Arboricultural Impact Assessment

10 Downside Crescent, London, NW3 2AP

Callum Campbell FdSc Arb MArborA

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Reviewer	MB
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Professional Service • Pragmatic Solutions
Ecology, Arboriculture, Countryside Management
Phone: 01268 711 021 Email: team@ses-eco.co.uk website: www.ses-eco.co.uk
Address: Unit 1, The Sudbury Stables, Sudbury Road, Downham, Essex, CM11 1LB

Summary

An arboricultural survey has been carried out, and this report prepared to support a planning application for the provision of an extension with basement to the rear of no.10 Downside Crescent, London, NW3 2AP.

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.*

1 area of ornamental shrubs (S10) in the rear garden 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.

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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 with basement to the rear of no.10 Downside Crescent, London, NW3 2AP. It has been produced in accordance with the principles of British Standard *BS 5837:2012, Trees in relation to design, demolition and construction - Recommendations* (BS 5837) 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 to construct a new development on land at 95 Seabrook Road, Hythe.

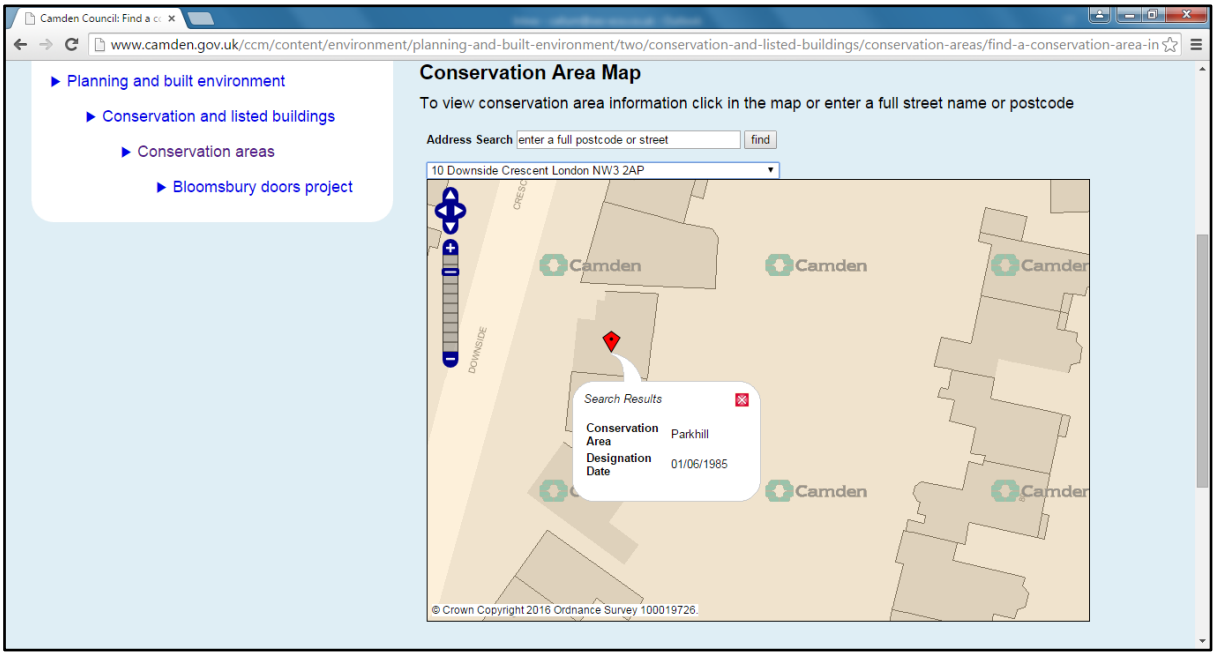
Image 1: Approximate area of development envelope.

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 was undertaken with the London Borough of Camden to establish if the site was subject to any planning constraints in regards to trees. The search concluded that the site is within the Hillpark Conservation Area (CA), and as such all trees on and adjacent to the site are protected under section 211 of the Town & Country Planning Act 1990.



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 visit

A site visit was undertaken on 22nd July 2016 by Southern Ecological Solutions Ltd. The weather was overcast with light rain.

2.2 Site description

The proposal site comprises a rear garden of a residential town house in an urbanised location close to Belzise Park, with several well established ornamental shrub beds and semi mature birch trees. There is one large ash tree at the front of the property on land directly adjacent which provides considerable visual impact and amenity in the immediate vicinity.

2.3 The subject trees

A total of 5 individual trees, 1 group of trees, 2 hedges and 2 areas of ornamental shrubs were identified as the subject of this report. These comprise 1 'B' category and '4' category individual trees, 1 'C' category group, 2 'C' category hedges and 2 areas of ornamental shrubs, all 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).

2.4 Comments on specific trees

2.4.1 Of the trees identified during the survey, none of the trees in the rear garden are visible from the public highway, and mainly comprising shrubs and small trees. One large ash (T1) is situated on third party land adjacent to the public highway. However, there is existing hard standing covering the theoretical RPA of this tree.

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)[1] 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.

Building lines should ideally be at least 2m outside the RPA to allow for scaffolding and other buildability issues and to allow for service runs and paths around the edges of buildings.

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.

[1] *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)

Trees to be retained have black centres and green outlines whilst trees to be removed have red centres and a red, dashed, outline. Tree protection is shown as barriers and/or ground protection defining the Construction Exclusion Zone (CEZ)[2] 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 area of ornamental shrubs (S10) will require removal to accommodate the design layout.

3.5 Trees to be pruned

It is possible that hedge trimming may be required at some stage of the development. All tree pruning and felling works to facilitate the development can be found at appendix 3 and 7.

3.6 Root protection area incursions

None of the trees to be retained will have their root protection areas directly impacted by the proposed development layout. Details of work methodology close to trees can be found in appendix 6 of this report.

3.7 Protection of retained trees

All trees for retention will be 'fenced off' with protective barrier fencing as per specifications in appendix 5 to prevent materials, plant etc. being stored in the RPAs of these trees.

3.8 Impact on local amenity

The proposed shrub removals are all of low quality and amenity value. The existing landscape planting scheme is already quite densely stocked and therefore it is believed that the impacts to amenity will be negligible.

[2] *Construction Exclusion Zone. An area based on the RPA in m^2 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.

Following planning consent, a detailed arboricultural method statement may be required, and secured by an appropriately worded planning condition.

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 the 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 'Trees in relation to design, demolition and construction'*. 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 majority of the proposed site comprises unmade grass area, but there is one area of hard standing, and care must be used 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 within the RPAs of trees to be retained is not known at the time of writing. However, if there are areas that will be resurfaced within the RPAs of tree to be retained 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.*

4.5 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 The tree population comprises young and semi-mature mixed broadleaves and ornamental shrubs, with the majority of trees situated around the peripheries of the site in shrub beds.

5.2 None of the trees identified during the survey will be impacted by the proposed extension works.

5.3 Trees and shrubs for retention will require protection with barrier fencing.

5.4 The shrubs and woody vegetation proposed for removal are all of low quality and amenity value and should not be considered as a constraint to the proposals.

6.0 Recommendations

6.1 All trees for retention will be collectively or individually 'fenced off' with protective barrier fencing as per specifications in appendix 5 (or using a lesser specification suitable for the site size and duration of works) to prevent materials, plant etc. being stored in the RPAs of these trees in accordance with BS 5837:2012 'Trees in Relation to design, demolition and construction – recommendations' (Figure 2) and to exclude construction activity within the root protection areas of all trees identified for retention.

6.2 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.

6.3 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.

Callum Campbell FdSc (Arb): MArborA

Senior arboricultural consultant— Southern Ecological Solutions Ltd.

I have over 20 years' experience in arboriculture, which includes 6 years as a forestry/arboricultural manager, 3 years as a County Council Tree Officer and 5 years in Arboricultural consultancy. I also hold the LANTRA Professional Tree Inspection certificate which is the industry's premier tree inspection qualification and I am a licenced Quantified Tree Risk Assessment (QTRA) user.

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 trees were understood to be accurate and SES Arboriculture 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[3] 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.*
- *Site layout.*

1.2 Contacts

Name	Company/organisation	Tel. no.
Hagop Matossian	Bow Tie Construction Ltd	-
Callum Campbell	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;*

[3] *BS 5837recommends that in most circumstances all trees over 75mm stem diameter should be included in a pre-planning land and tree survey*

- *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.*

1.4 Legal Constraints and Liabilities

1.4.1 **Tree Preservations Orders/Conservation Areas:** A search was undertaken with Shepway District Council to establish if the site was subject to any planning constraints in regards to trees. The search concluded that none of the trees are the subject of a Tree Preservation Order (TPO) and the site is not within a 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** = Group **H** = Hedge **S** = Shrub mass

Age Class:

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

Abbreviation:

Dia	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
Stems	Numbers of stems or M/S = multi-stemmed
Ht	Height in metres
Crown clear	Height of first significant branch above ground level and direction of growth
NSEW	Crown spread at the four cardinal points. Ø = average crown radius
Cond	Physiological condition. G = good; F = fair; P = poor; D = dead
Life exp	Estimated remaining contribution in years
RPR	Root protection radius in metres based on stem diameter
RPA	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
CEZ	Construction exclusion zone. An area based on the RPA in m^2 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.

A	High quality and value (non-fiscal) with at least 40 years remaining life expectancy
B	Moderate quality and value with at least 20 years remaining life expectancy
C	Low quality and value with at least 10 years remaining life expectancy, or young trees with a stem diameter below 150 mm
U	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 Schedules

Tree Survey Schedule

Client: C/O Bowtie Construction Ltd. **Surveyed by**: Callum Campbell

Site: 10 Downside Crescent, London, NW3 2AP. **Date**: 25th July 2016

Tree ref no.	Species	Stem Ø (mm) at 1.5m	Ht (m)	Crown spread (m)				Crown clear (m)	Age class	Condition: (P) Physiological (S) Structural	Preliminary management recommendations	Est life span (yrs)	Grade	Radii single stem	RPA
				N	E	S	W								
T1	Ash (*Fraxinus excelsior*)	Est 800	16	6	3	6	6	3.5	EM	(P) Good (S) Fair: Lapsed pollard with multiple stems at approx.2m. Off- site tree to front of adjacent property to north of no.10.	None.	20+	B1	9.6	289
H2	Yew (*Taxus baccata*)	<75	2.0	-	-	-	-	-	Y	(P) Fair (S) Fair: Maintained hedge to front of property.	None.	10+	C2	-	-
H3	Cherry laurel (*Prunus laurocerasus*)	<75	2.0	-	-	-	-	-	Y	(P) Fair (S) Fair: Maintained hedge to front of property.	None.	10+	C2	-	-
T4	Lawson cypress (*chamaecyparis lawsoniana*)	Est 350	8.0	1.0	1.0	1.0	1.0	1.5	SM	(P) Fair (S) Fair: Off-site ornamental conifer at front of adjacent property to south of no.10.	None.	20+	C1	4.2	55
T5	Silver birch (*Betula pendula*)	285	7.0	3.0	2.0	2.0	2.0	2.0	SM	(P) Fair (S) Fair: Previously crown reduced and crown lifted with large pruning wounds on main stem.	None.	10+	C1/2	3.4	36
T6	Cherry plum (*Prunus cerasifera*)	Est 200	5.0	2.0	2.0	2.0	2.0	1.0	EM	(P) Fair (S) Fair: Off-site tree behind adjacent fence to south of no.10. Unable to inspect.	None.	10+	C1/2	2.4	18
T7	Birch (*Betula sp*)	180	4.5	2.0	2.0	2.0	2.0	1.0	SM	(P) Good (S) Fair: Ornamental variety in shrub bed, no signs of ill health or significant structural defects.	None	20+	C1/2	2.1	14

Client: C/O Bowtie Construction Ltd. **Surveyed by**: Callum Campbell

Site: 10 Downside Crescent, London, NW3 2AP. **Date**: 25th July 2016

Tree ref no.	Species	Stem Ø (mm) at 1.5m	Ht (m)	Crown spread (m)				Crown clear (m)	Age class	Condition: (P) Physiological (S) Structural	Preliminary management recommendations	Est life span (yrs)	Grade	Radii single stem	RPA
				N	E	S	W								
S8	*Escallonia sp* *Pyracantha sp* *Sambucus sp* *Ligustrum sp* *Taxus sp* *Eleagnus sp*	<75	1 - 2	-	-	-	-	-	Y	(P) Fair (S) Fair: Mixed ornamental shrub bed along southern side of rear garden.	None.	10+	C2	-	-
G9	2 no. whitebeam (*Sorbus aria*)	Ave 120	4.0	-	-	-	-	-	Y	(P) Fair (S) Fair: Two young trees to front pf shed in rear garden.	None.	20+	C2	1.4	6.5
S10	*Buxus sp* *Sambucus sp* *Acer negundo* *Laurus nobilis* *Fatsia japonica*	<75	1 - 2	-	-	-	-	-	Y	(P) Fair (S) Fair: Mixed ornamental shrub bed along southern side of rear garden.	None.	10+	C2	-	-

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.

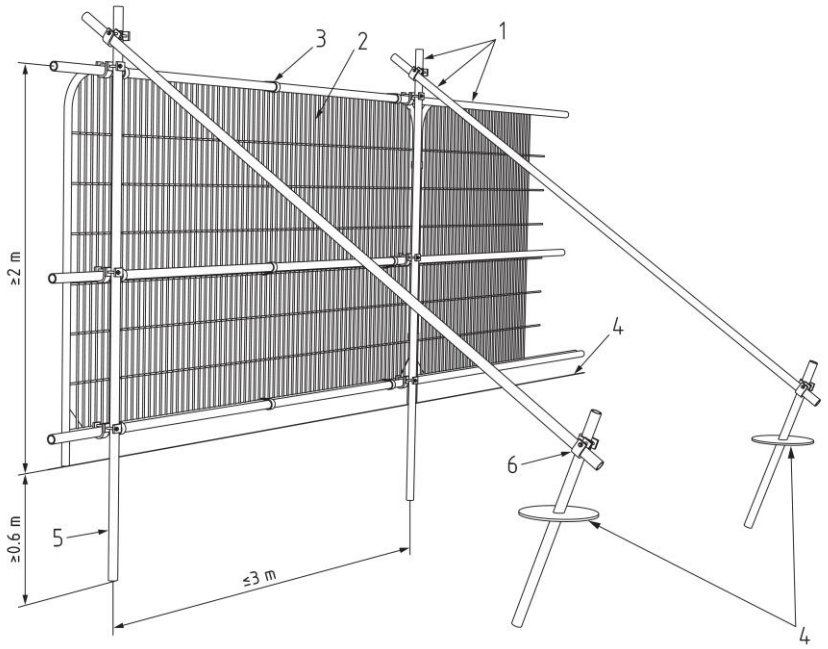
Where site circumstances and associated risk of damaging incursions into the RPA do not necessitate the default level of protection, an alternative specification may be used if agreed with the local authority. An example would be 'Heras' type welded mesh panels on rubber or concrete feet. The panels 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**

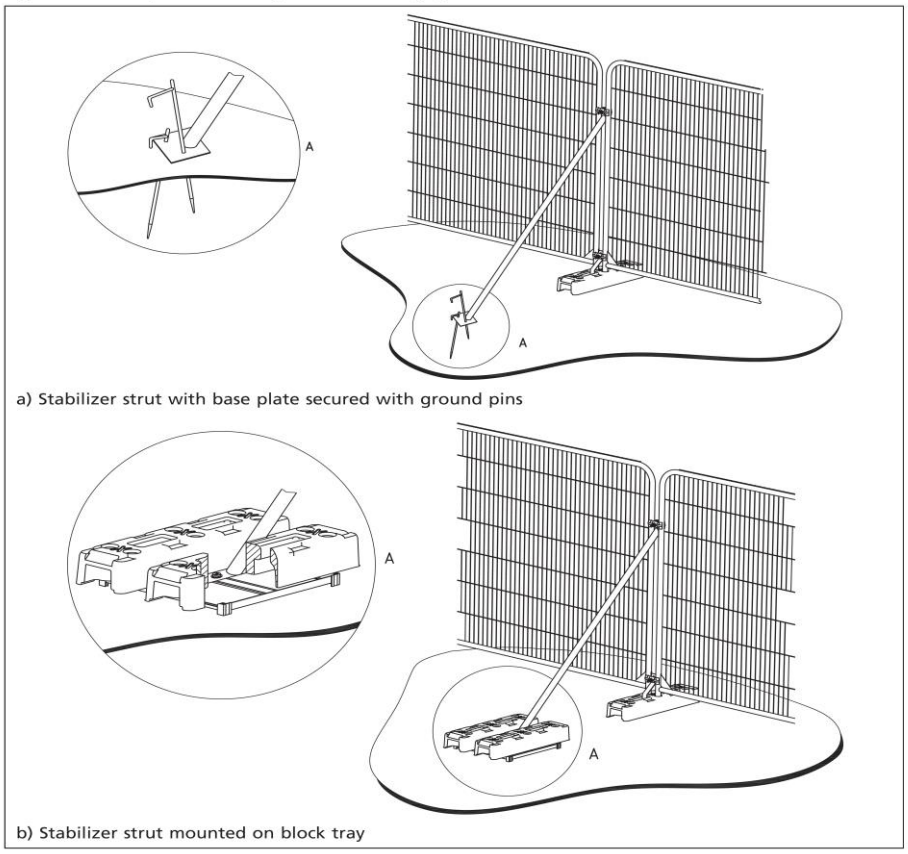
Figure 2 **Default specification for protective barrier**



Key

1 Standard scaffold poles
2 Heavy gauge 2 m tall galvanized tube and welded mesh infill panels
3 Panels secured to uprights and cross-members with wire ties
4 Ground level
5 Uprights driven into the ground until secure (minimum depth 0.6 m)
6 Standard scaffold clamps

Figure 3 **Examples of above-ground stabilizing systems**



a) Stabilizer strut with base plate secured with ground pins

b) Stabilizer strut mounted on block tray

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
- www.evetrakway.co.uk
- www.trakmatseurope.com
- www.centriforce.com
- www.marwoodgroup.co.uk
- 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

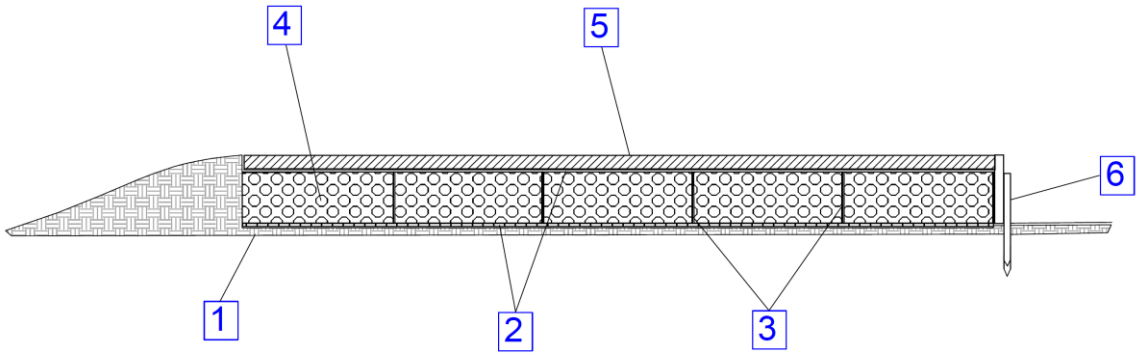
6.3.1 Where it has been agreed with the LPA that hard surfaces are acceptable within RPAs of retained trees, these will require designing to be of above ground, no-dig construction to minimise impact on tree roots and soil structure. In addition, finished surfaces of the car parking and paved areas will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

Example of a Cellular Confinement System



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.

6.5 Landscaping works within RPAs

6.5.1 Landscape operations within tree protection zones have the potential to damage trees if not carried out with care; in addition, the removal of protective fencing to carry out landscape operations may allow other contractors in previously protected areas.

6.5.2 If protective fencing is taken down to facilitate landscaping operations, the area of the CEZ must be delineated by pins and marker tape, spray paint, or some other method to clearly show the extent of the CEZ.

6.5.3 The preparation of soil for planting and laying turf must be carried out by hand where within CEZs. Cultivation should be kept to a minimum and new topsoil added must not exceed 100mm in depth within 1m of the stem of any tree.

6.5.4 Topsoil and other materials must be transported by wheelbarrow on running boards when working within CEZs.

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
S10	Mixed ornamental shrubs	Remove section nearest rear wall	To accommodate the proposed design layout	C2

Appendix 8 - Specific Report Caveats

8.0 Specific report caveats

- *The survey was based on a drawing provided by the client, a topographical plan identifying accurate tree locations was not available at the time of the tree survey.*
- *No internal diagnostic equipment was used other than a sounding mallet and probe.*
- *The survey is concerned solely with arboricultural issues.*
- *Any work with trees will discharge the due diligence requirements of all relevant wildlife and countryside legislation.*
- *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.*
- *This report is valid for 12 months.*

8.1 Copyright and non-disclosure