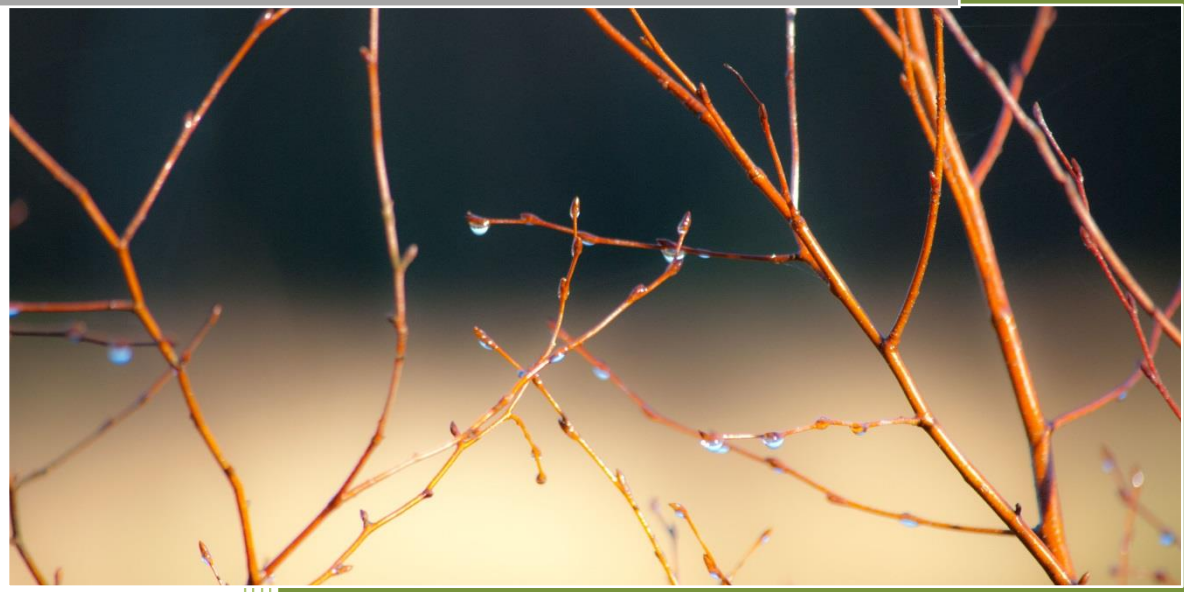
BS5837 Arboricultural Impact Assessment



25a Greencroft Gardens, London, NW6 3LN

Client:	**Mr M. Abdoula**
Job Reference:	03694R
Local Auth Ref:	TBC
Consultant:	Keiron Hart (BSc Hons, C.Env, F.Arbor.A, MICFor, MEWI)

Tamla Trees
consulting arborists

December 2021

Contents

1. Executive Summary

1.1 Tamla Trees ltd has been appointed by Mr M. Abdoula to provide advice on the arboricultural issues relating to proposed development which can be described as: *"Creation of a single storey rear extension and associated rear terrace".* We surveyed the site on 8.12.2021. The survey accorded with BS5837:2012 "Trees in relation to design, demolition and construction – Recommendations".

1.2 No trees will be removed to facilitate the proposal and the development area is accessed through the property significantly limiting the size of machinery which can access the work area. The rear working area (where required) will be supplemented with temporary ground protection to allow effective operative movement around the development without compromising the underlying soil/ roots.

1.3 The proposal places the extension outside the Root Protection Area (RPA) of the retained trees but some localised lowering of ground to create the rear patio/ terrace area results in excavation within the RPA of T1 & T2. This work is considered within the tolerable range for these trees and no special measures (other than the tree and ground protection detailed) is proposed.

1.4 The proposal is accessed through the existing building. Tree protective fencing and ground protection will be used to ensure that trees are protected during the proposed works. T3 (Cypress) is located within a 3rd party garden area.

1.5 The tree issues can be summarised as: **Effective Tree Protection (excavation & construction)> hand digging of patio area> Site operative knowledge of tree protection issues> Soft landscaping to make good.**

1.6 The site and trees are located within the South Hampstead Conservation Area and Camden Council advised no Tree Preservation Order (TPO) affects the property.

1.7 Subject to the working practices detailed within this report there should be no discernible impact on the health and stability of surveyed trees.

1.8 This report is based on proposed layout plan ref: 564 251 T1 and associated plans/ cross sections.

2. Statutory Protection

2.1 At the time of writing we are advised as follows:

Conservation Area Status	
Is the site located within a Conservation Area?	Yes South Hampstead
Notes: (i)All trees larger than 7.5cm diameter at 1.5m above ground level are subject to regulations within a Conservation Area. Exemptions apply for trees which are dead and dangerous but clarification before any tree works is advised. A notification is required in many circumstances.	
Tree Preservation Order Status	
Are inspected trees subject to a TPO?	No
Type of TPO	~~**Area**~~
	~~**Individual**~~
	~~**Group**~~
	~~**Woodland**~~
TPO Reference	-
Date TPO Made	-
Notes: (i) The type and details of any TPO determine which trees are 'protected'. Exemptions apply for trees which are dead and dangerous but clarification before any tree works is advised. An application may be required before undertaking works. (ii) At the time of writing Camden Council website indicates the above level of statutory protection (Conservation Area) and Camden have advised there is no TPO present.	

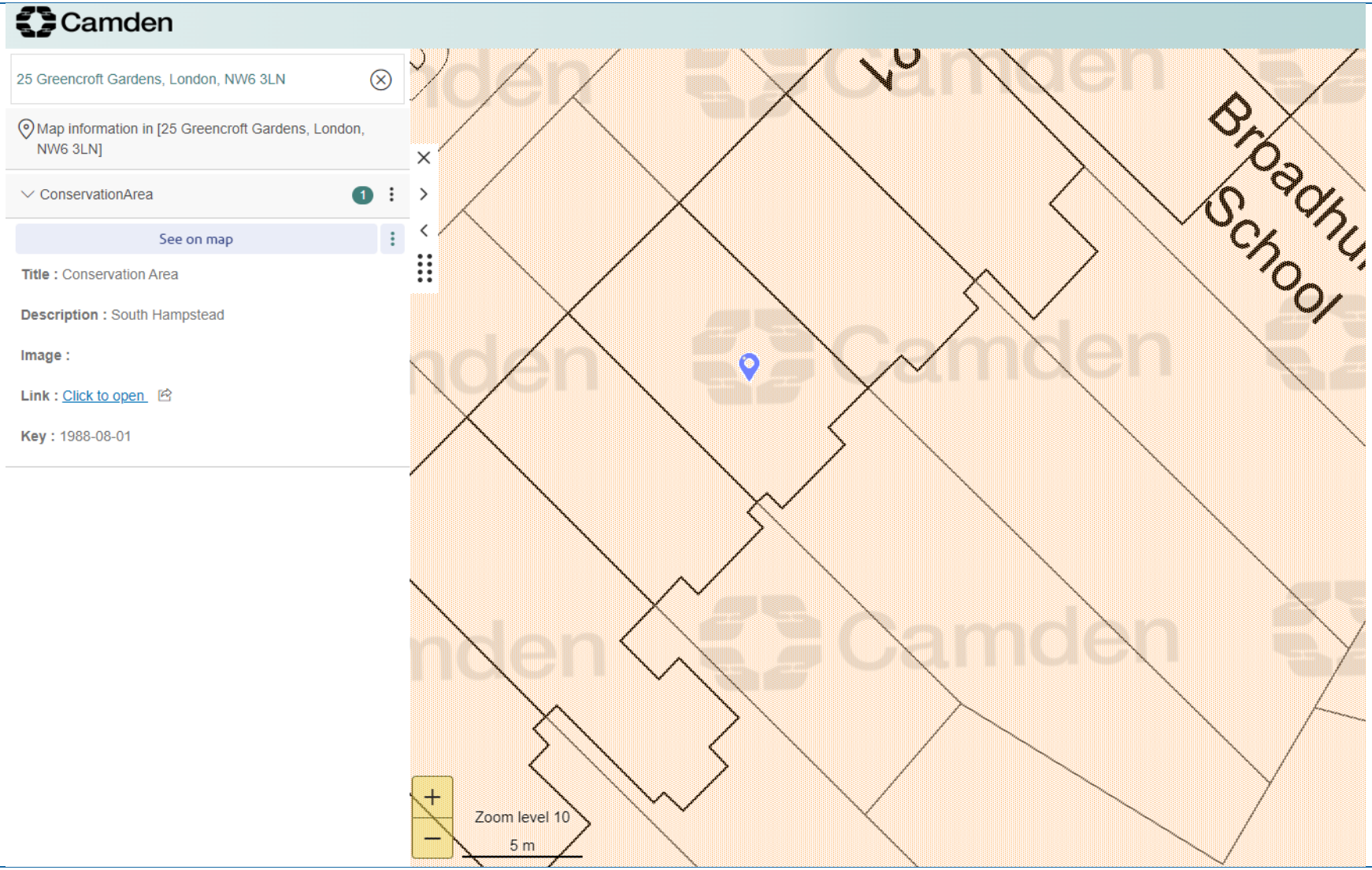


Fig 1 – Extract from Woking Council constraint plan Dec 2021. Note: The tree circled is no longer present.

3. Terms of Reference

3.1 BS5837:2012 'Trees in relation to design, demolition and construction – recommendations'

3.2 BS3998:2010 'Tree work – recommendations'

3.3 NJUG 4 – National Joint Utilities Group "Guidelines for the planning, installation and maintenance of utility apparatus in proximity to trees. Volume 4, issue 2. London: NJUG 2007" To include Operatives Hand-out Guidance

3.4 BGS Open-Source Soil Data http://www.bgs.ac.uk/nercsoilportal/maps.html

3.5 HSE (2014) Avoiding danger from underground services: https://www.hse.gov.uk/pubns/books/hsg47.htm

3.6 Eissenstat & Yanai (1997) The ecology of root lifespan. *Advances in Ecological Research*, 27, 1-60.

3.7 Hendricks & Pregitzer (1992) The demography of fine roots in a northern hardwood forest. *Ecology*, 73, 1094-1104.

3.8 BRE Digest 412: Desiccation in clay soils.

3.9 Matheny & Clark (1998) Trees and Development: A Technical Guide to Preservation of Trees During Land Development.

3.10 https://www.trees.org.uk/Help-Advice/Help-for-Tree-Owners/Guide-to-Tree-Pruning

3.11 https://www.trees.org.uk/ARB-Approved-Contractor-Directory

3.12 https://www.camden.gov.uk/web/guest/tree-preservation-orders

3.13 https://www.camden.gov.uk/conservation-areas

4. The Trees

4.1 The trees can be summarised as follows:

BS 5837 Cat	A	B	C	U
Specific Trees	-	T4	T1, T2 & T3	-
Total Number	None	1 individual	3 individuals	None

4.2 These tree locations and a summary of their visual contributions can be summarized as follows:

BS 5837 Cat	A	B	C
Greencroft Gardens Providing localized amenity between properties and contributing to the local (rear garden) treescape	-	T4	T2 & T3

4.3 There were no hedgerows that qualify for consideration under the 1997 Hedgerow Regulations.

5.0 Arboricultural Impact Assessment

5.1 Site Specific Soils

5.1.1 Soil is an important factor in tree growth and the type of underlying soil can impact on successful integration of new developments.

5.1.2 A free draining sandy soil containing sand/gravel is likely to lead to water being accessible in the upper horizons during the growing season and available at greater depths and trees will generally be forced to explore a larger volume/ depth on such soils. The structure of such soil also makes compression more difficult (by heavy construction plant) and root penetration is easier for the trees. By comparison, a clay soil is more easily compressed, particularly when wet and compression can have a greater impact on tree health.

5.1.3 As shown below the site is located within what is defined as clay:

Soil Description
Bedrock Deposits: London Clay Formation - Clay, Silt And Sand. Sedimentary Bedrock formed approximately 48 to 56 million years ago in the Palaeogene Period. Local environment previously dominated by deep seas. **Superficial Deposits: None Recorded**

Underlying Soil Material contains Clay	**Yes**
Soil Type increased rooting depth profile?	**No**
Increased risk of soil compaction due to soil type	**Yes**

5.1.4 All comments regarding soils should be verified with onsite geotechnical investigations and laboratory testing with foundation depth and design undertaken by a structural engineer in accordance with the requirements of NHBC Chapter 4.2.

5.1.5 BS5837 indicates: 4.6.2 "*The RPA for each tree should initially be plotted as a circle centred on the base of the stem. Where pre-existing site conditions or other factors indicate that rooting has occurred asymmetrically, a polygon of equivalent area should be produced. Modifications to the shape of the RPA should reflect a soundly based arboricultural assessment of likely root distribution*." It advises at Section 4.6.3 That any deviation in the RPA from the original circular plot should take account of a number of site-specific factors.

5.1.6 BS5837 recognises that the root morphology of trees may be affected by a number of factors and in certain situations the plotting of RPA's will deviate from the circle to reflect site specific considerations. It is our experience that to consider structures such as driveways, houses and garages as areas trees cannot utilise for rooting (and to then modify RPA plotting where they exist within an identified RPA) is too simplistic and not aligned with how trees actually utilise soil.

5.1.7 Within around 3 to 4m of the base of mature trees there will generally be a structural root system providing both support and the main structure/ root architecture for smaller roots to originate. These larger roots have the very real capacity to be influence by any significant structures (footings, roads to adoptable standard construction etc) where there may be a physical obstruction close to them and this can affect root morphology in such locations. In addition to this there will generally be a noticeable increase in structural rooting to the southwest of mature trees in the UK to reflect the prevailing wind direction, particularly where a tree may be isolated/ open grown increasing its wind exposure. Root growth and location will also be influenced by the presence of other trees, structures sheltering trees etc all of which can combine to affect the shape and location of a structural root system.

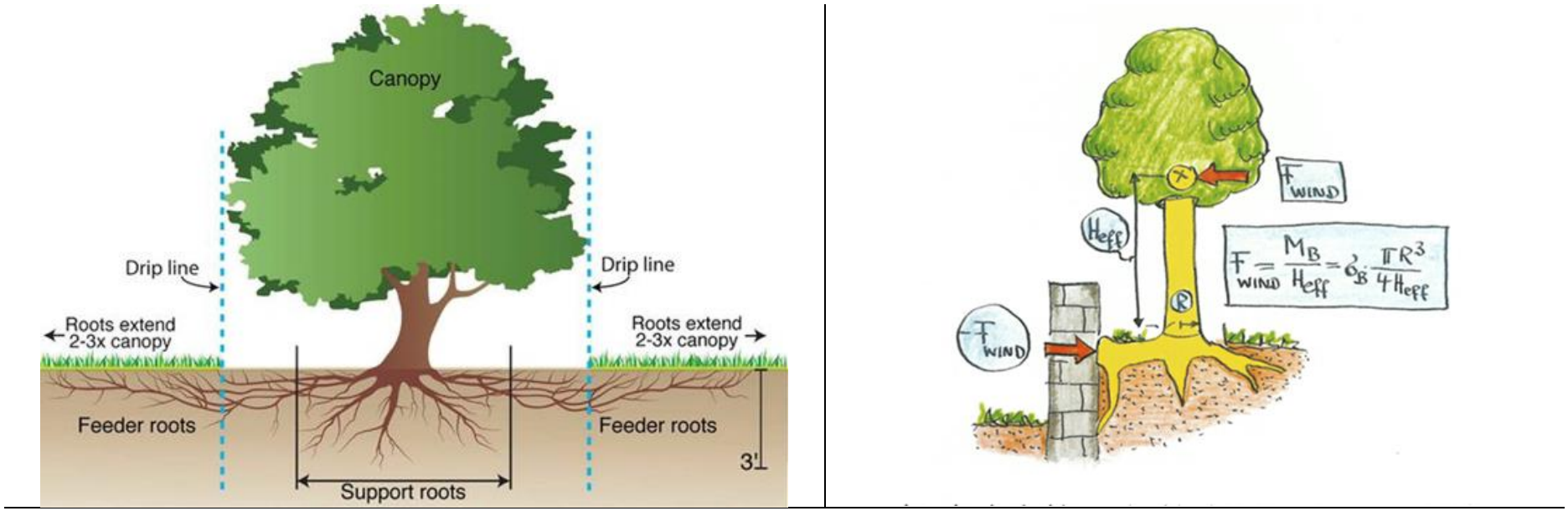


Fig 2 – Open grown trees or those with minimal obstructions close to their stems will have a network of structural roots supporting feeder/ fine root growth beyond (above left). In certain situations root morphology can be affected by structures close to the main stem (above right: Mattheck)

5.1.8 Beyond the structural (and generally permanent) root system will be a network of smaller roots which in turn subdivide to fine roots. Fine roots will also be found throughout the root system (i.e. both close to and distant from a tree) to maximise soil resource uptake and reflect underlying soil conditions. Some larger roots (>25mm and sometimes much larger) can extend away from this area and remain permanent particularly where there may be a constant supply of water (such as a broken downpipe on a building some distance away) which encourages a roots development. Generally the smaller roots (<10mm and particularly fibrous roots) outside of the immediate structural root plate can be considered to be in a state of constant change. They will grow seasonally and tree roots generally grow at night. Small fibrous roots are also mostly short lived (ranging from anything between 10 days to over a year[1]). The cyclical death and decay of roots releases both nitrogen and carbon into the soil and is an important part of soil nutrient cycling process. The extent and location of the trees fine root system reflects a trees resource requirement (as resources are removed from certain areas of the soil and exploited in others) as well as the resource capacity required to form such a fibrous root system. Fine roots produced near the soil surface tend to live longer than those deeper in the soil[2].

[1] Eissenstat & Yanai (1997) The ecology of root lifespan. *Advances in Ecological Research,* 27, 1-60.
[2] Hendricks & Pregitzer (1992) The demography of fine roots in a northern hardwood forest. *Ecology*, 73, 1094-1104.

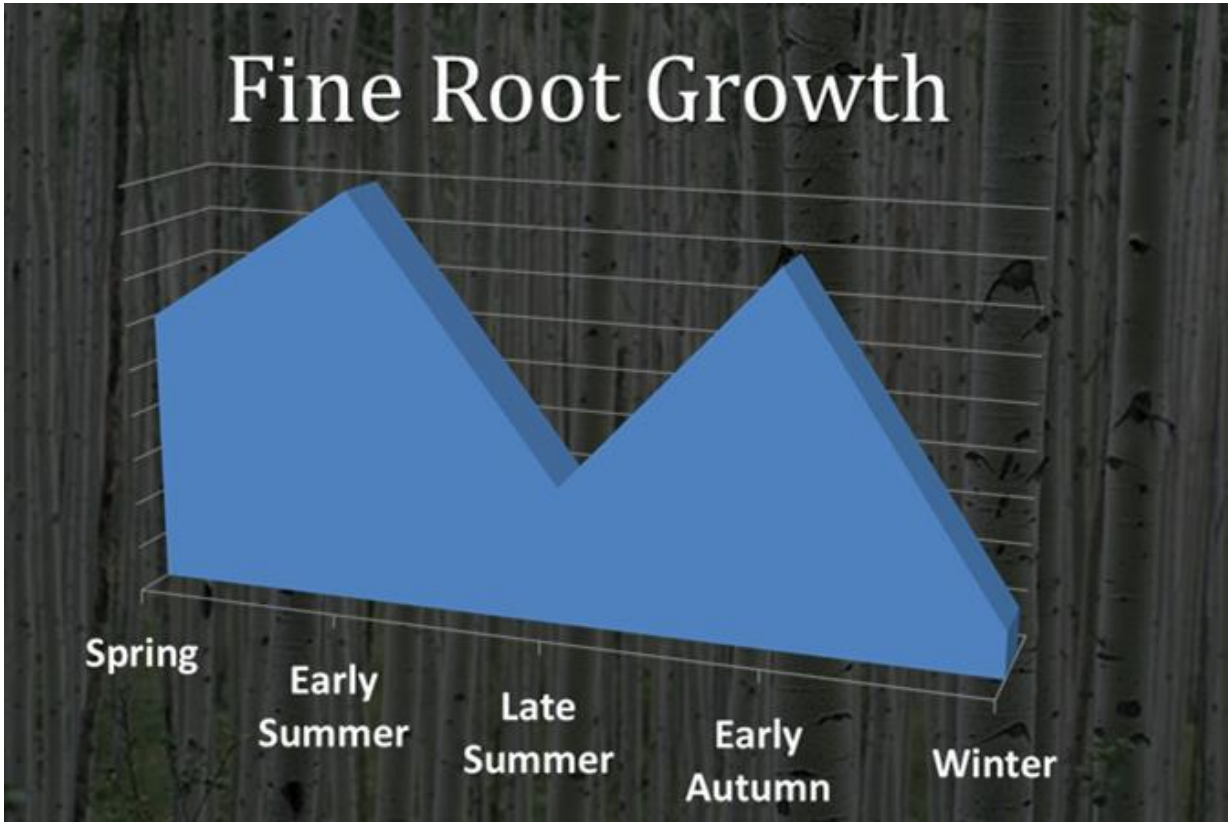


Fig 3 – Fine root growth is (generally) seasonal peaking in late spring and again in early autumn but dying back in winter dormant periods when photosynthetic production ceases. This is an important part of the soil nutrient cycle and demonstrates that a static RPA as calculated by BS5837 is a 'simplistic' view of the tree rooting dynamic. (Image Source: Tamla Trees**)**

5.1.9 The fine root system shows species variation and will also vary in depth (depending on species dynamics and underlying soil conditions). Adopted highways generally have a footing that extends < 0.5m and most UK residential properties have footings in the range of 0.5-1.5m depth. Trees will easily root below these depths and this is evidenced by the fact that every year in the UK there are thousands of tree related subsidence cases.

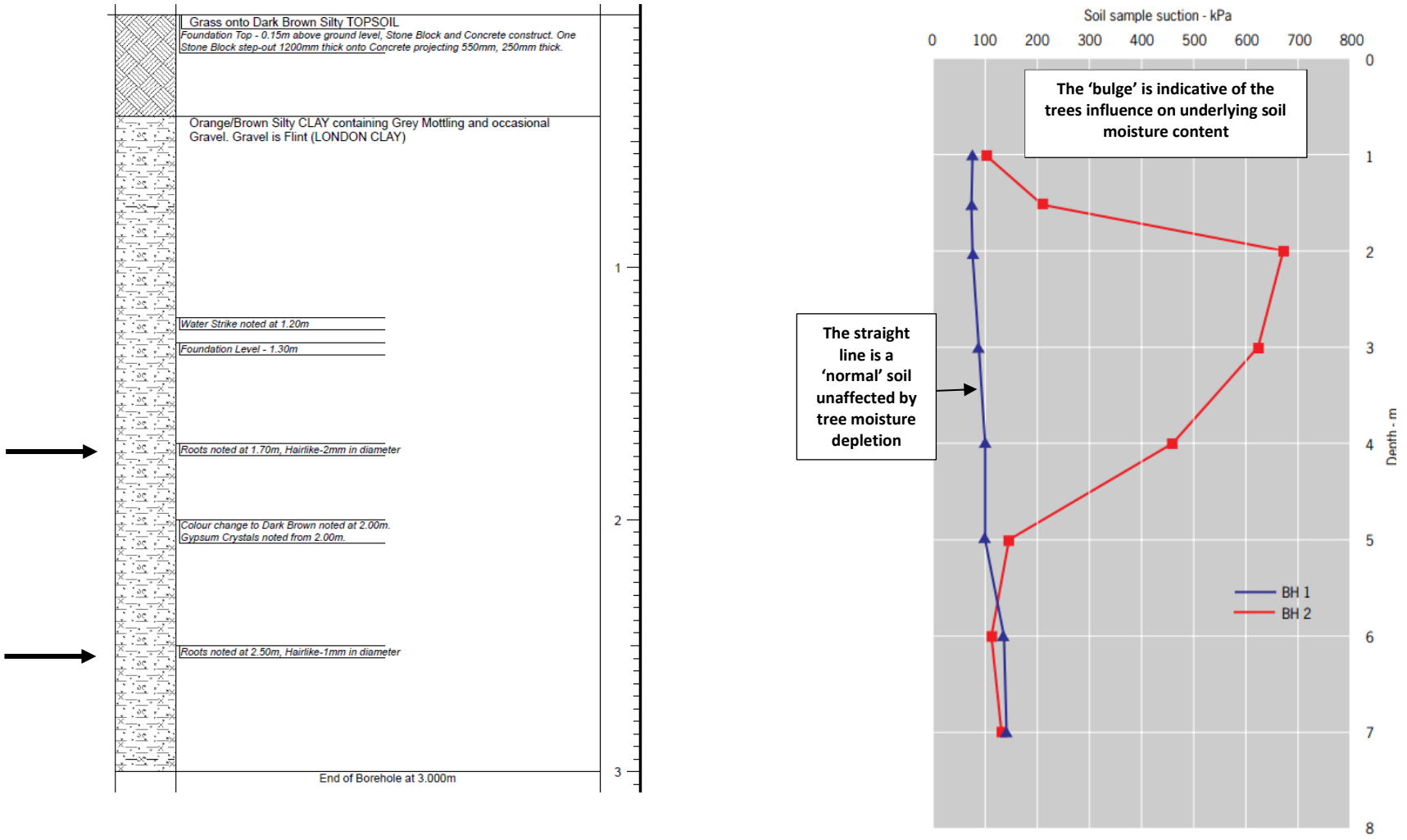


Fig 4 – Borehole log 10m from mature Oak tree on clay soil detailing fine roots to depths of 2.5m indicated with arrows (Source: Tamla Trees project**) and annotated soil moisture depletion by trees showing a peak influence at 2m and extending to 5m (above right)[3]**

[3] BRE Digest 412: Desiccation in clay soils

5.1.10 Against this backdrop rooting information seeking to manipulate RPA shapes to account for the presence of houses, garages etc outside of the immediate zone of structural rooting (3-4m) is not considered appropriate. Unless ground obstructions are present within the immediate structural rooting area or to such a depth as to nullify potential fine root growth (below basements or retaining wall step changes in levels for example) Tamla Trees ltd will show RPA's in a circular fashion but seek to maximise the quality and positioning of specified tree protection measures and encourage ground treatments (such as mulching – see Section 5.7). **Clients and developers must implement these measures for them to be effective. A failure to protect trees during the development process adversely affects soil and roots. Symptoms may not present themselves for a number of years following the development as the tree(s) enter a spiral of potentially irreversible decline.**

Fig 5 - Manion's spiral of tree decline for Norway Spruce (modified by Mrkva 1993)

5.1.11 BS5837 Section 4.6.3 Site Specific Assessment:

Section	Consideration	Site Specific Comments
4.6.3 (a)	*the morphology and disposition of the roots, when influenced by past or existing site conditions (e.g. the presence of roads, structures, and underground apparatus);*	• There are no site features within the existing RPA's of surveyed trees likely to have had a significant impact on root morphology.
4.6.3.(b)	*topography and drainage;*	• The site is generally level and there is nothing to indicate adverse draining conditions (such as water pooling at the base of the tree). • The proposal retains all existing ground levels other than removal of soil to form the rear patio area which is considered within the tolerable range.
4.6.4.(c)	*the soil type and structure;*	• Soil is indicated by the BGS data to be a clay (up to 150m thick). The clay soil increases the risk of compaction related impacts for retained trees but also means moisture availability remains high at most times of the year for retained trees.
4.6.4.(d)	*the likely tolerance of the tree to root disturbance or damage, based on factors such as species, age, condition and past management.*	• There will be minor root loss from the formation of the patio area to the rear of the proposal and this impacts the RPA of T1 & T2. It is considered within the tolerable range subject to the protection measures being utilised as detailed within his report. • T1 is *Salix* spp which is shown to be tolerant of root pruning[4] and as such has a potential tolerance to the minor loss of roots from the proposed patio works. Research data on *Laurus* spp (T2) is not available. • It is accepted the proposal is close to the trees but they should be able to tolerate the very minor root damage incurred as a result of patio formation particularly given they root within an existing wider soft open/ garden area.

[4] Matheny & Clark (1998) Trees and Development: A Technical Guide to Preservation of Trees During Land Development

5.2 Root Protection Area (RPA) Incursions

5.2.1 The following incursions into the RPA's of trees to be retained have been identified:

BS 5837 Cat	A	B	C	Summary
RPA Incursion	-	-	T1 & T2	**Construction** – The proposal places the extension outside the RPA of retained trees. The incursion is to form the rear patio area where ground will be excavated to form a lower level before the relevant low wall and patio is formed. At the distances and levels of incursion proposed we do not believe there will be an adverse impact. In summary T1 has only a minimal incursion and the species is tolerant to such works (the tree is also quite small). In terms of T2 the works are sufficiently distant from the tree that no structural rotos are expected. As a precaution the patio will be hand dug with an assessment of any roots undertaken prior to any appropriate root pruning. Any roots >50mm will not be removed/ pruned but none are expected. Herras fence panels and temporary ground protection will be installed prior to any works and retained for the full duration of building work. This seeks to be realistic to the pressure/ movement to the rear of the proposal whilst adequately protecting the retained site trees. Ground workers will be fully briefed on site prior to works commencing. **Competent contractors who understand the tree protection measures is key to the successful delivery of projects retaining trees.** **Services** – It is envisaged that the extension will tie into the existing site services. We have not been advised of any new service trenches being dug that may adversely affect retained tree RPA's. **Landscaping** – Further to the proposal being completed there will be a need to make good. BS3882 compliant topsoil will be spread/ raked out by hand to a depth no greater than 100mm and any localized shrub and tree planting completed. Areas below retained trees are recommended for mulching where possible with composted bark mulch where possible. Detailed further comment on landscaping proposals is outside the scope of this report.

5.2.2 The relative incursions into the RPA are summarised as follows

Tree Number	RPA Total (Sqm)	Incursion (Sqm)	As % of trees RPA
T1	15	2	13%
T2	137	11	8%

5.2.3 The existing relationship is shown below:

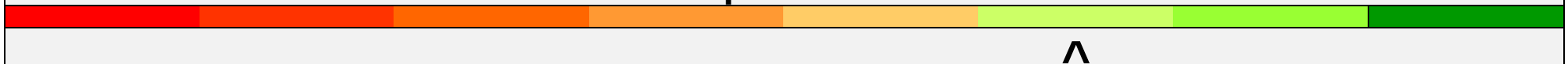
Fig 6 – Existing rear garden looking towards the proposal area.

5.2.4 It is recognised that BS5837 recommends all structures be placed outside the RPA of retained trees: *5.3.1 The default position should be that structures (see 3.10) are located outside the RPAs of trees to be retained. However, where there is an overriding justification for construction within the RPA, technical solutions might be available that prevent damage to the tree(s) (see Clause 7). If operations within the RPA are proposed, the project arboriculturist should: a) demonstrate that the tree(s) can remain viable and that the area lost to encroachment can be compensated for elsewhere, contiguous with its RPA; b) propose a series of mitigation measure.*

5.2.5 It is considered in this instance that there is 'overriding justification' on the basis that the incursions for T1 & T2 are small and relatively low level (being patio excavation only) and the remaining rooting area for the trees remains high quality garden areas with open ground, high moisture infiltration and gas exchange levels.

5.2.6 The assessed risk based on the likely impact to the health and safety of T1 & T2 on the basis that all the tree protection measures outlined within this report are implemented and maintained for the duration of all site works is summarised below:

Tree & Development Risk Indicator



- Our assessment has confirmed the presence of probable underlying CLAY soil
- This heightens the risk of modifications to the underlying soil from construction activity.
- Ground protection and tree protective fencing secure the rear garden where T1 & T2 are drawing moisture and nutrients.
- The Tree & Development Risk Indicator (TDRI™) is therefore **LOW**.
- **Note:** This level of risk if a visual guide only and is only relevant **if all advised tree protective measures are put in place prior to any on site activity and maintained for the duration of the works.**

Note: Only on-site testing can confirm the local soil conditions below foundation level but available information suggests the presence of a CLAY subsoil.

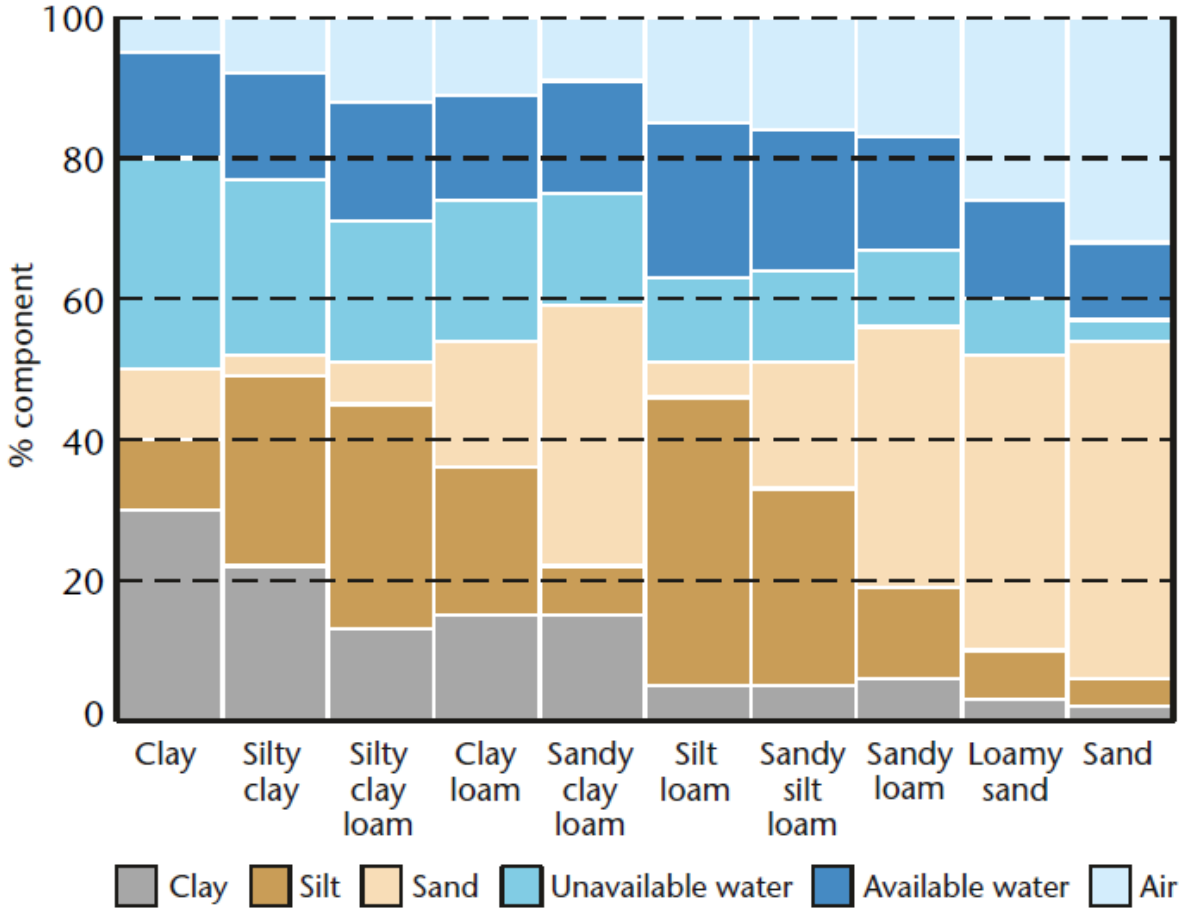


Fig 7 – Diagram showing the typical particulate composition and air/ water content at field capacity for mineral soil types[5] The variation in soil type has a direct bearing on the potential impact of adverse construction techniques (such as soil compaction) as well as overall root system morphology & development. Clay soils tend to have shallower rooting as moisture remains readily available while soils containing free draining gravel and sand can encourage deeper rooting based on reduce soil bulk density and greater seasonal variations in moisture availability.

[5] Forestry Commission (2005) The Influence of Soils and Species on Tree Root Depth

5.3 Tree Loss

5.3.1 No trees are proposed for pruning or removal to facilitate the proposal. Please note this report is not a health and safety assessment of surveyed trees.

Tree Surgery

Tree No.	Species	Proposed Tree Works	BS Cat

Proposed Removal

Tree No.	Species	Proposed Tree Works	BS Cat

5.3.2 **Birds -** In the event future tree works are required to be completed between 1st March & the 31st July (inclusive) a due diligence check for nesting birds must be completed before work starts in order to comply with the Wildlife & Countryside Act 1981. This check should be recorded in the Site-Specific Risk Assessment. If active nests are found work should not take place until the young have fledged.

5.3.3 **Bats** – It should be noted that in England and Wales, the relevant legislation is the Wildlife and Countryside Act (1981) (as amended); the Countryside and Rights of Way Act, 2000; the Natural Environment and Rural Communities Act (NERC, 2006); and by the Conservation of Habitats and Species Regulations (2010).

5.3.4 On the following page is a visual representation of the likelihood of pruning requests in light of the proposal.

Tree Pruning Indicator

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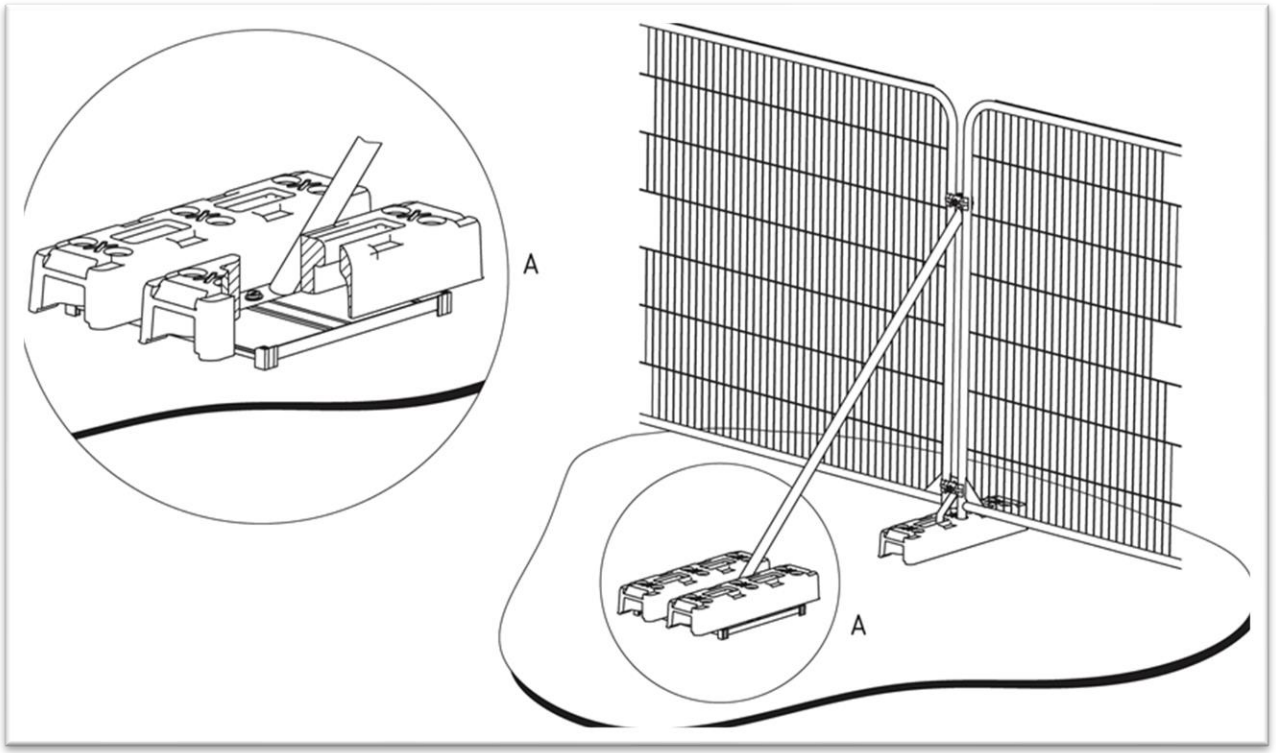
- There is no apparent need for trees to be pruned other than potential light issues given their orientation to the property and this remains unchanged.
- The council retain control over the tree given the location within a Conservation Area.
- A s211 notification would be required prior to any pruning works.
- **Note:** This is an indicative assessment. All and any future works should be undertaken in accordance with BS3998 (Tree Works) and we recommend the use of Arboricultural Association approved contractors.[6]

[6] https://www.trees.org.uk/ARB-Approved-Contractor-Directory

5.4 Demolition & Foundations

5.4.1 The proposal requires the removal of the existing decking and tree protection will be installed prior to any on site activity. High quality BS5837 compliant tree protection will be installed prior to any site works:

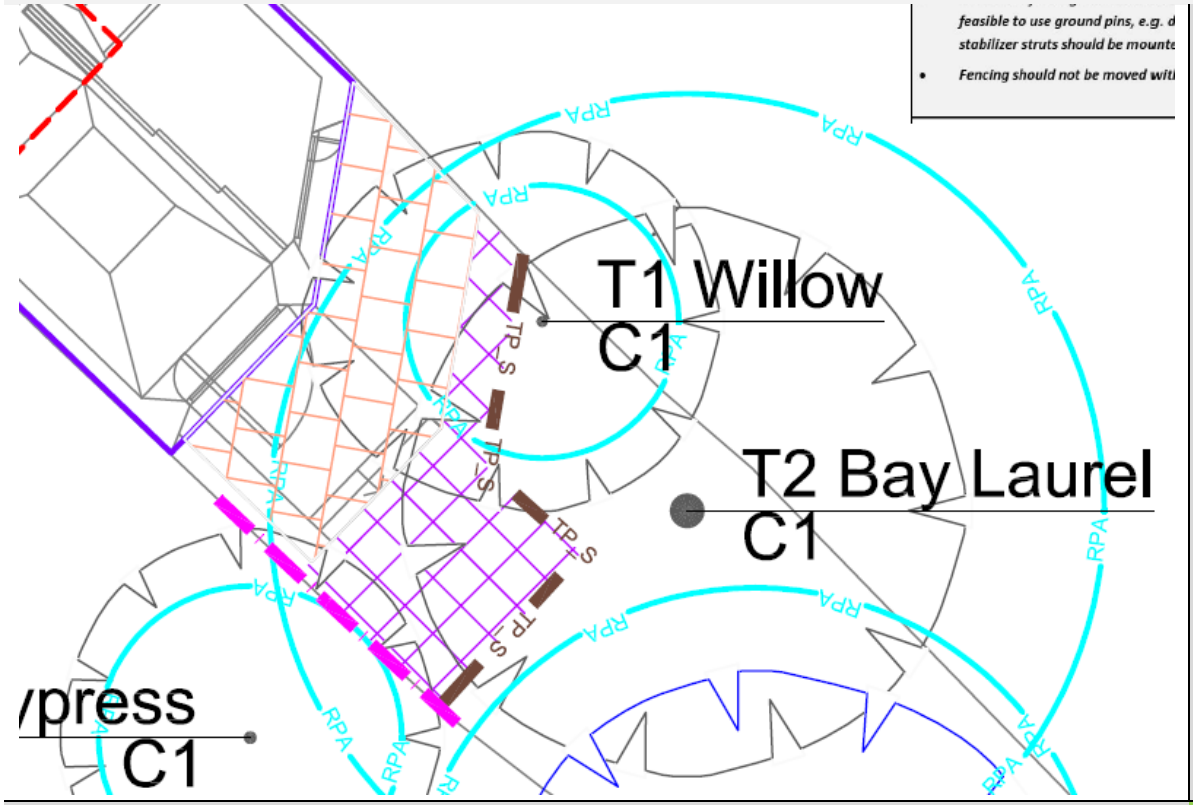
Tree Protection	
	**Overview** • ***Tree protection required internally to site.*** • ***Installed prior to any on site works.*** • ***Feet fence spec.*** • ***Note: To be marked with signs (inset) and purpose to be briefed to all ground workers.*** • ***Maintained for duration of the build.***
Threat Level to Retained Trees	**LOW**

5.4.2 All internal tree protection must be appropriately signed to ensure that all site operatives know its purpose.

Fig 8 – Professional grade weatherproof tree protection signs no smaller than 297 x 420 mm (A3) will be located at 5m intervals and all 'return' faces for tree protective fencing

5.4.3 Temporary ground protection will be used wherever open (soft) ground is exposed and this seeks to limit the risk of compression of the ground or spills of any potential ground contaminants. It also seeks to be realistic to movement and localised storage in delivery of the project.

Temporary Ground Protection



Overview

- ***Tree protection required internally to site.***
- ***Installed prior to any on site works.***
- ***Ground protection to allow movement around the proposal (demo and construction).***
- ***Laid on all open ground in areas indicated.***
- ***Maintained for duration of the build.***

Threat Level to Retained Trees	LOW

5.4.4 It is considered that there sufficient space provided around the proposal to respect the proposed fencing and provide site welfare/ movement/ storage etc but in the event any fencing requires manipulation (for temporary access/ low level material storage) the (further) exposed ground must be covered with temporary ground protection immediately following removal of any fencing.

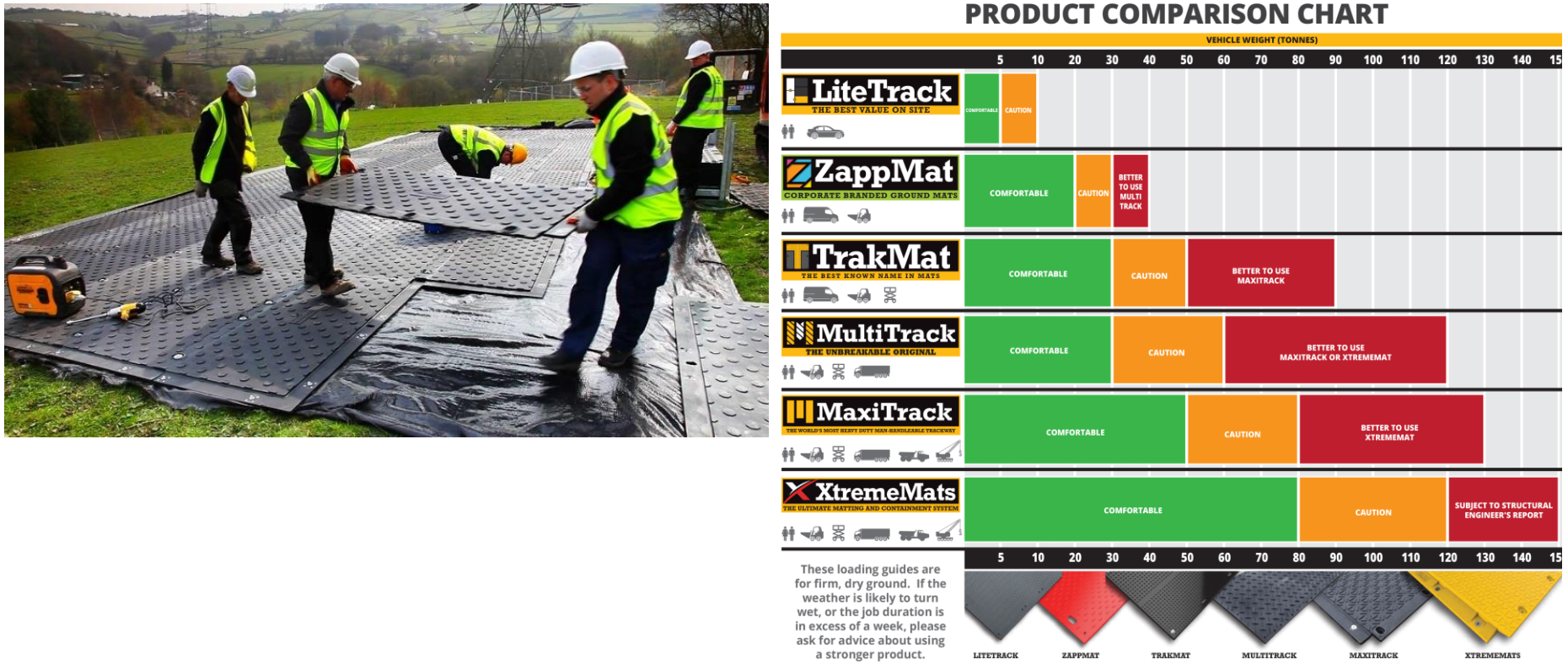
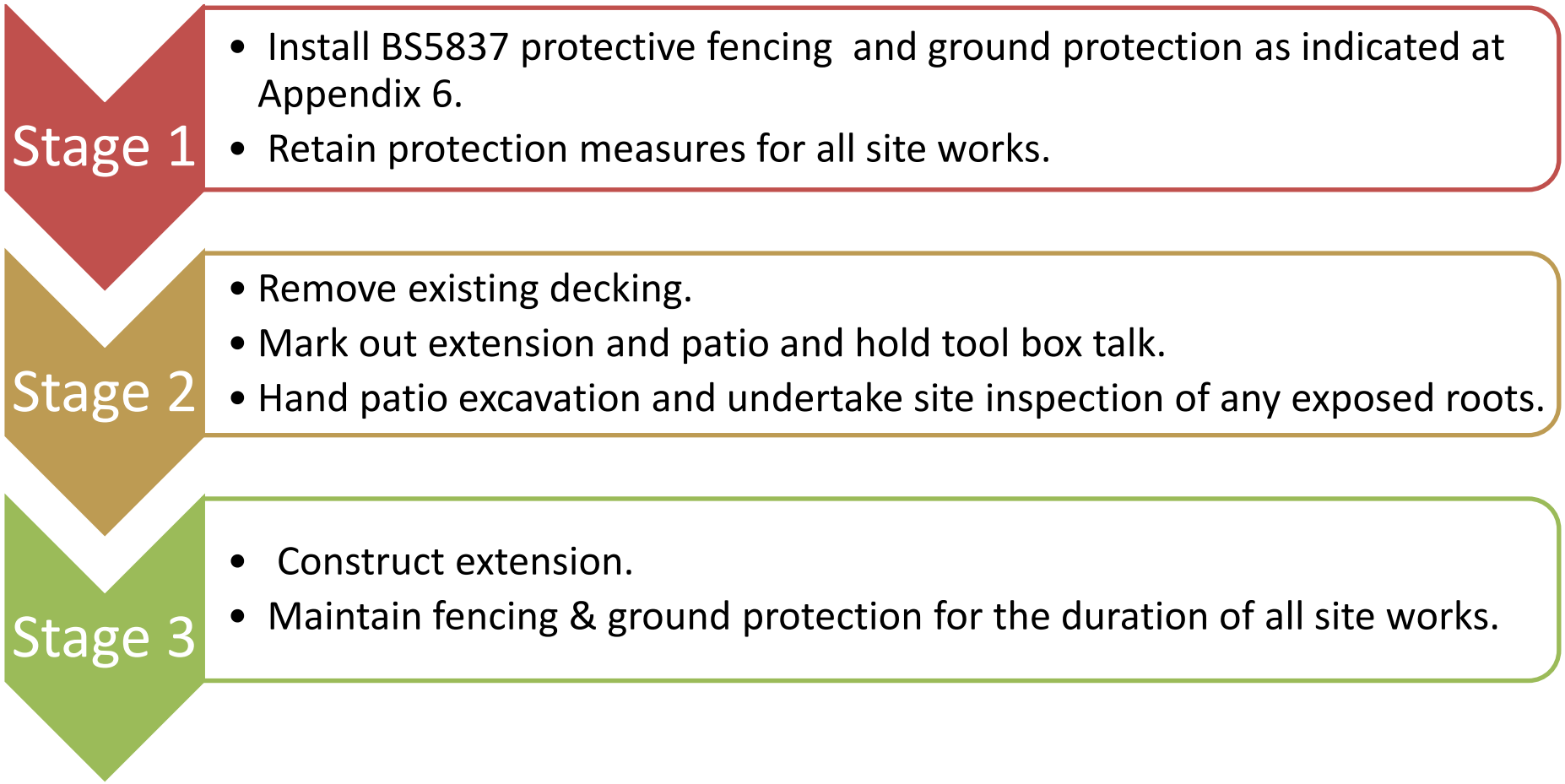


Fig 9 –The construction firm/ contractors must ensure that any areas where fencing may be moved (temporary) leads to exposed ground being covered with suitable temporary ground protection. This approach maximises the integrity of retained tree RPA's.

Fig 10 – Temporary ground protection is an effective way of allowing access through the RPA of retained trees. It must be installed prior to any on site activity and maintained for the duration of all works to be effective. Above left Tamla Trees project ground protection in place and above right being removed following the completion of site works. (**Note:** *depending on the length of time it is in place it will adversely affect underlying grass ground cover which will need reseeded/ turfed accordingly*).

5.4.5 The tree protection process can be summarised as indicated below:



5.4.6 **Site Manager/ Consultant Sign Off:** At this point a site inspection is required to confirm the appropriate tree protection measures have been completed.

Date of Inspection	Compliance with Tree Protection Plan?			
	Yes		No	
Rectification Actions (insert notes)				
Site Manager Signature:				
Print Name:				
Arboricultural Consultant Signature:				
Print Name:				

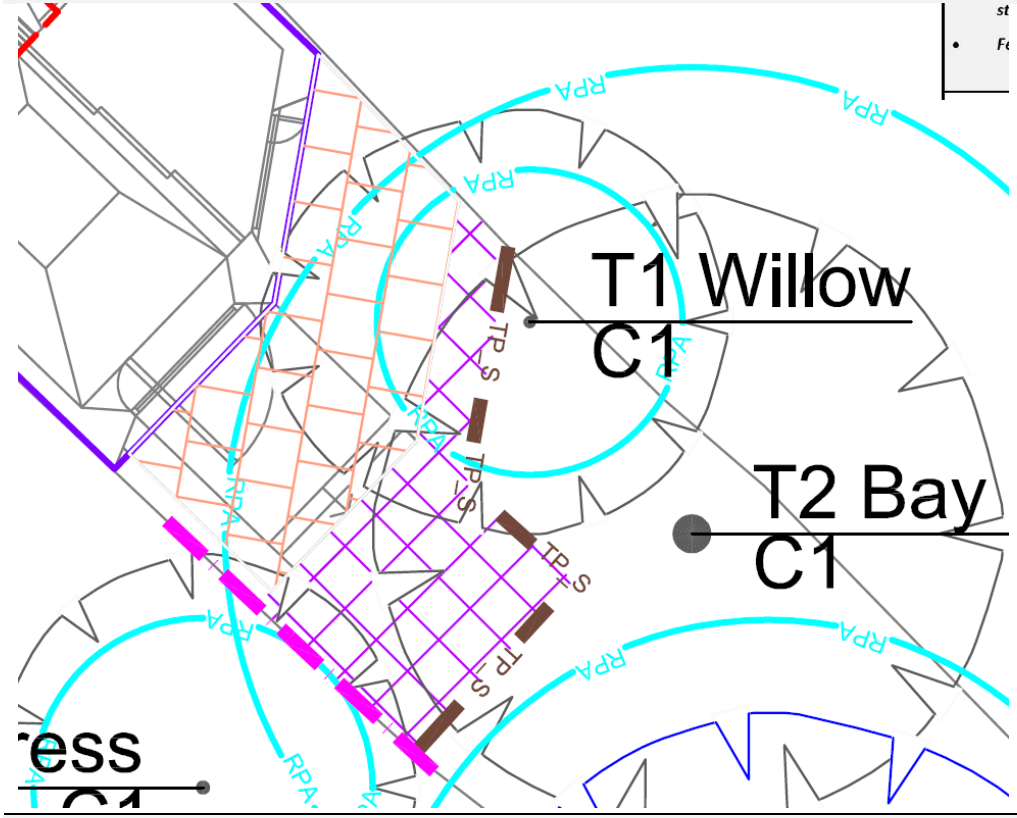
SITE TREES ARE NOW ADEQUATELY PROTECTED AND CONSTRUCTION ACTIVITY CAN COMMENCE

5.4.7 Following installation of the tree protection the existing decking can be removed from site.

Fig 11 – Existing decking removed in direction away from trees following tree protection measures being installed.

5.4.8 Following removal of the decking the patio and extension locations will be marked out and a further toolbox talk/ site inspection completed.

Patio Excavation



Overview

- ***Tree and ground protection maintained.***
- ***Patio excavation locations marked out.***
- ***Toolboxes talk & hand dig.***
- ***Localised manipulations to retain all roots >25mm***

Threat level to Retained Trees	**LOW/ MODERATE**

5.4.9 **Patio Excavation** - Any activity to excavate within the RPA has the capacity to cause root damage but the level of damage must be considered in the context of the species, soil, and location. Areas of excavations will be identified/ marked on site by way of site meeting before they are undertaken.

PLEASE NOTE THIS OPERATION HAS AN ELEVATED CAPACITY TO CAUSE DAMAGE TO TREE ROOTS

5.4.10 **Planning the excavation:** A 'toolbox talk' will spot mark and agree the locations and working practices.

				
Narrow Face Spade & Hand Trowel	**Stiff Hand Brush**	**Hi Vis Paint (for spot marking roots)**	**Hessian (to wrap exposed roots)**	**Duct Tape (to secure hessian)**

Fig 12 – Advised tools/ materials which should be available for all excavation works within RPA

5.4.11 Digging around tree roots is a skill and operatives must proceed with caution. Once a root is located it is often necessary to use a combination of hand tools and a stiff hand brush to track and 'trace' the roots location. Spot marking roots >25mm with spray paint is advised. **All roots >25mm in diameter will be retained. Please also note that retention of all roots where possible (including fibrous ones) is advised.**

5.4.12 **How deep?** – To the depth required to form the patio amenity area. Any exposed roots must be covered/ wrapped in hessian if being left uncovered for longer than 12 hours. In the event any root >50mm is uncovered works must stop immediately and a review meeting be held on site to assess.

5.4.13 **WARNING:** Breaking the ground has the potential to uncover services/ destabilise adjacent structures etc. Some general advice from the HSE can be found here.

5.4.14 **Root Wrapping/ Protection:** In the event the patio works expose any roots >25mm in diameter these must be wrapped or protected with a covering of soil if left exposed overnight or for longer than any single 4-hour period before backfilling.

Root Wrapping	
	**Overview** • **Any exposed roots >25mm should be wrapped in hessian (example left) if exposed overnight or for any 4-hour period.** • **Spot marking with spray paint to highlight locations also advised.** • **Alternatively roots can be covered over with topsoil to maintain moisture retention.** • **No roots >50mm to be cut.** • **Example Tamla Trees project on London Plane (left)**
Threat Level to Retained Trees	**LOW**

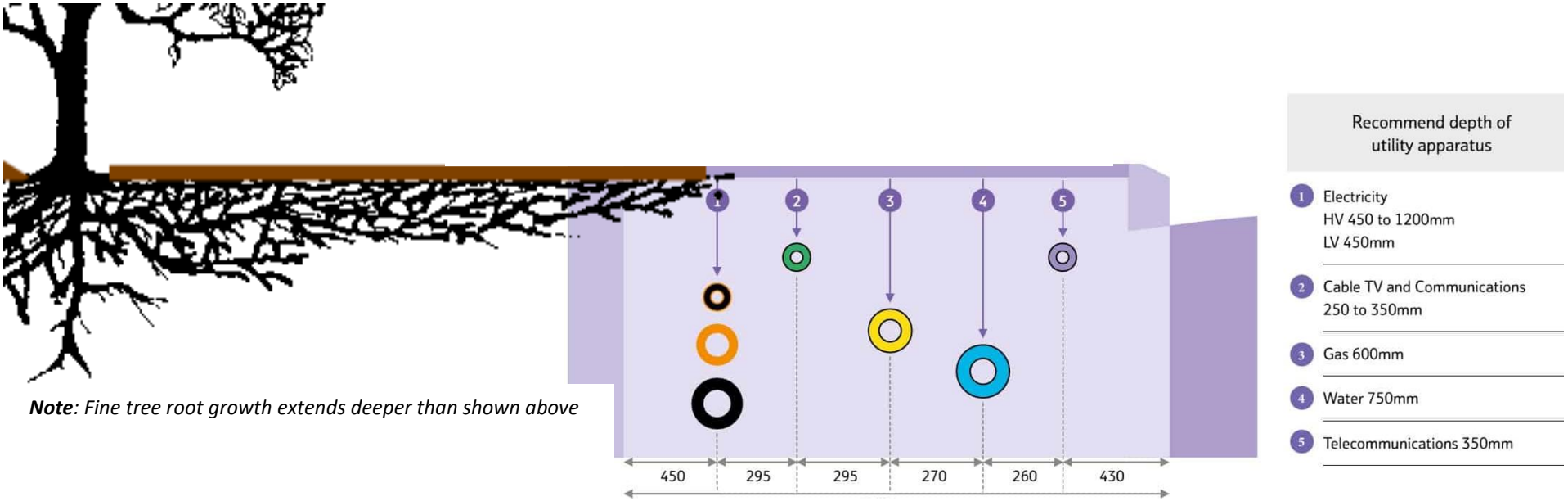
5.5 Surfaces near Trees

5.5.1 No new surfaces within retained tree RPA's are proposed other than the new rear patio formed below existing ground levels and therefore not the subject of special protection measures (such as a no dig surface for example).

5.5.2 Temporary ground protection will be laid before works commence on site as indicated at Section 5.4 of this report and visualised at Appendix 6.

5.6 Site Service Provision

5.6.1 The new extension will draw on existing building service connections. No new service excavations are advised.



***Note**: Fine tree root growth extends deeper than shown above*

Fig 13 – Annotated service installation depth drawing (source: Thorne & Derrick**). Service installations occupy the same soil volume/ depth where the greatest level of tree roots will likely be found but on this project, none are proposed.**

5.7 Ground Level Changes & Landscaping

5.7.1 Following completion of the project any 'making good' will be with BS3882 compliant topsoil raked out by hand (to no more than 100mm depth within any tree RPA) and then seeded/ planted as appropriate.

Fig 14 – All 'making good' topsoil will be BS3882 compliant and raked out by hand to no greater depth than 100mm

5.7.2 Please note that spoil/ soil excavated from the footings etc. **must not** be spread in the existing garden area as this will adversely affect the trees. We encourage the use of composted bark mulch below tree canopies where possible to aid water retention and increase soil microbial activity. This is particularly relevant to mature retained trees.

Mulching	
	**Overview** • *Circular area edged to 50-100mm depth to stop mulch from 'creeping' on to surround lawn.* • *Composted mulch then spread around below tree by hand – no need to lift or remove underlying grass.* • *Mulch topped up annually/ as required.* • *Positive benefits for mulched trees* • *Image Kew Gardens (left) (Source: Tamla Trees)*
Threat Level to Retained Trees	**LOW**

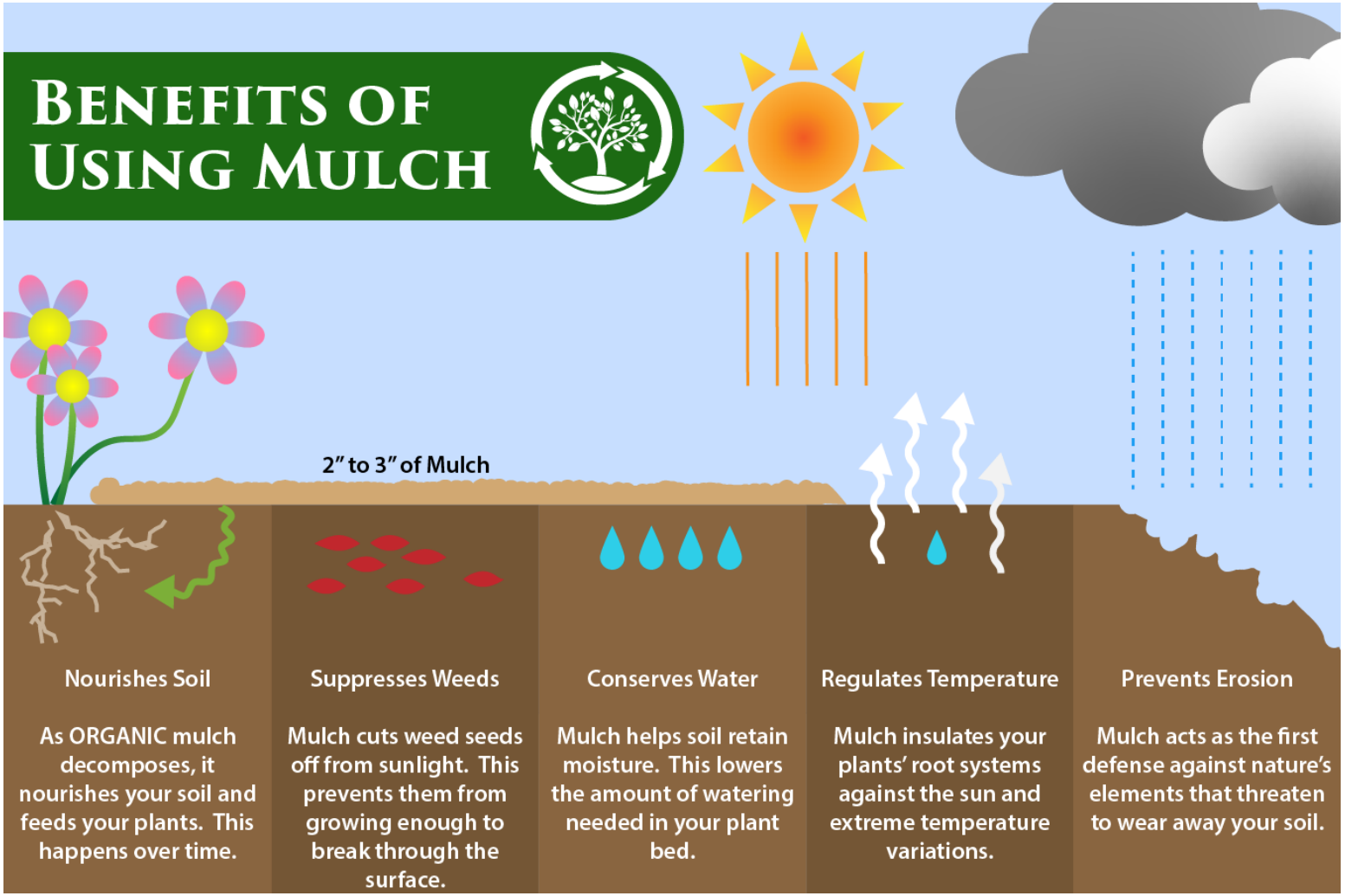


Fig 15 – Benefits of Mulch (Image Source 1st Stop Landscape Supply (US)

5.8 Tree Shading of Proposal

5.8.1 The nature of the design relative to trees and its incorporation of roof skylight and large glazed garden facing doors means issues of shading are not considered an issue on this project.

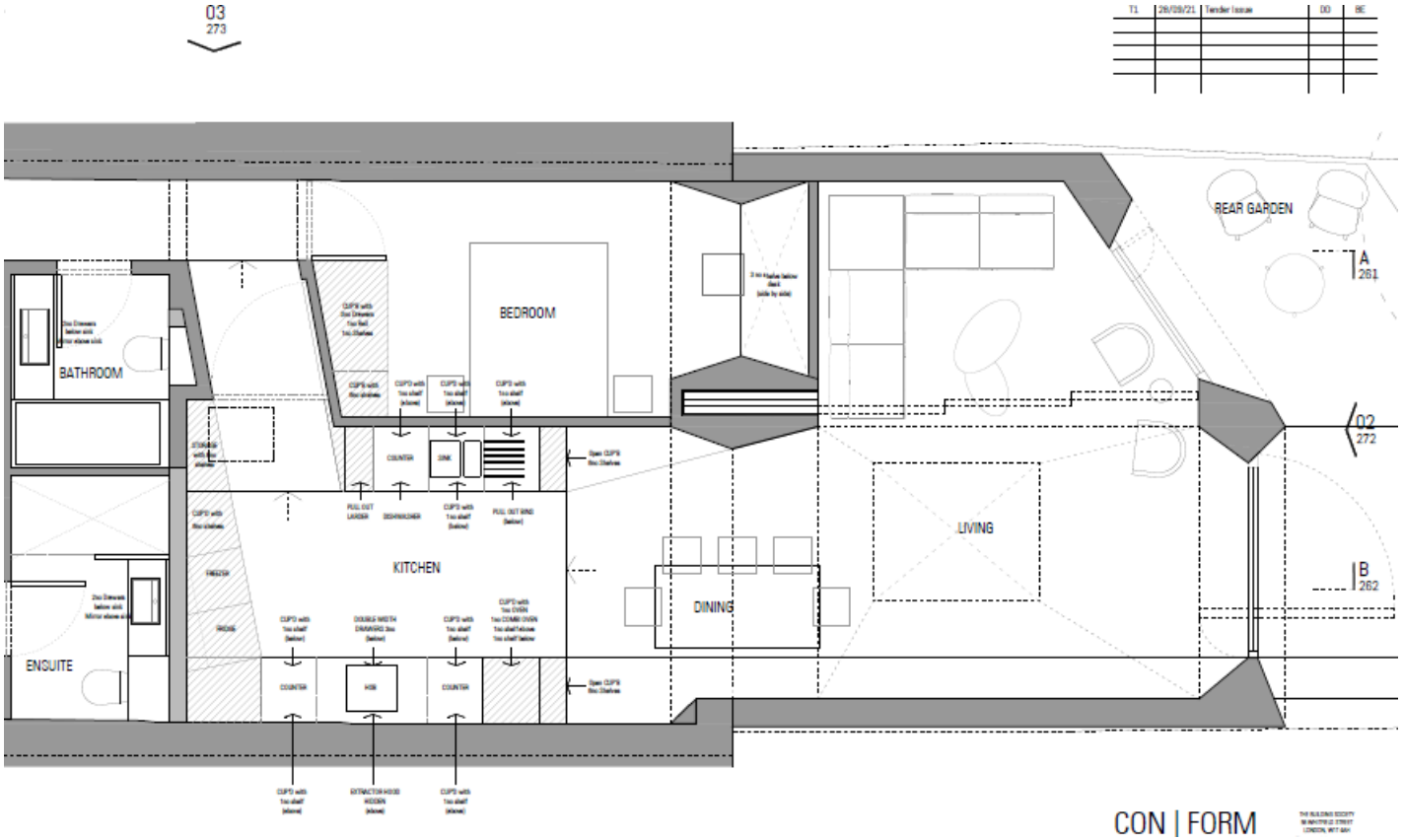


Fig 16 – The proposal incorporates skylight and large glazed doors to the garden and as such there are not considered to be issues associated with shade on this project.

5.8.2 To limit maintenance from leaf drop given the proximity of trees it is proposed that gutter guards be installed.

Fig 17 - Suitable gutter guards (2 types shown above) should be fitted to ensure that leaf drop from adjacent trees does not block new guttering leading to potential pressure for tree works.

5.9 Arboricultural Project Supervision

5.9.1 Most damage to trees on developments sites is caused inadvertently and to ensure continued protection during development a system of site monitoring is normal.

5.9.2 Basic checks will be undertaken as the construction phase progresses to ensure that protective fencing remains intact and ensure the proposed works close to trees are completed in accordance with this report. Any unforeseen issues can be identified and discussed with the consulting arboriculturalist before any damage to trees occurs.

5.9.3 This approach allows a strong working relationship with the site manager/ construction staff to identify issues that may affect retained trees and ensure they are addressed before they escalate.

5.9.4 After each site inspection is completed, a formal record will be sent to the local authority. On this basis we would advise the following inspection regime:

Visit Detail	Date	Status
1st Site Inspection Attend site once tree protection is in place. Inspect/ Toolbox talk with site operatives regarding tree protection measures and patio hand dig. Inspect excavation upon its completion Update local authority on findings.	**TBC**	**Incomplete**
Final Site Inspection Final site visit to confirm that no damage has been done to retained trees/ identify any remedial actions in the event damage has occurred. Assess any required tree surgery following construction. Update local authority on findings.	**TBC**	**Incomplete**

Note: Actual visit dates subject to change/ confirmation depending on project program.

Appendix 1 – BS5837 Survey Key

BS 5837 Cat	Description
A	Those of high quality and value: in such a condition as to be able to make a substantial contribution (> 40 years)
B	Those trees of moderate quality and value: those in such a condition as to make a significant contribution (> 20 years)
C	Those trees of low quality and value: currently in an adequate condition to remain until new planting could be established (> 10 years)
U	Those in such a condition that any existing value would be lost within 10 years and which should, in the current context, be removed regardless of development (< 10 years)

Note: Subcategories are denoted in the tree survey data (A1, B1, C2 etc.). You are referred to BS5837 for further detail if required.

Tree No.	T (tree), G (group), H (hedge), W (woodland) + Ref No.
Species	Common Name
Ht (m)	Measured height in metres
DBH (m)	Diameter at 1.5m above ground level
No of stems	An indication of the trees form @1.5m (1 = single stem, m/s = multi-stemmed)
Branch Spread	In m to cardinal points
Cr Ht Clearance (m)	Overall height of lowest branches from the ground level on side of proposed development
Life Stage	Young, Semi-Mature, Early Mature, Mature, Over-Mature
General Observations	Observations on the condition of the tree(s)
Tree Work Specification	Proposed tree works in accordance with BS3998
BS Cat	See above
Life Exp	Estimated remaining contribution in years.
RPA Radius(m)	Radius of the trees Root Protection Area measured from the trunk to the edge of the RPA circle in metres

Note: Topographical surveys are sometimes not provided (most commonly for smaller residential surveys) or trees may not be included on supplied topographical surveys but added given their presence/ potential constraints. In such circumstances the positioning is indicative only.

Appendix 2 – BS5837 Tree Classification

The classification of trees is undertaken during the survey to inform decisions as they relate to designs and retention/ removal. The 'value' of a tree in terms of its visual amenity is subjective and the full condition of a tree may not be apparent given access and other site-specific factors. If a tree is proposed for retention in many respects its BS category is irrelevant. We encourage the retention of all trees where the design realistically allows this with the exception of U cat trees (as these are usually 'defect' trees). There should not be a presumption that all C category trees can or should be removed. Generally A & B Category trees are those of greatest value to a development and designs should be manipulated to retain these where possible. Further detail on classification of trees is contained at Section 4.5 of BS5837. Some selective extracts are detailed below:

4.5.2 *The purpose of the tree categorization method, which should be applied by an arboriculturist, is to identify the quality and value (in a non-fiscal sense) of the existing tree stock, allowing informed decisions to be made concerning which trees should be removed or retained in the event of development occurring.*

4.5.5 *When determining the appropriate category for any given tree, group, or woodland (see* ***4.4****), the arboriculturist should start by considering whether the tree falls within the scope of category U. Assuming that it does not, the arboriculturist should then proceed on the presumption that all trees are considered according to the criteria for inclusion in category A. Trees that do not meet these criteria should then be considered in light of the criteria for inclusion in category B. This process should be repeated, as required, until the appropriate quality or value assessment is reached.*

4.5.6 *Trees of generally high quality and/or value which have a defect or defects that do not reduce their retention span below the suggested 40-year threshold, should be placed in category A, i.e. they should not be downgraded as a result of minor imperfections.* **Tamla Trees Note:** We do not apply a simple >40 = Cat A approach as many trees will have retention values in excess of 40 years but not be considered Cat A.

4.5.11 *The tree survey might identify the presence of veteran trees on the site. The implications of their presence on the use of the surrounding land should be assessed at the earliest possible stage of the design process. Where such trees are to be retained, particular care should be taken in the design to accommodate them in a setting that aids their long-term retention.*

Please note assessments are made based on available access and factors can affect full inspections (3rd party tree location, extensive basal undergrowth, Ivy etc). This survey is not a full health and safety inspection although obvious defects (where noted) will be identified.

BS5837 Table 1 is shown on the following page and provides detail on the relevant categorisation. Elements of this remain subjective and if a tree is shown for retention its category is somewhat irrelevant as we consider all trees should be afforded the same value/ protection if to be retained.

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 3 – BS5837 Survey Data

Tree No.	Species	DBH (m)	No of Stems	Ht (m)	Crown Spread				BS Cat	Age Class	Life Expect	Cr Ht (m)	Observation	Recommendations	RPR (m)
					N	E	S	W							
T1	Willow	0.18	2	3	3	2.8	3	3.8	C1	Mature	20 to 40	1	Small low level ornamental.	No works	2.2
T2	Laurel (Bay)	0.55	M/S	13	4.8	4.4	4.2	4.5	C1	Mature	20 to 40	1	Basal growth hindered full inspection. Localised screening but minimal wider amenity and tight V unions likely.	No works	6.6
T3	Cypress (Leyland)	0.2	1	8	3.3	3	3	3	C1	Semi-mature	> 40	2	3rd party tree with no access to inspect. Retains high growth potential.	No works	2.4
T4	Sycamore	0.46	1	19	4.2	5	4.8	4.1	B2	Mature	20 to 40	11	Lower stem pruning wounds. Ivy establishing. Some signs of canopy stress. Monitor closely.	Remove/ Ring Ivy to allow fuller future inspections	5.5

Appendix 4 – Tree Works Schedule

Tree Surgery

Tree No.	Species	Proposed Tree Works	BS Cat

Proposed Removal

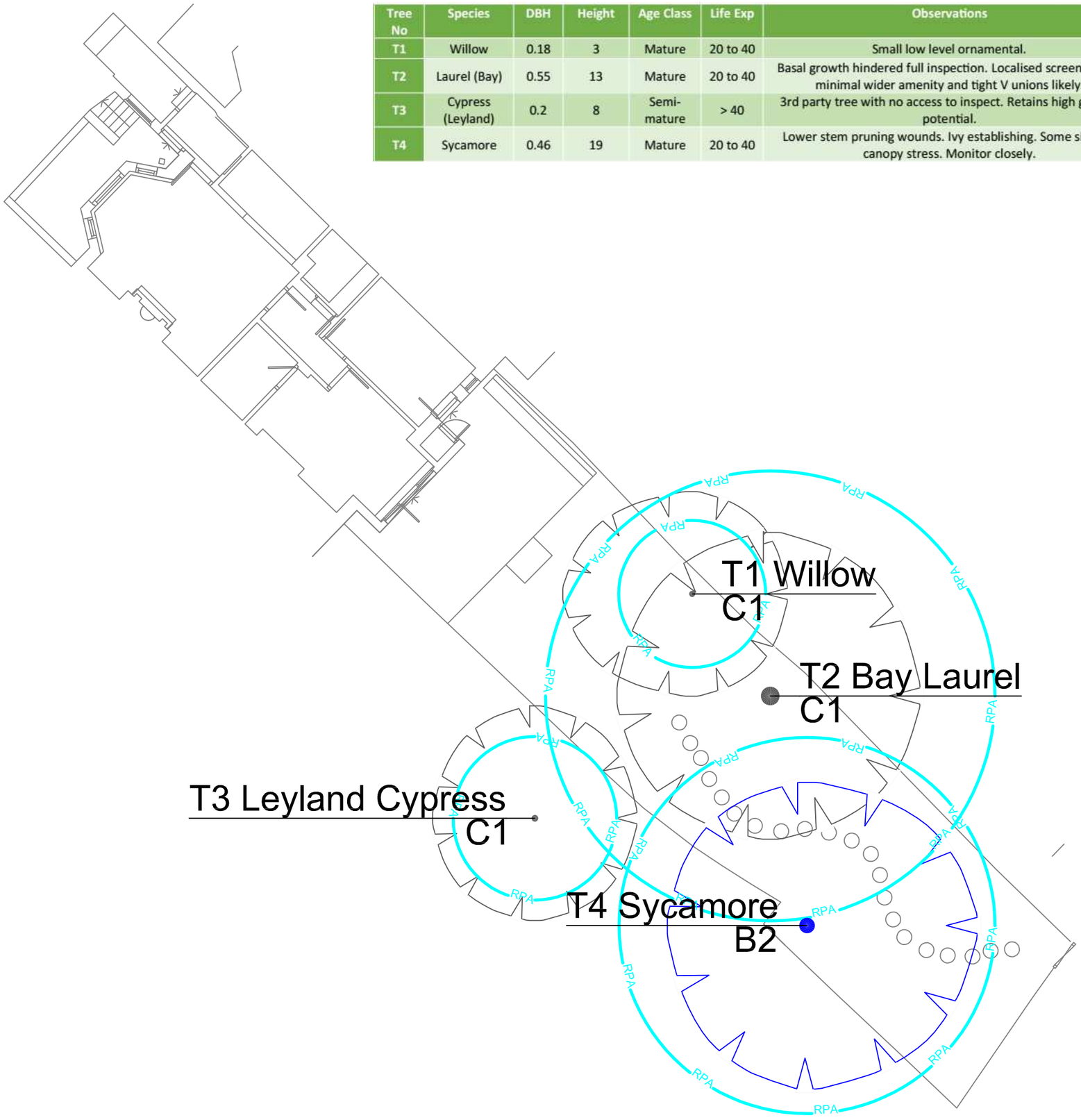
Tree No.	Species	Proposed Tree Works	BS Cat

NOTE: All tree works to be undertaken in accordance with BS 3998:2010 'Tree work - Recommendations'.

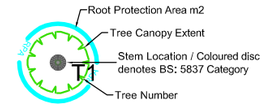
Note: We recommend using Arboricultural Association approved contractors who can be sourced here

Appendix 5 - Tree Constraints Plan

Tree No	Species	DBH	Height	Age Class	Life Exp	Observations	BS Cat	RPR
T1	Willow	0.18	3	Mature	20 to 40	Small low level ornamental.	C1	2.2
T2	Laurel (Bay)	0.55	13	Mature	20 to 40	Basal growth hindered full inspection. Localised screening but minimal wider amenity and tight V unions likely.	C1	6.6
T3	Cypress (Leyland)	0.2	8	Semi-mature	> 40	3rd party tree with no access to inspect. Retains high growth potential.	C1	2.4
T4	Sycamore	0.46	19	Mature	20 to 40	Lower stem pruning wounds. Ivy establishing. Some signs of canopy stress. Monitor closely.	B2	5.5



Tree Survey Drawing Key

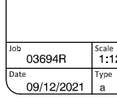


See Tamla Trees, Tree Survey for Individual Tree Details

KEY

Please refer to Tamla Trees report for details

- Category A - Trees of high quality
- Category B - moderate quality
- Category C - low quality
- Category U - Dead, Dying or Defect trees with <10 years retention value



RPA - root protection area as defined by Table 2 BS 5837:2012

NOTE # Tree positions indicatively mapped due to lack of detailed topographical plan

REV	AMENDMENTS	DRAWN	DATE	AUTH'D

PROJECT
25a Greencroft Gardens,
London,
NW6 3LN

CLIENT
M Abdoula

TITLE
Tree Constraint Plan (TCP)

Job	Scale	DRG NO	Revision
03694R	1:125 @ A3	03694P_TCP_01	-
Date 09/12/2021	Type a		

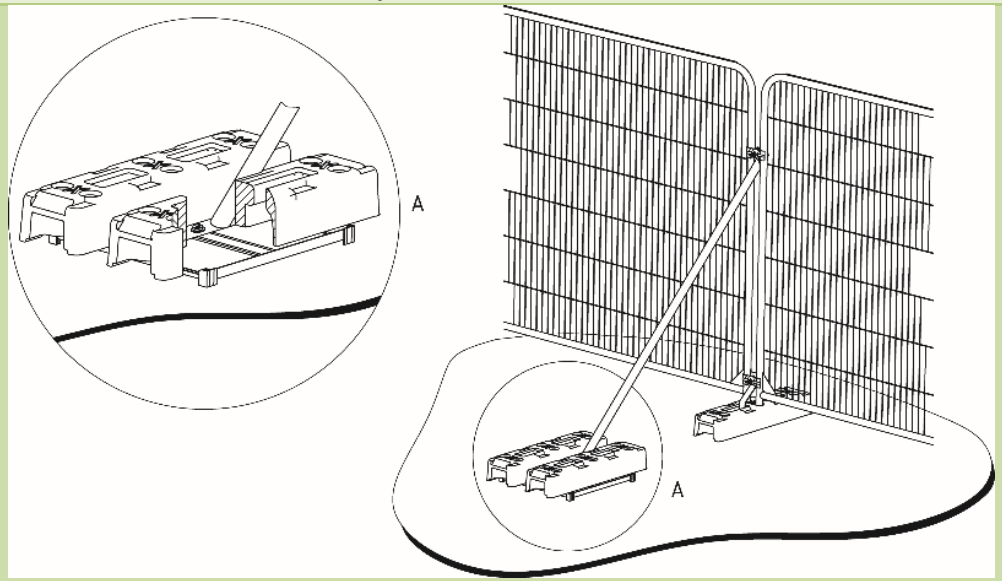
Tel: 01252 811 233
Email: Info@tamlatrees.com
Web: www.tamlatrees.com
Tamla Trees consulting arborists

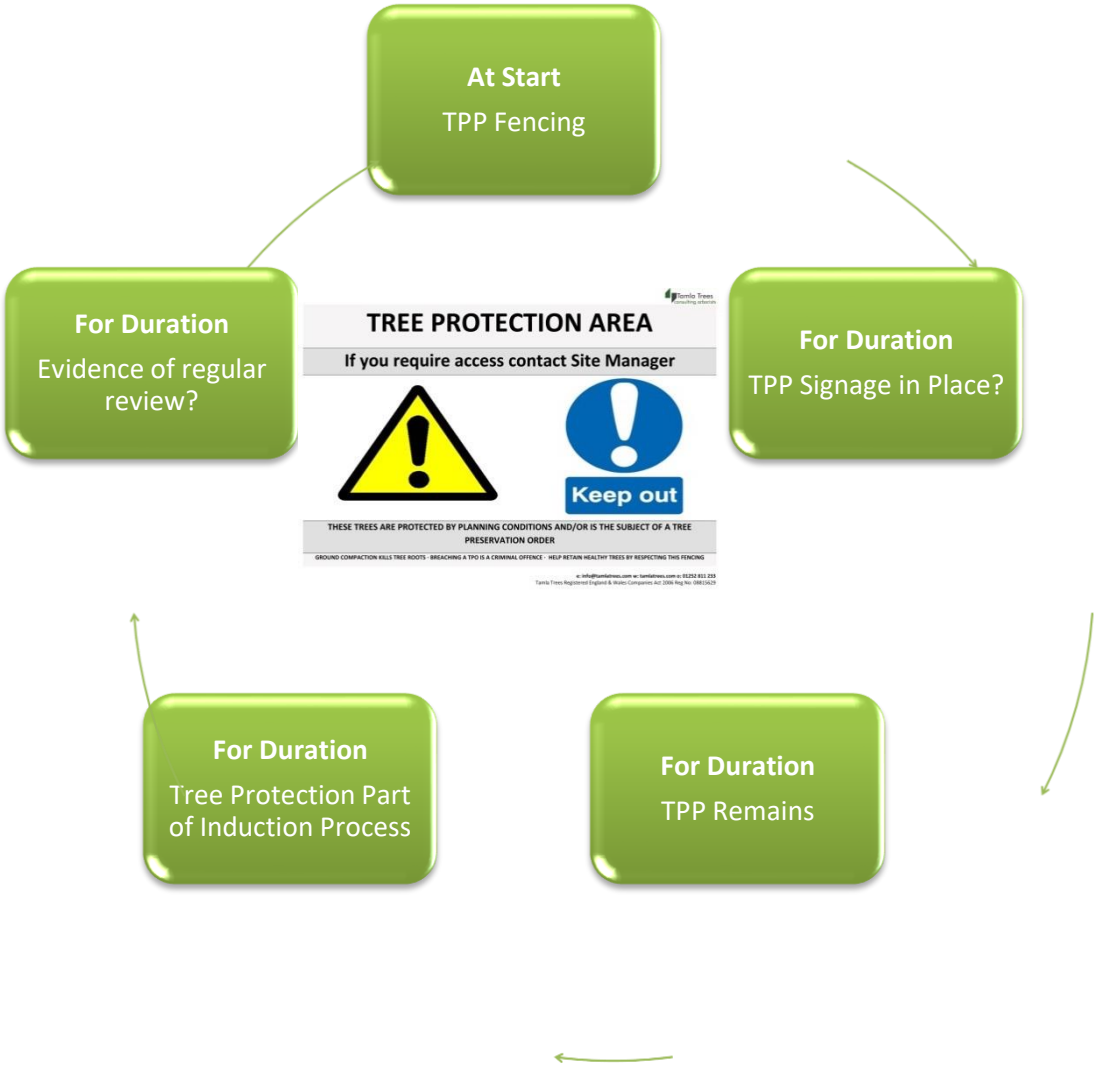
Appendix 6 - Tree Protection Plan

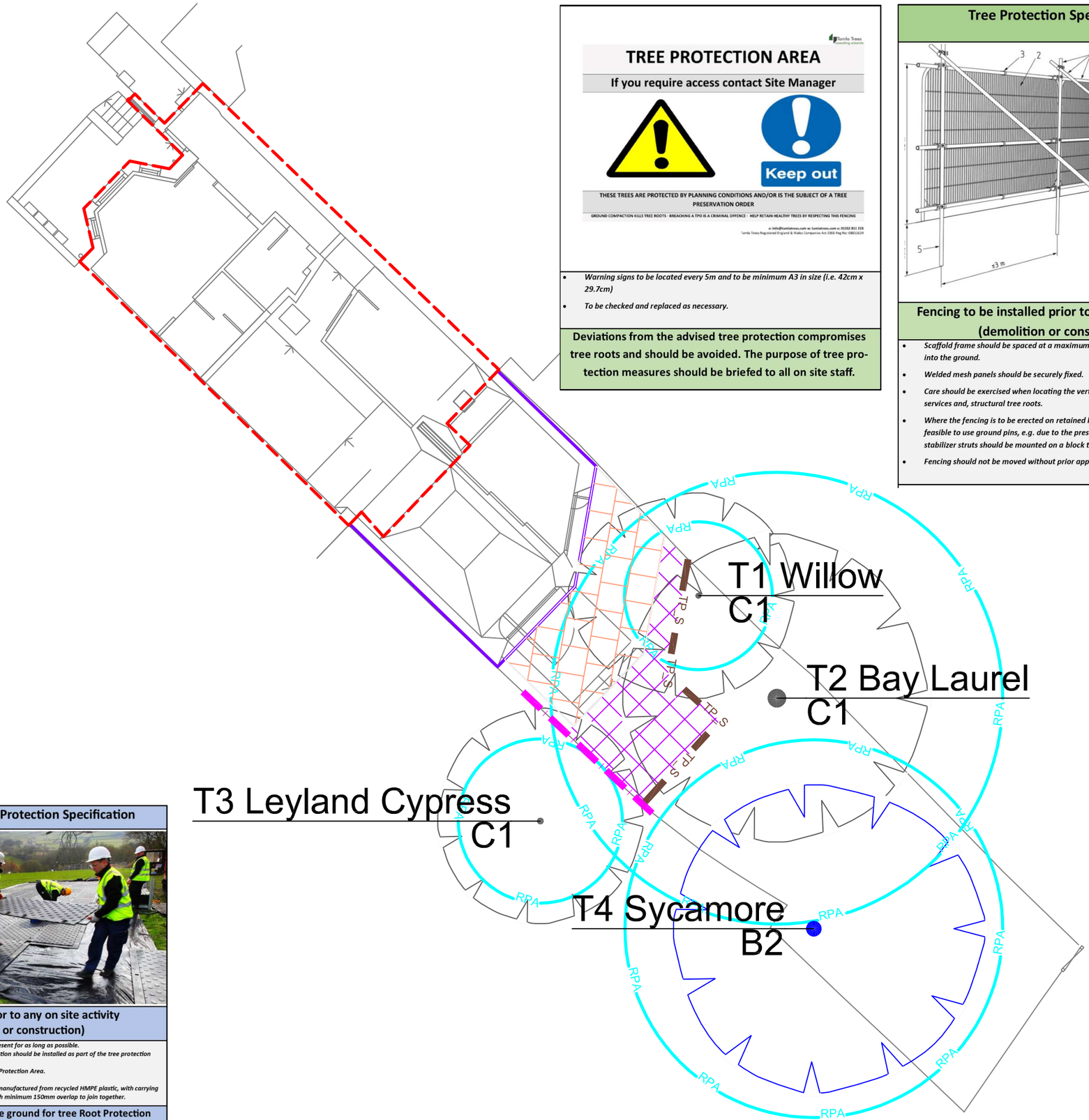
Tree protection is essential to successfully integrate the proposal into the surrounding trees. It is designed to manage the impact on the underlying soil and rooting environment. It must therefore be installed prior to any further site activity. Even apparently minimal tracking of the soil near trees has the capacity to irretrievably modify the soil environment to the detriment of tree health and stability.

All our fencing specifications accord with advice and guidance within BS 5837. Modifications to fence types are possible but should be discussed prior to implementation. In all other instances the form detailed below should be shown. This offers the best protection to retained trees.

- **All tree protection must be in place prior to any site activities. It is recommended that this fencing is installed prior to any site works (including demolition).**
- **To be effective Tree Protection must remain in place for the duration of the development and form part of the site induction process.**
- **Fencing spec (right) proposed and installed prior to any on site activity.**
- **To be combined with temporary ground protection (not shown).**




At Start
TPP Fencing
For Duration
TPP Signage in Place?
For Duration
TPP Remains
For Duration
Tree Protection Part of Induction Process
For Duration
Evidence of regular review?
TREE PROTECTION AREA
If you require access contact Site Manager
Keep out
THESE TREES ARE PROTECTED BY PLANNING CONDITIONS AND/OR IS THE SUBJECT OF A TREE PRESERVATION ORDER



TREE PROTECTION AREA

If you require access contact Site Manager

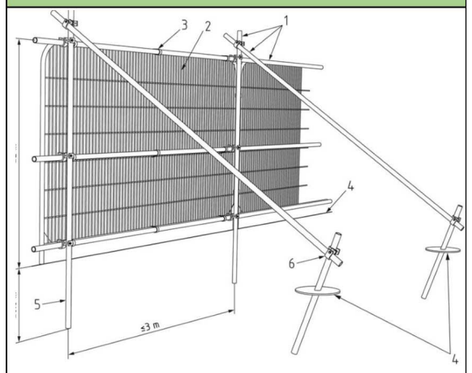
THESE TREES ARE PROTECTED BY PLANNING CONDITIONS AND/OR IS THE SUBJECT OF A TREE PRESERVATION ORDER

GROUND COMPACTION KILLS TREE ROOTS - BREACHING A TPO IS A CRIMINAL OFFENCE - HELP RETAIN HEALTHY TREES BY RESPECTING THIS FENCING

- *Warning signs to be located every 5m and to be minimum A3 in size (i.e. 42cm x 29.7cm)*
- *To be checked and replaced as necessary.*

Deviations from the advised tree protection compromises tree roots and should be avoided. The purpose of tree protection measures should be briefed to all on site staff.

Tree Protection Specification



Fencing to be installed prior to any on site activity (demolition or construction)

- *Scaffold frame should be spaced at a maximum interval of 3 m and driven securely into the ground.*
- *Welded mesh panels should be securely fixed.*
- *Care should be exercised when locating the vertical poles to avoid underground services and, structural tree roots.*
- *Where the fencing is to be erected on retained hard surfacing or it is otherwise unfeasible to use ground pins, e.g. due to the presence of underground services, the stabilizer struts should be mounted on a block tray.*
- *Fencing should not be moved without prior approval.*

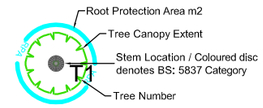
Temporary Ground Protection Specification

To be installed prior to any on site activity (demolition or construction)

- *Retain existing on site hard standing if present for as long as possible.*
- *If indicated new temporary ground protection should be installed as part of the tree protection measures prior to work starting on site.*
- *For exposed unmade ground within Root Protection Area.*
- *To be laid on non-permeable membrane*
- *We recommend 3m x 1m x 20mm matts manufactured from recycled HMPE plastic, with carrying handles and an engraved grid pattern with minimum 150mm overlap to join together.*

To cover all exposed unmade ground for tree Root Protection Area outside of Tree Protective Fencing

Tree Survey Drawing Key



See Tamla Trees, Tree Survey for Individual Tree Details

KEY

Please refer to Tamla Trees report for details

- Category A - Trees of high quality
- Category B - moderate quality
- Category C - low quality
- Category U - Dead, Dying or Defect trees with <10 years retention value

RPA - root protection area as defined by Table 2 BS 5837:2012

Existing building

Proposed extension

Location of protective fencing - Scaffold Frame Fence

Existing boundary acting as protective fencing

Temporary ground protection

Proposed area of new paving

NOTE # Tree positions indicatively mapped due to lack of detailed topographical plan

REV	AMENDMENTS	DRAWN	DATE	AUTH'D

PROJECT
25a Greencroft Gardens,
London,
NW6 3LN

CLIENT
M Abdoula

TITLE
Tree Protection Plan (TPP)

Job	Scale	DRG NO	Revision
03694R	1:125 @ A3	03694P_TPP_01	-
Date: 09/12/2021	Type: a		

Tel: 01252 811 233
Email: Info@tamlatrees.com
Web: www.tamlatrees.com
Tamla Trees consulting arborists

Appendix 7 – Site Photographs

Image 1 – Existing access significantly limits machinery/ materials which can be brought on to site.

Image 2 – T1 Willow	Image 3 – T2 Bay Laurel

Appendix 8 – Limitations

Full Legal Disclaimer

This report was prepared as a report of work instructed by client (as specified). Neither Tamla Trees ltd nor any associated company, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or any third party's use or the report and its findings. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favouring by Tamla Trees ltd or any associated company. The views and opinions of authors expressed herein do not necessarily state or reflect those of Tamla Trees ltd or any associated company.

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Specific - Trees

All tree inspections, unless specified, have been undertaken from ground level and using non-invasive techniques. Comments contained within the report on the condition and risk associated with any tree relate to the condition of the tree at the date and time of survey. Please note that the condition of trees is subject to change. This change may occur but is not limited to biological and non-biological factors as well as mechanical/ physical changes to conditions in the proximity of the tree. Trees should be inspected at intervals relative to risk/ target areas and in accordance with relevant HSE guidance. Tamla Trees ltd can provide further information on this matter if required. Where full access to trees (Ivy, materials at base, location on 3rd party land) was not possible Tamla Trees ltd accept no liability for issues that arise.

Please note no statutory control checks have been undertaken (unless specified). Where tree surgery works have been identified these works are based on the assumption that planning is approved, no tree works should be undertaken prior to determination of this application without up-to-date confirmation of the Tree Preservation Order / Conservation Area Status of the vegetation. All works should be undertaken in accordance with the appropriate Duty of Care. This should include, for example, site specific risk assessments and due diligence inspections for the presence of protected species.

Any comment/ measurements relating to 3rd party trees have been made without full access to the tree(s). Should these trees have any impact on the proposed development we would advise you to instruct us to contact the 3rd party and undertake further detailed inspection work.

A legal Duty of Care requires that any tree works specified in this report should be performed by qualified, arboricultural contractors who have been competency tested to determine their suitability for such works in line with Health & Safety Executive Guidelines. Additionally all works should be carried out according to British Standard 3998 (2010) Recommendations for Tree Work.