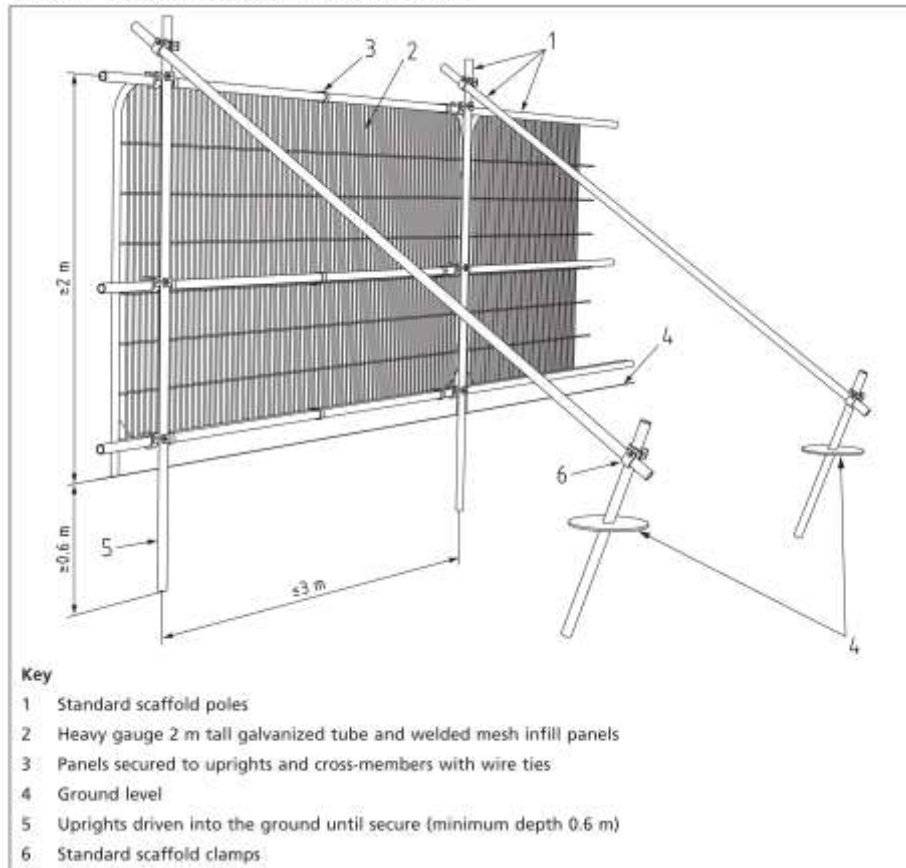
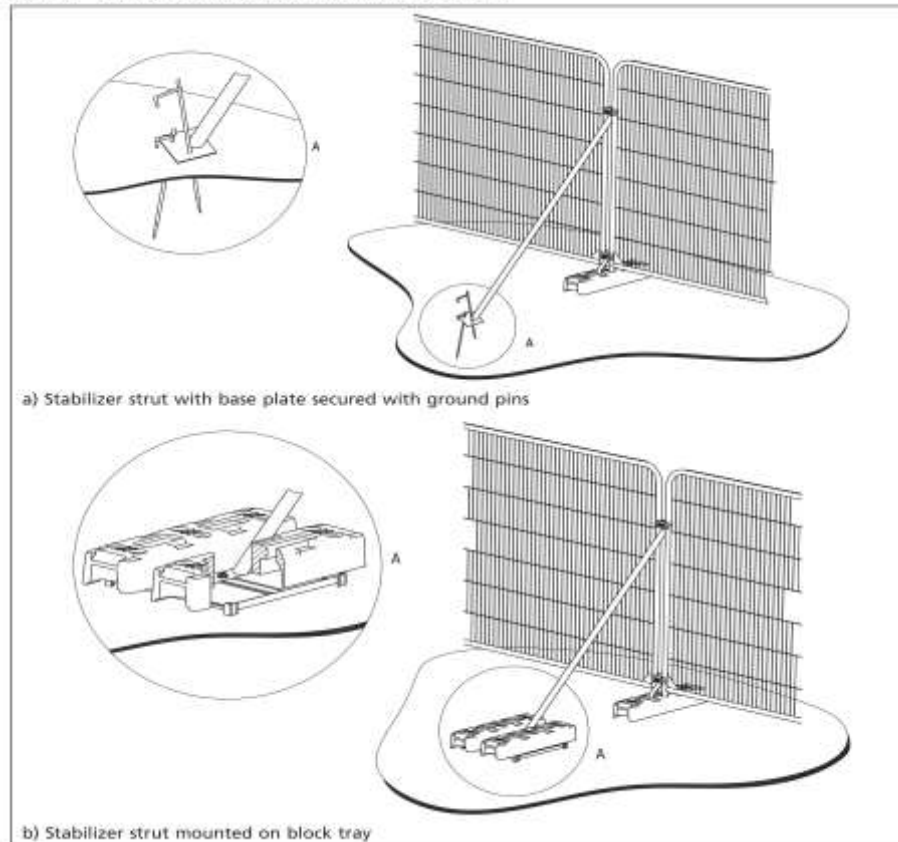


Figure 3 Examples of above-ground stabilizing systems



Figures above are reproduced with the permission of the British Standards Institute.

## 5.1 Ground protection

In areas where it is not possible to erect protective fencing, ground protection must be used to protect the CEZ of trees. Where it has been agreed during the design stage, and as shown on the tree protection plan, that vehicular or pedestrian access for the construction operation may take place within the CEZ, the possible effects of construction activity should be addressed by a combination of barriers and ground protection. The position of the barrier may be within the CEZ at the edge of the agreed working zone but the soil structure beyond the barrier to the edge of the CEZ should be protected with ground protection. **This must be installed before any site activity takes place to protect soil structure and tree roots.**

5.1.1 Ground protection must be fit for the purpose of supporting any traffic entering or using the site without being distorted or causing compaction of underlying soil. It might comprise one of the following:

- *for pedestrian movements or the erection of scaffolding within the RPA the installation of ground protection in the form of a single thickness of scaffold boards either on top of a driven scaffold frame, so as to form a suspended walkway, or on top of a compression-resistant layer (e.g. 100 mm depth of woodchip laid onto a geotextile);*
- *for pedestrian-operated plant up to a gross weight of 2 t, proprietary, inter-linked ground protection boards or panels placed on top of a compression-resistant layer (e.g. 150 mm depth of woodchip), laid onto a geotextile membrane; or*
- *for wheeled or tracked construction traffic exceeding 2 t gross weight, an alternative system (e.g. proprietary systems or pre-cast reinforced concrete slabs) to an engineering specification designed in conjunction with arboricultural advice, to accommodate the likely loading to which it will be subjected.*



5.1.2 The following is a list of suppliers of temporary ground protection including polymer, metal or wooden panels. Other companies supply similar products and the following are given only as an example:

- [www.ground-guards.co.uk](http://www.ground-guards.co.uk)
- [www.evetrakway.co.uk](http://www.evetrakway.co.uk)
- [www.trakmatseurope.com](http://www.trakmatseurope.com)
- [www.centriforce.com](http://www.centriforce.com)
- [www.marwoodgroup.co.uk](http://www.marwoodgroup.co.uk)
- [www.groundtrax.com](http://www.groundtrax.com)

Cellular confinement no-dig systems can also be used.

5.1.3 Example of proprietary ground protection panels



## Appendix 6 - Methods of Work Close to Trees

## **6.0 Guidance for working within RPAs**

(This chapter sets out the general principles that must be followed when working in RPAs).

### **6.1 Removal of hard surfaces within RPAs**

- 6.1.1 All structures including hard surfaces, walls and fences within construction exclusion zones (CEZ) must be removed following the methods detailed below to minimise damage to tree roots.
- 6.1.2 The use of conventional tracked and wheeled machinery causes damage to soil structure from compaction and damage to roots from excavation and must not be used within the CEZ. All areas of hard surfacing requiring removal within a CEZ will be broken up using a hand held pneumatic drill or mounted hydraulic breaker attached to a digger located outside the CEZ. The broken rubble will then be removed by hand.
- 6.1.3 The only exception to this is where the hard surface is of such a size as not to be reachable from outside the CEZ. In this situation a rubber tracked mini-digger will be used. The maximum working height of the machine must be less than the lowest branch of any overhanging trees.
- 6.1.4 The mini-digger will work from the existing hard surface pulling the debris away from the tree/s.
- 6.1.5 No excavation of existing soil beneath the hard surface will take place.
- 6.1.6 Immediately after removal of the hard surface, topsoil or sharp sand must be used to cover the soil surface and any roots to prevent drying out.
- 6.1.7 Upon completion, the protective fencing must be moved out to the edge of the CEZ or ground protection used if access is required.

### **6.2 Services**

- 6.2.1 The location and direction of new services should be designed to allow for services to be routed away from the RPAs of retained trees.
- 6.2.2 If any services need to run through a CEZ the main contractor must contact the project arboriculturist before any works are undertaken. Agreement will then be sought from the LPA tree officer on methodology. Works will only begin with the agreement of the LPA. Methodology used must comply with *NJUG Volume 4: Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees*, which can be summarised as:
- *hand excavate only;*
  - *work carefully around roots only cutting as a last resort;*
  - *do not cut roots over 25mm in diameter without referring to the project arboriculturist; and*
  - *for roots less than 25mm in diameter use a sharp tool to make a clean cut leaving as small a wound as possible.*

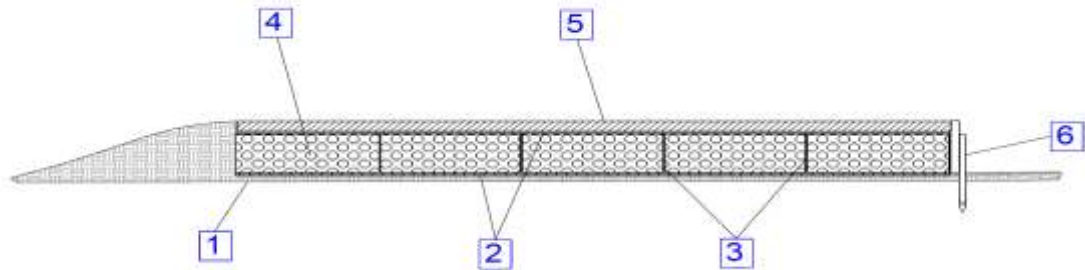
### 6.3 New hard surfaces within RPAs

6.3.1 Where it has been agreed with the LPA that hard surfaces are acceptable within RPAs of retained trees, these will require designing to be of above ground, no-dig construction to minimise impact on tree roots and soil structure. In addition, finished surfaces of the car parking and paved areas will need to be of porous design to allow water and air passage in and out.

6.3.2 An illustrative example of a cellular confinement no-dig system can be found below. The actual system will need to be designed by a structural engineer to accommodate the loadings anticipated.

6.3.3 The principles to follow are:

- *no excavation other than the removal of existing hard surfaces if required, or the removal of surface vegetation and no more than 50mm of leaf litter, vegetation debris etc;*
- *a method to spread and support the load of the hard surface and anticipated usage without causing compaction of the soil structure beneath;*
- *the use of a porous sub-base and finishing layer to allow water and air diffusion in and out of the soil;*
- *porosity must be designed to be long-term and not to block with fine particles in the short-term; therefore, irregular, no-fines aggregate must be used; and*
- *the pH of the aggregate must be considered as many conventional road stones have very high pH values which can damage susceptible trees and therefore aggregates with a near neutral pH should be preferred.*



#### Notes

- 1** Existing ground
- 2** Geotextile membrane
- 3** Cellular confinement system

- 4** 20/40mm clean angular stone
- 5** Porous surface layer
- 6** Timber retaining edge



## **6.4 Fencing within RPAs**

- 6.4.1 Where posts are to be installed within RPAs the holes must be dug carefully by hand. If roots with a diameter of 25mm or greater are found, the position of the post must be moved. Roots smaller than 25mm diameter can be cut with sharp tools leaving as small a wound as possible. The sides of the hole should be lined with an impermeable membrane such as plastic sheeting to prevent the caustic and toxic effects of wet cement in the concrete from damaging tree roots.

## Appendix 7 - Tree Work Schedule



## 7.0 Tree Work Schedule

All tree works to be undertaken in accordance with *BS 3998:2010 Recommendations for tree works*, or industry best practice.

Tree no.	Species	Proposed works	Reason	Grade
G1	Silver Maple, Norway Maple, Alder, Cherry, Whitebeam	Section removal	To accommodate the proposed layout	B2
G2	Purple Norway Maple, Midland Thorn	Remove	To accommodate the proposed layout	C2
G4	Silver Maple, Purple Norway Maple	Remove	To accommodate the proposed layout	B2
G6	Midland Thorn	Remove	To accommodate the proposed layout	C2

## Appendix 8 - Specific Report Caveats

## **8.0 Specific report caveats**

- 8.0.1 The survey was based on drawings provided by the client, however a topographical plan identifying accurate tree locations was not available during the survey and all trees were plotted by hand.
- 8.0.2 No internal diagnostic equipment was used other than a sounding mallet and probe.
- 8.0.3 The survey is concerned solely with arboricultural issues.
- 8.0.4 Any work with trees will discharge the due diligence requirements of all relevant wildlife and countryside legislation.
- 8.0.5 Trees are dynamic living organisms whose health and condition can change rapidly. Any changes to the tree or conditions close to the tree may change the stability and condition of the tree and a further examination would be required and may affect the validity of this report.
- 8.0.6 This report is valid for 12 months.

## **8.1 Copyright and non-disclosure**

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