Treework Environmental Practice

Arboricultural Impact Assessment

63 Hillfield Road, London NW6 1QB

Report Reference Number: 170726-2.0-63HR-AIA-LF

On behalf of

Frank Rodrigues and Deirdre King, 67 Hillfield Road, London NW6 1QB

08 February 2018

Document Control Sheet

Project Name: **63 Hillfield Road, London NW6 1QB**

Report Ref: **170726-2.0-63HR-AIA-LF**

Report Title: **Arboricultural Impact Assessment**

	Name	Position	Date
Prepared by:	Luke Fay	Senior Arboricultural Consultant	26/07/2017
Surveyed by:	Luke Fay	Senior Arboricultural Consultant	28/06/2017

Revision	Date	Description	Prepared by
1.0	26/07/2017	Draft	LF
1.1	26/07/2017	Issue	LF
2.0	08/02/2018	Revised following updated design layout	LF

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Executive Summary

- This report provides an assessment of the impact of the proposal upon on site trees and relevant off-site trees, and makes recommendations for mitigating any negative impacts. It is suitable for submission in support of a planning application. The proposal consists of *refurbishment of 63 Hillfield Road and development of land to the rear including:*
    - *Basement, rear and side extension, rear dormer and conversion of existing building from two to three flats*
    - *New two storey three bedroom house on land to rear*

- The design has been developed with careful consideration to minimise the impact on the most important trees.

- Eight tree features were surveyed. The data for each is presented within the Tree Schedule at Appendix A. Three of these tree features are adjacent to the site. The five tree features that are located within the site are categorised C category trees and four of these trees are not clearly visible from public spaces outside of the site.

- Four tree features have been identified for removal to facilitate the development, all of which are category C and none of which are clearly visible from public spaces outside of the site.

- Two trees (T1 and T2) recorded in neighbouring gardens to the east of the site do not have Root Protection Areas or canopies that extend into the site and so will not be affected by the proposal.

- Construction and excavation works will extend into approx. 12% of the RPA of one Lawson cypress tree (T3) which is located at the northern boundary within the site. This encroachment will not significantly impact the physiological and structural condition of this vigorous cypress tree. Sufficient space and adequate protection measures have been set out to ensure that this tree is not damaged during the pre-construction and construction phase and to enable its successful development post-construction. Retained tree protection measures are discussed throughout this report and illustrated on the Tree Protection Plan at Appendix B.

- Formative pruning has been proposed for T3 to reduce shadowing / shading of the lightwell at the north of the proposed building, to prune the crown to a compact form and remove a climbing plant from its branches while retaining screening to street.

1 Introduction

1.1 Brief and Context

1.1.1 Treework Environmental Practice was instructed by Frank Rodrigues on 08 June 2017 to provide an Arboricultural Impact Assessment, in accordance with British Standard BS5837: 2012 Trees in *Relation to Design, Demolition and Construction – Recommendations*, of the effect of development proposals on trees at 63 Hillfield Road, London NW6 1QB.

1.1.2 Michael Schienke instructed revision of the Arboricultural Impact Assessment and Tree Protection Plan, on behalf of Frank Rodrigues, on 08 February 2018 following revision of the design layout of the scheme.

1.1.3 Trees are a material consideration for a Local Planning Authority when determining planning applications, whether or not they are afforded the statutory protection of a Tree Preservation Order or Conservation Area. British Standard BS 5837:2012 *Trees in Relation to Design, Demolition and Construction* sets out the principles and procedures to be applied to achieve a harmonious and sustainable relationship between trees and new developments. The Standard recommends a sequence of activities that starts in the initial feasibility and design phase (RIBA Stage 2 'Concept Design') with a survey to qualify and quantify the trees on site and establish the arboricultural constraints to development (above- and below-ground) to inform the design in an iterative process, and continues with an assessment of the arboricultural impacts of the final design and measures to mitigate such impacts should they be negative. Detailed technical specifications for mitigation and protection measures are devised in the design phase that follows (RIBA Stage 3-4 'Developed and Technical design'), and the sequence ends with the Implementation and Aftercare phase (RIBA Stages 5-7) with the implementation of those measures once planning permission is granted, guided by Arboricultural Method Statements (RIBA Stage 4-5, 'Technical Design and Construction) and professional guidance where appropriate.

1.1.4 This Arboricultural Impact Assessment (AIA) reports on the direct and indirect impacts of the proposed development on trees in terms of both the buildability of the proposals and the long-term impact of the finished scheme, and where necessary presents mitigation for these impacts.

1.2 Purpose of this Report

1.2.1 This AIA, and accompanying Tree Schedule and Tree Protection Plan, is provided to support a planning application for the proposed development. It sets out the arboricultural impacts of the proposals using the following considerations as a framework:

- Trees to be removed and trees to be retained.

- Remedial tree work to retained trees to allow development and ensure retained trees will form a harmoniously integrated component of the proposed development.
- Suitable measures to protect retained trees.
- Special construction or engineering measures required to enable trees to be harmoniously integrated into the proposed development.

1.3 The Development

1.3.1 The proposed development is for *refurbishment of 63 Hillfield Road and development of land to the rear including:*

- *Basement, rear and side extension, rear dormer and conversion of existing building from two to three flats*
- *New two storey three bedroom house on land to rear*

1.3.2 The following documents have been provided to and reviewed by Treework Environmental Practice:

Document Title	Document/Drawing number	Originator
Pre-Planning Presentation	0775 (29/03/2017)	Vorbild
Site Location Plan	0775 OS Map	StreetWise
Existing Basement and Ground Floor Plan	A-(10)-010 (21/07/2017)	Vorbild
Proposed Building Plan - Lower Ground Floor	A-(13)-014 (02/02/2018)	Vorbild
Proposed Building Plan - Ground Floor and Roof	A-(13)-015 (02/02/2018)	Vorbild
Tree Constraints Plan	170726-1.1-63HR-TCP-MM	Treework Environmental Practice

2 Existing Tree Population and Constraints

2.1.1 A survey covering trees on site and trees on adjacent land close enough to be affected by the development was undertaken on 28 June 2017. The full survey results are presented in the Tree Schedule at Appendix A.

2.1.2 The survey was undertaken based on trees plotted using an outline base map as reference in Treework Environmental Practice's specialist tree management software – MyTrees. The basemap contained a measured survey of some of the trees. Trees and hedges were plotted on the basemap using the measured survey as reference with measurements taken from features on site where measured survey information was not available.

2.1.3 The proposed development site currently houses several small garden trees and shrubs including cypress, holly, pyracantha, sumach and yew; one larger Lawson cypress is located adjacent to the northern boundary of the site.

2.1.4 BS 5837:2012 recommends classifying trees into four quality and value categories to determine their relative retentive worth. A summary of the relative retentive worth of the trees on site as recorded during the tree survey and expressed by their categories is given in Table 1. Appendix A explains the BS 5837:2012 tree categorisation process.

Table 1: Trees/Groups in each Retention Category

BS Category	No. of Trees (T)	No. of Groups (G)	Total
A	0	0	**0**
B	1	0	**1**
C	5	2	**7**
U	0	0	**0**
Total	**6**	**2**	**8**

2.1.5 Trees present constraints to development both above and below ground. The above ground constraints comprise the physical extent of tree crowns The below ground constraints comprise the roots, and are expressed in terms of the root protection area (RPA), which is the minimum rooting area that a tree needs to sustain itself in reasonable health. These constraints, as established by the tree-survey, inform this assessment of the impact of the development proposals.

2.1.6 The full results of the tree survey on which this report is based are given in the Tree Schedule at Appendix A, and the above- and below-ground constraints are illustrated on the Tree Protection Plan at Appendix B. Each tree (T), tree group (G) and hedge (H) has been allocated an individual number to which it is referred in this report and all associated documents. The survey method and limitations are set out in Appendix E.

3 Arboricultural Impact of the Proposals

3.1 Tree Removal and Retention

3.1.1 Every effort has been made to retain trees wherever possible. Where high-quality trees have been found to be in conflict with the proposed design, the decision to remove such trees has been informed by an iterative process, following a review of alternative options.

3.1.2 The four tree features proposed for removal to facilitate the proposed development are summarised in Table 2 by BS5837: 2012 category. Trees have been identified for removal where they come into direct conflict with structures, where construction cannot be achieved without their removal, or where their future relationship with the development is considered unsustainable, having regard to their eventual potential size. All Category U trees should be removed due to their poor condition, which would be advisable regardless of the development proposal. Where higher value trees may be in minor conflict with the proposals, pruning or special construction and protection measures have been specified, as explained in Section 3.4.

Table 2 – Tree Features for Removal by BS Category

Category A Trees/Groups/Hedges/Woodland	**Category B Trees/Groups/Hedges/Woodland**	**Category C Trees/Groups/Hedges/Woodland**	**Category U Trees/Groups/Hedges/Woodland**
None	None	H4, T5, G6, T7	None
0	**0**	**4**	**0**

3.1.3 The felled trees comprise small garden trees which provide little / no amenity outside of the site.

3.1.4 All trees other than those in Table 2 will be retained and protected during development (see section 3.3).

3.2 Facilitative Tree Works

3.2.1 T3 will be formatively pruned to a more compact form to reduce shadowing / shading of the lightwell by lifting the crown on the southern aspect to approx. 4m and reducing the lateral extend of the crown to all aspects by pruning back peripheral growth while retaining live growth on all retained branches (it will not be pruned back to internal growth that no longer produces new shoots). Lower branches to the north, east and western aspects of the tree will not be removed in order to retain screening to street. This specification is presented in the Tree Schedule at Appendix A and an approx. outline of the reduced crown is indicated on the Tree Protection Plan at Appendix B.

3.3 Tree Protection

3.3.1 ***Root Protection Areas and Construction Exclusion Zones***

Retained trees will be protected during development by establishing a Construction Exclusion Zone (CEZ) around their Root Protection Areas (RPAs). RPAs are a layout design tool, indicating the minimum area around a tree deemed to contain sufficient roots and soil to maintain the tree's viability. RPAs should be treated as a precautionary area within which activities such as ground compaction, excavation, the storing of materials, ground level changes and other construction activity are likely to cause damage to trees and should therefore be excluded. This CEZ can be achieved by the erection of barriers at the locations shown on the Tree Protection Plan at Appendix B. Tree protection barriers must be installed before any demolition or construction works start, and, unless approved by the Local Planning Authority or by an arboriculturist approved by them, should remain in place until all construction activity has been completed.

3.3.2 The type of barriers should match the level of activity around the retained trees. Where a high level of construction activity is expected, fencing must be braced to be robust to vehicular impact and to prevent it from being easily repositioned; a specification similar to drawing 3 in BS 5837:2012 will be suitable (reproduced at Appendix D). In areas away from the main construction activity and vehicle movement, it may be appropriate to install a lower specification fencing, examples of which are given at Appendix D.

3.3.3 All protection fencing should carry identifying signs that state its purpose and proscribe its removal until all demolition and construction work is complete. An example sign is given at Appendix D.

3.3.4 ***Construction within the RPA***

The lightwell at the north of the proposed building encroaches on the RPA of T3 by approx. 4.6m^2 this represents loss of approx. 12% of the peripheral southwestern RPA of T3 (total

RPA of 38m^2). The retention of this tree is desirable and it has been assessed that the minimal incursion into the RPA of this Lawson cypress tree will not impact significantly on its physiological or structural viability. Root damage can be minimised by carrying out all excavation from within the footprint of the proposed building.

3.4 Additional Precautions

3.4.1 ***Utilities and Services***

Information on the location of utility and service runs for the proposed development was not available at time of writing. In principle, traditional trench-installed utilities should be routed outside of the RPAs of retained trees to avoid root damage. Where routing utility runs within RPAs is unavoidable, all work should comply with The National Joint Utilities Volume 4 and advice should be sought from a professional Arboricultural Consultant.

3.4.2 ***Soft Landscaping***

The Arboricultural Consultant should review any landscape operations that involve any work within the RPAs of retained trees and input additional site specific methodology where necessary.

Appendix A

Tree Schedule

63 Hillfield Road, London, NW6 1QB
Tree Survey BS5837-2012

Treework Environmental Practice

Tree/Group Reference	Tree Count	Species	Height (m)	Stem Count	Stem Diameter (cm)	Crown Radius (m)	Crown Clearance Height (m)	Lowest Branch Height (m)	Life Stage	Physiological Condition	Observations and Recommendations	RPA (m^2)	RPR (m)	Remaining Contribution (Years)	Retention Category	Retention Sub-category
T1	1	*Acer pseudoplatanus* Sycamore	15.0	1	45	N 4.0 E 4.0 S 4.0 W 4.0	1.0	4.0	Early Mature	Fair	Access to inspect base - Not possible. Base / stems obscured - Structure. Base / stems obscured - Vegetation. Crown reduction - Historic. Deadwood - Minor. Ivy or climbing plant. Tree in neighbouring property. Not plotted on topographical survey. Tree plotted using measurements from features present on site.	91.6	5.4	20-40	C	1
T2	1	*Eucalyptus sp.* Eucalyptus Tree	16.0	1	45	N 3.0 E 4.0 S 6.0 W 4.0	3.0	5.0	Early Mature	Fair	Access to inspect base - Not possible. Base / stems obscured - Structure. Base / stems obscured - Vegetation. Crown reduction - Historic. Deadwood - Minor. Ivy or climbing plant. Tree in neighbouring property. Not plotted on topographical survey. Tree plotted using measurements from features present on site.	91.6	5.4	20-40	C	1
T3	1	*Chamaecyparis lawsoniana* Lawson Cypress	10.0	1	29	N 3.5 E 3.5 S 3.5 W 3.5	1.6	1.2	Early Mature	Good	Ivy or climbing plant. **Formative prune - Structural.** Prune to reduce shadowing / shading of lightwell by lifting the crown on the southern aspect to approx. 4m and reducing the lateral extend of the crown to a compact form to all aspects by pruning back peripheral growth while retaining live growth on all retained branches (do not prune back to internal growth that no longer produces new shoots). Retain screening to street. **Climbing plant - Sever and strip.**	38.0	3.5	40+	C	1

63 Hillfield Road, London, NW6 1QB
Tree Survey BS5837-2012

Treework Environmental Practice

Tree/Group Reference	Tree Count	Species	Height (m)	Stem Count	Stem Diameter (cm)	Crown Radius (m)	Crown Clearance Height (m)	Lowest Branch Height (m)	Life Stage	Physiological Condition	Observations and Recommendations	RPA (m^2)	RPR (m)	Remaining Contribution (Years)	Retention Category	Retention Sub-category
H4	3 1 1	*Abies sp.* Fir sp. *Ilex aquifolium* Holly *Taxus baccata* Yew	3.0	1	9	N E S W 1.5 1.5 1.5 1.5	0.0	0.0	Semi Mature	Good	Base / stems obscured - Vegetation. Ivy or climbing plant. Not plotted on topographical survey. Tree plotted using measurements from features present on site. **Fell - Ground level.** Fell and remove stump to facilitate construction.	3.7	1.1	20-40	C	3
T5	1	*Taxus baccata* Yew	6.0	1	16	N E S W 2.0 2.0 2.0 2.0	2.0	1.2	Semi Mature	Good	Epicormic growth - Base / bole / principal stems. Pruning wounds - Historic. Not plotted on topographical survey. Tree plotted using measurements from features present on site. **Fell - Ground level.** Fell and remove stump to facilitate construction.	11.6	1.9	40+	C	1
G6	2 1 1	*Cupressocyparis leylandii* Leyland Cypress *other* Other *Pyracantha sp.* Pyracantha	4.0	1	8	N E S W 1.0 1.0 1.0 1.0	0.0	0.0	Early Mature	Fair	Not plotted on topographical survey. Tree plotted using measurements from features present on site. Group comprising garden shrubs and small hedgerow trees. Approx. average dimensions recorded. **Fell - Ground level.** Fell and remove stump to facilitate construction.	2.9	1.0	20-40	C	3
T7	1	*Rhus sp.* Sumach	5.0	1	9	N E S W 2.0 3.0 3.0 3.0	2.2	2.3	Early Mature	Good	Access to inspect base - Restricted / obscured. Base / stems obscured - Vegetation. Not plotted on topographical survey. Tree plotted using measurements from features present on site. **Fell - Ground level.** Fell and remove stump to facilitate construction.	3.7	1.1	20-40	C	1

63 Hillfield Road, London, NW6 1QB
Tree Survey BS5837-2012

Treework Environmental Practice

Tree/Group Reference	Tree Count	Species	Height (m)	Stem Count	Stem Diameter (cm)	Crown Radius (m)				Crown Clearance Height (m)	Lowest Branch Height (m)	Life Stage	Physiological Condition	Observations and Recommendations	RPA (m^2)	RPR (m)	Remaining Contribution (Years)	Retention Category	Retention Sub-category
						N	E	S	W										
T8	1	*Fraxinus excelsior* Ash	11.0	1	42	3.5	3.5	3.5	3.5	2.0	2.5	Mature	Good	Crown reduction - Recent.	79.8	5.0	20-40	B	1

Tree Schedule Key

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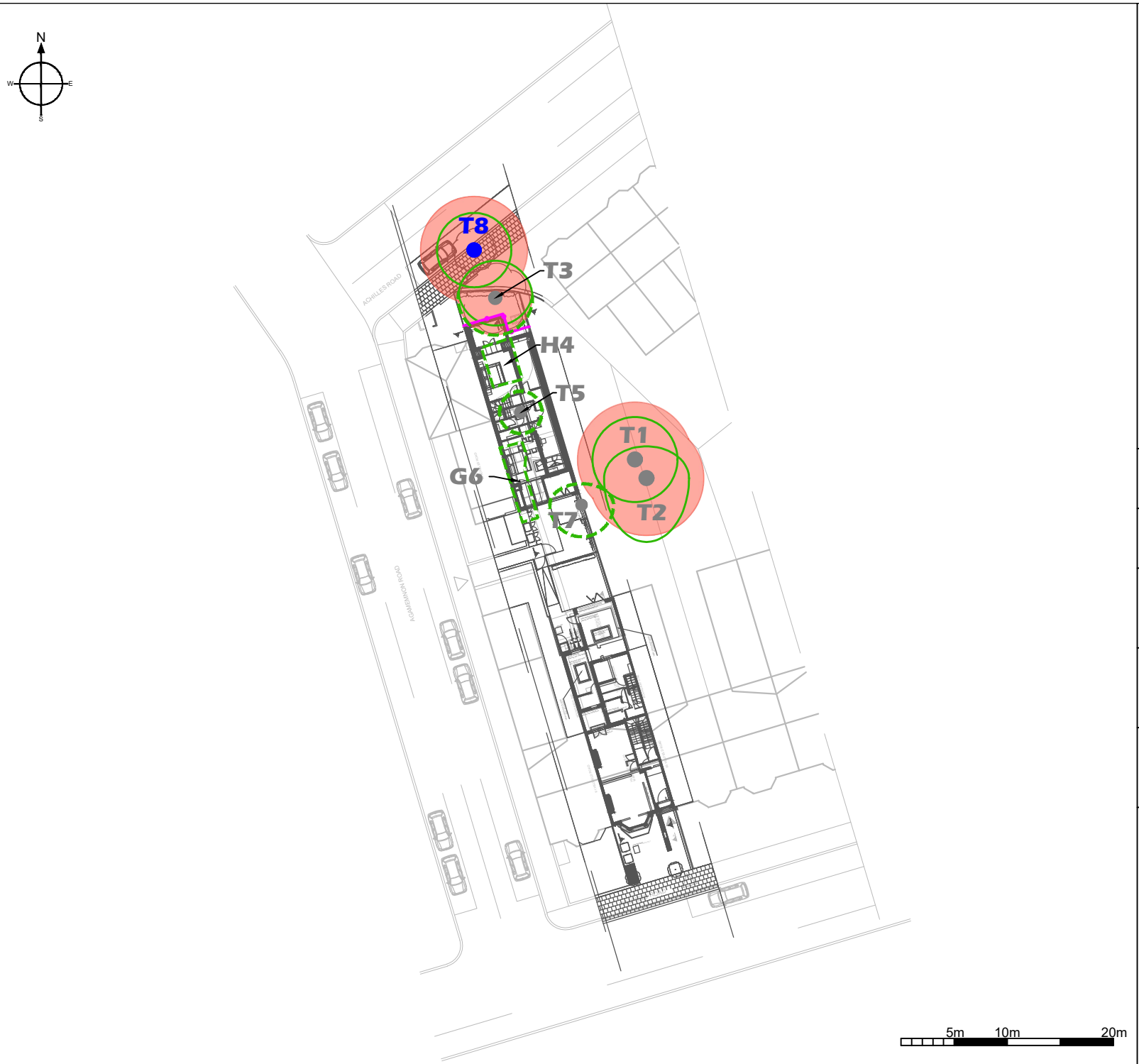
Tree/Group Reference	Reference number for individual trees or groups of trees, prefixed by T (Tree), G (Group), W (Woodland), H (Hedge) or S (Shrub) to indicate the type of feature.
Tree Count	Number of trees of a particular species recorded within a group feature, with the default value of 1 for single trees.
Species	Scientific name followed by common name (where available).
Height (m)	Tree height to the nearest metre, either measured with a device or estimated. Tree height for group records refers to the estimated average height of trees within the group (unrepresentative trees may be excluded from this estimate).
Stem Count	Number of stems. Stem count indicates whether the tree is single-stemmed or multi-stemmed and informs the RPA calculation.
Stem Diameter (cm)	Stem diameter, measured at 1.5m above ground level in accordance with Annex C of BS5837:2012. Diameters of multi-stemmed trees are presented as a combined stem diameter calculated in accordance with the formulae in Section 4.6.1 of BS5837:2012. Stem diameter for group records refers to the estimated average stem diameter of trees within the group (unrepresentative trees may be excluded from this estimate).
Crown Radius (m)	Distance from stem position to crown periphery in either the four cardinal or four ordinal directions, estimated to the nearest half metre. Crown spreads for group records refer to the estimated average spreads of trees within the group (unrepresentative trees may be excluded from this estimate).
Crown Clearance Height (m)	Distance between the ground and the lowest point of the crown periphery, estimated to the nearest half metre.
Lowest Branch Height (m)	Height of the lowest branch, the removal of which is considered likely to have a significant negative effect on the tree in terms of physiology or in terms of the size of wound created.
Life Stage	Young, Semi-mature, Early Mature, Mature, Late Mature, Ancient or Veteran.
Physiological Condition	Good, Fair, Poor, Dead.
Observations	General description of the tree or tree group, including basic features and morphology, structural and physiological condition, growing conditions and surroundings.
Recommendations	Management recommendations for tree works to address immediate unacceptable risks, or to facilitate development proposals.
RPA (m^2)	Minimum area around a tree deemed to contain sufficient roots and rooting soil volume to maintain the tree's viability, in which the protection of roots and soil structure is treated as a priority. Calculated from the stem diameter according to the formulae in BS5837:2012. RPA for group records is based on the estimated average stem diameter of trees within the group (unrepresentative trees may be excluded from this estimate).
RPR (m)	Radius of the RPA, in metres, when this is plotted as a circle around the tree stem.
Remaining Contribution (years)	Estimated number of years for which the tree will continue to make a positive contribution to the site, banded as < 10, 10-20, 20-40, 40 +.
Retention Category	Quality and value category (**A**, **B**, **C** or **U**) as defined in Table 1 of BS5837: 2012 (reproduced below), where **A** = high quality and value; **B** = moderate quality and value; **C** = low quality and value and **U** = tree identified for removal due to poor condition regardless of development proposals.
Retention Sub-category	One or more sub-categories (1-3) as defined in Table 1 of BS5837: 2012 (reproduced below), assigned for Categories **A**, **B** or **C** where 1 = arboricultural qualities, 2 = landscape qualities and 3 = conservation and cultural value.

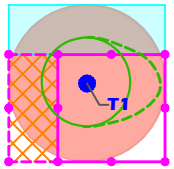
Table 1 **Cascade chart for tree quality assessment**

Category and definition	Criteria (including subcategories where appropriate)			Identification on plan
Trees unsuitable for retention (see Note)				
Category U Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years	• Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees (e.g. where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning) • Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline • Trees infected with pathogens of significance to the health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality *NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve; see 4.5.7.*			See Table 2
	1 Mainly arboricultural qualities	**2 Mainly landscape qualities**	**3 Mainly cultural values, including conservation**	
Trees to be considered for retention				
Category A **Trees of high quality** with an estimated remaining life expectancy of at least 40 years	Trees that are particularly good examples of their species, especially if rare or unusual; or those that are essential components of groups or formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue)	Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture)	See Table 2
Category B **Trees of moderate quality** with an estimated remaining life expectancy of at least 20 years	Trees that might be included in category A, but are downgraded because of impaired condition (e.g. presence of significant though remediable defects, including unsympathetic past management and storm damage), such that they are unlikely to be suitable for retention for beyond 40 years; or trees lacking the special quality necessary to merit the category A designation	Trees present in numbers, usually growing as groups or woodlands, such that they attract a higher collective rating than they might as individuals; or trees occurring as collectives but situated so as to make little visual contribution to the wider locality	Trees with material conservation or other cultural value	See Table 2
Category C **Trees of low quality** with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150 mm	Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories	Trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value; and/or trees offering low or only temporary/transient landscape benefits	Trees with no material conservation or other cultural value	See Table 2

Appendix B

Tree Protection Plan





- Tree or Group Reference Number
- Tree Stem Position A Category Tree
- Tree Stem Position B Category Tree
- Tree Stem Position C Category Tree
- Tree Stem Position U Category Tree
- Tree Crown
- Root Protection Area
- Tree Protection Fencing
- Initial Tree Protection Fencing
- Ground Protection
- Special Engineering /Supervised Excavations
- Construction Exclusion Zone
- Pruning/Tree Removal

Date:
February 2018

Scale:
1:500 @ A4

Project Name:
63 Hillfield Road, London, NW6 1QB

Drawing Title:
Tree Protection Plan

Drawing Number:
180208-1.2-63HR-TPP-MM

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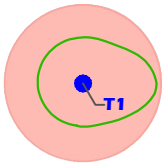
Appendix C

Tree Constraints Plan



- Tree or Group Reference Number (T1)
- Tree Crown
- Root Protection Area
- Tree Survey Boundary
- Tree Stem Position A Category Tree
- Tree Stem Position B Category Tree
- Tree Stem Position C Category Tree
- Tree Stem Position U Category Tree

Date:
July 2017

Scale:
1:500 @ A4

Project Name:
63 Hillfield Road, London, NW6 1QB

Drawing Title:
Tree Constraints Plan

Drawing Number:
170726-1.1-63HR-TCP-MM

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Appendix D

Tree Protection Specifications

Treework Environmental Practice

Technical measures to prevent tree damage

Tree Pruning

Tree pruning will be carried out where the design and / or planned site operations encroach into the crowns of trees and where these encroachments can be accommodated through facilitation pruning without significantly reducing the landscape value and / or viability of the tree.

Tree pruning operations will:

- be specified by the arboricultural consultant
- be in accordance with current best practice
- be carried out by a suitably experienced and qualified arborist

Tree Protection Fencing

Tree protection fencing will be located at the edge of the Construction Exclusion Zone (CEZ) and will be suitably robust to provide sufficient protection trees.

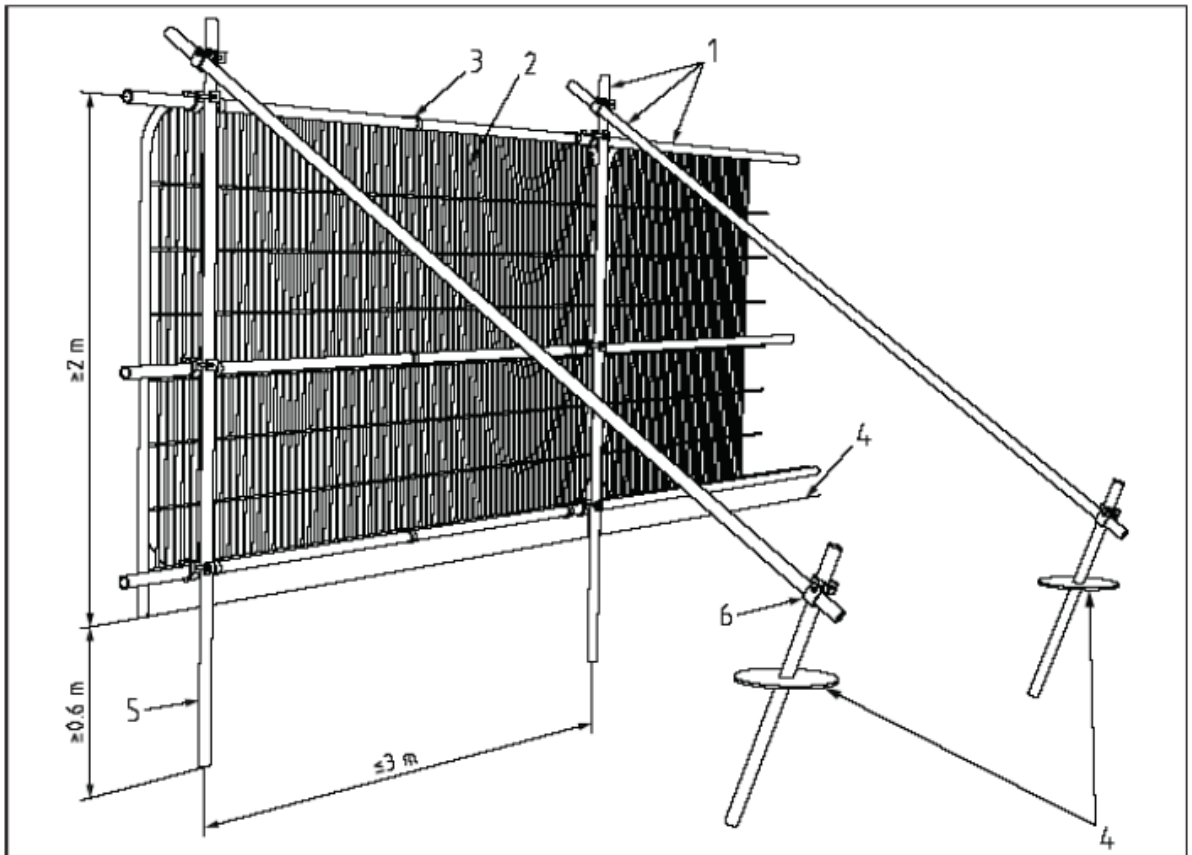
The performance requirement for fencing will be determined by the type of activity that will take place in the area around the CEZ.

Typically the performance requirement for the Tree Protection Fencing will be:

- Tree Protection Fencing will be installed prior to commencement of activity on the site.
- Tree Protection Fencing will only be removed once all works associated with the development have been completed.
- The Tree Protection Fencing will be installed and removed without causing damage to retained trees
- Installation, removal and, where required, replacement of Tree Protection Fencing will be supervised and signed off by the Arboricultural Consultant
- The Tree Protection Fencing will be stable and robust (minimum construction method, in accordance with BS5837: 2005, see illustration below)
- The area between the Tree Protection Fencing and the tree will be a Construction Exclusion Zone (CEZ)
- Fence panels will be made of mesh (e.g.: heras fencing) or, if solid, will have 30cm windows cut into each panel to allow visual assessment of conditions within the CEZ

- The CEZ will be clearly identified (see construction exclusion zone sign example below)

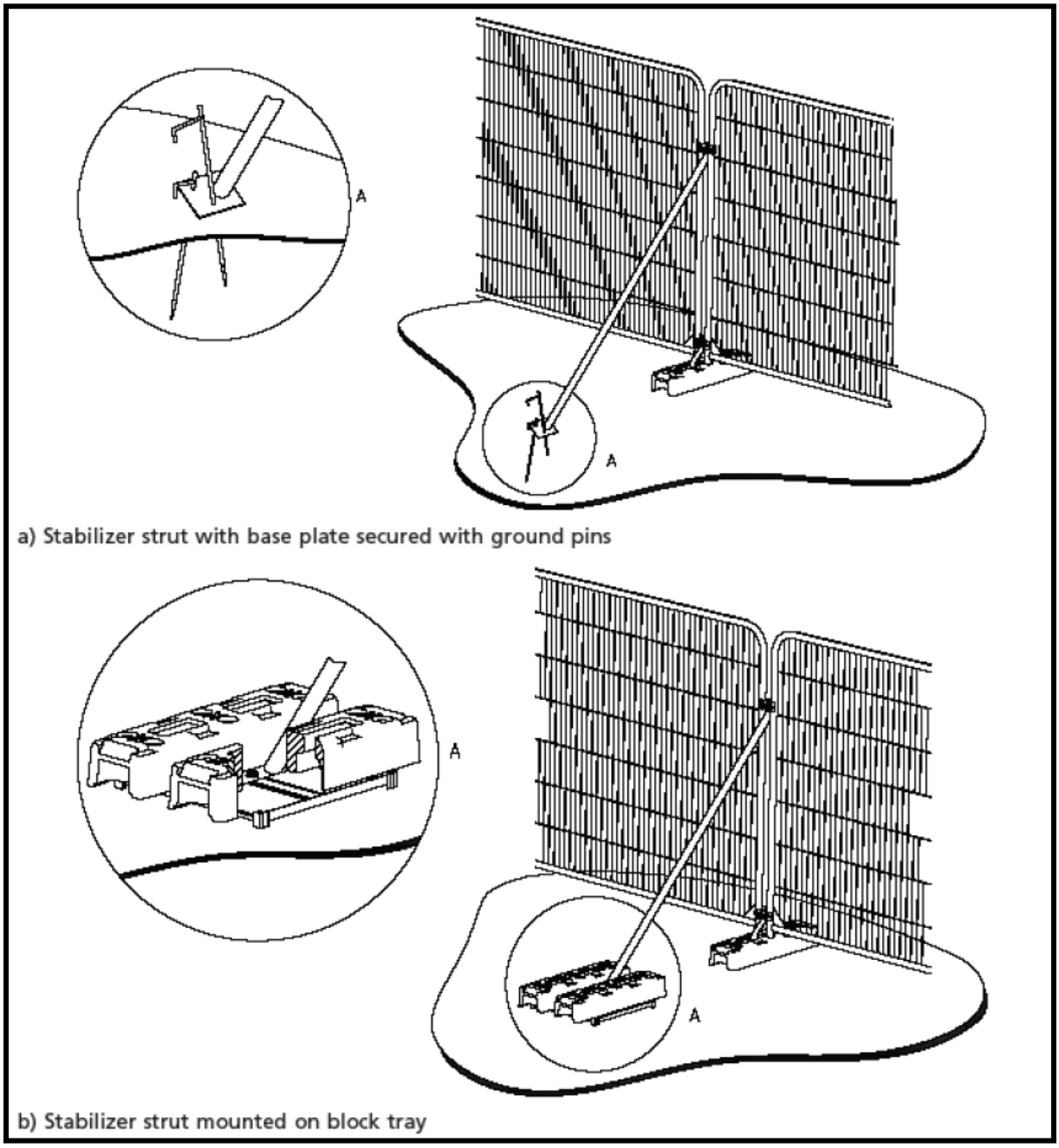
Tree Protection Fencing Sign



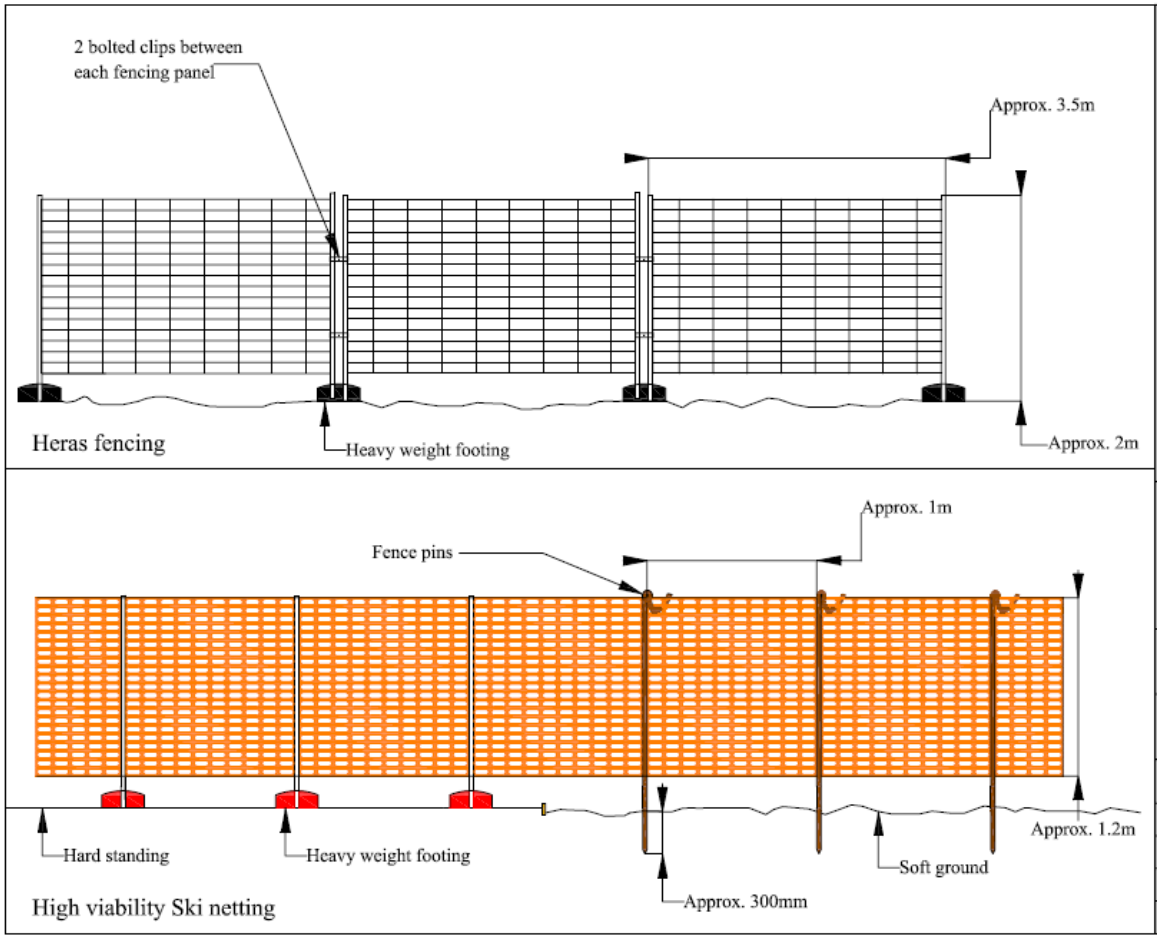
Key

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

BS5837: 2012 - Figure 2 – Tree Protective Barrier



BS5837: 2012 – Figure 3 – Examples of Above Ground Stabilisation Systems for Temporary Tree Protection Fencing.



Examples of lower specification fencing may be considered areas of low intensity activity.

Ground Protection Measures

BS5837: 2012 provides the following examples of temporary ground protection measures:

a) *for pedestrian movements only, a single thickness of scaffold boards placed 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 membrane;*

b) *for pedestrian-operated plant up to a gross weight of 2 t, proprietary, inter-linked ground protection boards placed on top of a compression-resistant layer (e.g. 150 mm depth of woodchip), laid onto a geotextile membrane;*

c) *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.

The areas shown on the Tree Protection Plan as Temporary Ground protection Provided by Concrete Slab will be protected throughout the demolition process.

The Ground Protection will be installed using reinforced concrete slabs to an engineering specification, designed in conjunction with arboricultural advice, to accommodate the likely loading to which it will be subjected.

For the roots of the trees to remain undamaged there must be no excavation, soil stripping or site grading within the rooting areas – in other words NO DIGGING. This means that finished levels of the Temporary Ground Protection will be above existing ground level.

The ACoW and Construction Manager will supervise and sign off the installation and removal of the Ground Protection and any change to the Ground Protection.

General Performance Specification:

- The Ground Protection will ensure that tree roots are not physically damaged
- The Ground Protection will ensure that soil within the tree root environment is not compacted
- The Ground Protection will reduce the possibility for spilled materials / substances to seep into the soil
- The Ground Protection will be designed to prevent anaerobic conditions building up under the Ground Protection allow sufficient gaseous exchange and water penetration to the covered root environment.
- The Ground Protection will only be removed once all works associated with the demolition have been completed
- The installation and removal of Ground Protection will not damage trees.

This is a typical specification for Temporary Ground Protection:

The Ground Protection will be installed using a cellular confinement system minimum 100mm thick laid upon a permeable membrane and filled with washed no fines gravel such as 20-40mm washed angular stone.

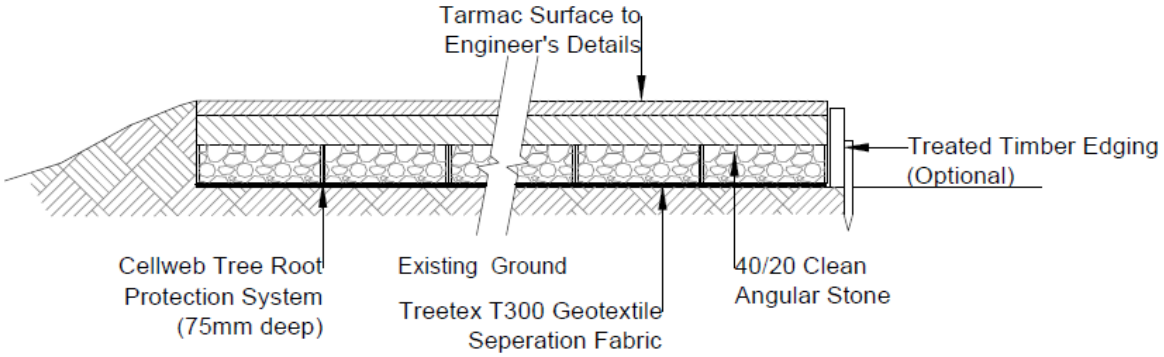
For the roots of the trees to remain undamaged there must be no excavation, soil stripping or site grading within the rooting areas – in other words NO DIGGING. This means that finished levels of the Temporary Ground Protection will be above existing ground level.

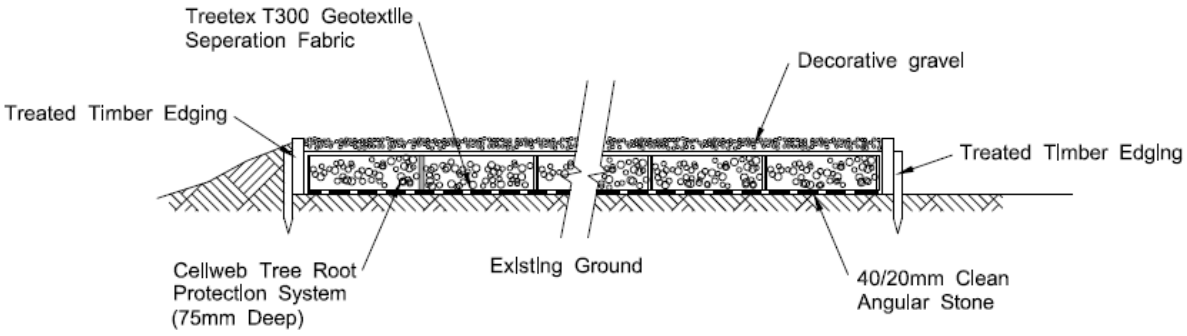
The Arboricultural Consultant will supervise and sign off the installation and removal of the Ground Protection and any change to the Ground Protection.

The installation of Ground Protection will involve the following sequence of operations:

1. *All organic material should be removed to prevent any build up of anaerobic conditions beneath the construction.*
2. *Rocks and other obstacles will be removed by hand.*
3. *Major hollows will be filled with sharp sand.*
4. *A suitable permeable membrane will be laid directly on to the ground and a cellular confinement system e.g. 'Cellweb' (see Appendix H) will be laid directly upon the membrane and pegged into position.*
5. *Washed, no-fines 20/40mm angular stone, to fill the cellular confinement system will be placed at one end and then pushed on to the grid so that machinery moves on the spread sub-base, not directly on the cellular confinement system and not the ground either side of it.*
6. *Depending on the type of access required, a sufficiently porous surface material may be laid over the top of the cellular confinement system.*
7. *The Ground Protection will only be removed once all works requiring access to the protected area have been completed and prior to commencement of soft landscaping.*

Operations to remove the Ground Protection within the RPAs of trees will be supervised and signed off by the Arboricultural Consultant.





Examples of Cellular Confinement System Details (Cellweb)

Appendix E

Tree Survey Method and Limitations

Treework Environmental Practice

Tree Survey Method and Limitations

Tree Survey Method

1. The tree survey was conducted from ground level aided by the Visual Tree Assessment method (Mattheck and Breloer, 1994) and in accordance with BS5837: 2012.

2. All trees on the site with a stem diameter of over 75 mm (measured at 1.5 m above ground) were included in the survey.

3. Offsite trees within influencing distance of the site (typically those located within a distance of up to 12 times their stem diameter away from the site) were included in the survey.

4. Data collected included:

   - a designated tree number
   - type of feature (trees, group, woodland, hedge)
   - number of trees in group
   - tree species
   - height (metres)
   - number of stems
   - stem diameter (in centimetres, as measured at 1.5 m above ground)
   - crown clearance (height of periphery of crown spread above ground level in metres)
   - height of lowest branch (metres),
   - branch spread (to N, S, E and W)
   - age class
   - physiological condition
   - useful life expectancy
   - structural condition
   - BS5837 retention category (A, B, C or U)
   - site notes (where this has a bearing on the present or future health or structural condition of the tree)
   - preliminary management recommendations.

5. All measurements were made in metric using measuring devices where applicable. Estimated stem diameters (e.g., due to lack of access or dense undergrowth) were recorded as such and are shown in the Tree Schedule in bold (see the key at the end of the Tree Schedule table at Appendix A for an explanation of the measurements and codes presented therein).

6. While the appraisals of the surveyed trees are not tree risk assessments, they nonetheless take into account observed structural defects in drawing conclusions about the trees' retentive worth.

Survey Limitations

1. The survey was a preliminary assessment from ground level and observations were made solely from visual inspection for the purposes of an assessment relevant to planning and development. Only binoculars, trowel, mallet and fine manual metal probe were used to aid tree assessment, where necessary. No invasive or other detailed internal decay detection devices were used in assessing trunk condition.

2. The conclusions relate to conditions found at the time of survey. Any significant alteration to the site that may affect the trees that are present or have a bearing on the planning implications (including level changes, hydrological changes, extreme climatic events or other site works) will require a re-assessment of the trees and the site.

3. This survey is not a tree safety inspection. It is carried out in order to inform the planning process. Where clear and obvious hazards have been observed, these have been addressed in the recommendations (see Appendix A - Tree Schedule). A full assessment of the levels of risk posed by trees would need to consider site use together with tree hazards.

Treework Environmental Practice

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