Arboricultural Report

Planning and Development

Arboricultural Appraisal and Impact Assessment

Project Name and Address	**13 Elsworthy Road, London NW3 3DS**		
Prepared for	AZ Urban Studio	**Project Ref**	-
ACS Ref	ha/aiams2/21/13elsworthyrd	**Client**	K Gurova
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Report Date	27th April 2021		

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Executive Summary

The construction of a new, rear single-storey extension includes the removal of one low-quality tree and one remove category tree. All other trees at the site can be retained. Construction includes manual excavations within the proximity of a Flowering Cherry tree to form the extended patio area and new steps. It will be prudent to carry out some modest canopy pruning to the Cherry tree, which will reduce stressed placed upon the tree should roots need to be pruned back. Root zone improvement and mitigation measures can be installed around this tree, which will encourage new roots to develop.

The construction of a modest out-building has been designed to retain the existing ground levels, by ensuring that the ground floor slab is at or just above ground level, supported by a series of micro piles, positioned to avoid any conflicts with roots of importance to nearby trees.

Subject to the implementation of the tree protection measures, which I have set out in principle in Part Two of this report, the trees of significance to the landscape can be effectively protected and retained for the future.

PART ONE

1.0 Introduction and Scope

1.1 A planning application for the construction of a new, single-storey rear extension and extended lower-ground floor level patio area, together with the erection of an outbuilding, is to be submitted for consideration by the Local Planning Authority.

1.2 The proposed construction is to be undertaken in the vicinity of trees within a conservation area. In Part One of this report, an assessment of the impact of the proposals upon the trees and the implications upon them is presented. Preliminary methods of tree protection and preservation during ground works, demolition and construction are set out in Part Two, which refers to and includes a requisite a tree management and protection plan.

1.3 I have been appointed on behalf of the site owners as a competent and qualified arboricultural consultant to provide this report and to supervise any works that may have the potential to affect the protected and retained trees.

1.4 The trees have been inspected on 26th February 2021. The details are provided in accordance with the guidance set out in BS 5837:2012 'Trees in relation to design, demolition and construction- Recommendations' (the BS) and an extract from that guidance is appended herewith. The root protection areas (RPAs) of the relevant trees are indicated upon the plans. Some RPAs may be modified from the standard circle by the presence of structures in the ground e.g. foundations, roads or kerbs.

2.0 The Site, Trees and Implications of Proposals

2.1 The site comprises a four-storey town house with lower ground floor space. The rear garden is accessible from the rear patio via a short set of garden steps. Mature trees and understorey garden shrubbery exists throughout the site including at the front. A space for vehicular parking is set to the eastern side of the front garden area. Similar properties and associated gardens adjoin the site.

Fig. 1 Front of No 13 Elsworthy Road

2.2 The BS details of the trees are provided within the tree survey schedule at **Appendix 1** and their corresponding positions are shown on the tree protection plan included at **Appendix 2**.

2.3 There are two trees, which are to be removed to accommodate the new design. These include a Judas Tree (T6), which is growing in the rear garden only just visible from Elsworthy Road (arrowed in Fig. 1). The tree is graded 'C' (low quality) with reference to the BS categorisation methods. The other tree (shrubby) is a Lilac (T17), which is dead and is therefore within the 'Remove' category of the BS. The removal of both these trees will go unnoticed to the public, the environment and the conservation area.

2.4 The proposed designs mean that excavation of soil, which is likely to contain roots will occur within the proximity of a further Flowering Cherry tree, T7. The project seeks to retain this tree for desirable landscape reasons although it would not be unreasonable, in my view, to remove and replace the tree. However, this scheme

includes the tree's protection and I have set out ways that this could be achieved with a reasonable degree of success. I have recommended that the soil excavation should be carried out manually and under the supervision of the project arboriculturist, who can advise upon tree root pruning, where this may be necessary. The regeneration of roots can be encouraged by implementing some root zone mitigation measures, which are also set out in this report.

2.5 The proposed out building is proposed to be installed near to a 'C' grade Mulberry tree, T11. In spite of the tree's low grade, it does provide private amenity and is worthy of retention and protection. In conjunction with the architects, the base of the out building will be supported at or just above ground level by a series of micro piles, positioned to avoid conflicts with roots important to retained trees. This can be achieved by first manually digging out the soil into which the pile is to be inserted to around 1m depth to assess for the presence of roots. If roots are unearthed, the pile position can be adjusted to accommodate the root(s).

Fig. 2 Example of micro piles in use for an out building (Hampstead 2018)

2.6 The BS at para. 5.3 recommends that applicants should provide justification for conducting construction works within BS root protection areas (RPAs) of trees to be retained. Where this is proposed, the reasonable protection and preservation of the trees is dependent upon a range of factors. To this end, I have identified six arboricultural impact criteria to be considered positively in order for a tree(s) to be reasonably retained and protected, where construction is proposed within an RPA.

1) The linear separation distance between construction and the tree's trunk and canopy spread is sustainable for the future.
2) The tree's maturity, condition and known species tolerance to root loss or disturbance (biological tolerance).
3) The extent of RPA used by the proposed construction
4) The nature and intensity of the proposed construction and its associated implementation
5) The level of existing constraints to tree growth and development
6) The scope of opportunities for tree root and tree growth mitigation* measures

Each of the above impact criteria carries an escalating score ranging from 0-4, where 0 represents the potential for significant impacts and 4 identifies a low to negligible impact.

Impact Criteria Scores
0-10 Tree unsuitable for retention
11-20 Tree suitable for retention; protection and preservation methods available
>20 Tree unaffected by the proposals

Table 1

Impact Criteria	Distance from Tree	Biological Tolerance	Extent of RPA	Construction Type	Existing Constraints	Mitigation	Total
	Score						
T7	1	2	2	2	3	2	12
T11	0	2	3	3	4	3	15
T15	4	2	3	3	3	2	17

*mitigation means soil/rooting area environment improvement works e.g. applications of mulch, bio stimulants or soil aeration.

NOTES on Impact Criteria:
1 – Distance from tree - Within the canopy merits up to 2 points; up to 2m beyond the canopy merits 3 points; more than 2m separation from the canopy merits 4 points.
2 – Biological Tolerance - Veteran/very mature tree or tree with low vitality merits 0-2 points; mature tree with normal vitality merits 3; maturing tree with normal vitality merits 4 points.
3 – Extent of RPA - Use of more than 20% of the RPA merits 0-2 points; between 10-20% merits 3 points; less than 10% merits 4 points – **Note to be considered in the context of criterion 2 above.**
4 – Construction Type - High intensity construction and excavations through expected rooting profile merits 0-2 points; moderate intensity work or excavations no deeper than 50% of the rooting

profile merits 3 points and low invasive or no-dig work, retaining 100% of the rooting profile merits 4 points
5 – Existing Constraints - Lateral root and canopy spread restricted in more than one compass direction merits 0-2 points; lateral growth of roots or canopy in one direction merits 3 points; no constraints to roots or canopy merits 4 points
6 – Up to 50% of the existing RPA available for mitigation but no compensatory root growth area merits 0-2 points; more than 50% of the RPA available for mitigation and compensatory root growth areas merits 3 points; 100% of RPA available for mitigation and compensatory root growth area merits 4 points.

The extent of proposed works within the BS root protection areas and the justification for same, is set out in Table 2 below:

Table 2 Construction Activities within RPAs of trees

Tree Ident.*	Maturity	Vitality	% of RPA*	Tolerance** Acceptability	Justification/Recommendation
T7 Cherry	Mature	Normal	30%	Medium	1. Majority of RPA retained undisturbed 2. Small, secluded tree of importance to resident client 3. Mitigation measured available
T11 Mulberry (& T15 Oak)	Mature	Normal	2%	Medium	1. Vast majority of RPAs retained undisturbed (98%) 2. No change of existing ground level required 3. Manual siting of micro piles to retain all roots of importance

* % of BS RPA used for construction
** Tolerance to construction activities is described as High (no adverse effects); Medium (potential for temporary stress, mitigation recommended) and Low (Potentially unsustainable adverse impacts, tree replacement to be considered)

Table 3 **Proposed/Recommended Tree Works**

Tree Works (Spec.)	Tree Nos	Visual Landscape Impact of Works*	Space Available for Replacement Planting(Y/N)	Comments
Fell (Sp6)	T6, T17	None	Y	Secluded and dead trees
Crown Reduce by 1m (max) (Sp1)	T7	None	-	Pruning to reduce risk water stress
Total		None		

*This is a preliminary visual appraisal based upon the opinion of the author having inspected the trees in the context of their current surroundings. – None (no change or beneficial impact) Negligible or indiscernible difference to treed landscape; Low – Noticeable but mitigated by retention of other landscape trees and features; Medium – Obvious but temporary alteration to the treed landscape; High – Obvious and permanent alteration to the landscape.
Visual receptors include the public or community at large, residents, visitors or other groups of viewers together with the visual amenity of potentially affected people.

Specifications for recommended tree works:

General

All work is to conform to BS 3998:2010 'Tree work – Recommendations' and with current arboricultural best practice. Tree works are to be undertaken by a professional and specialist arboricultural contractor, who carries the appropriate experience and insurance cover, equipment and PPE. Unless stated within this report, no checks have been or will be made by ACS (Trees) Consulting, upon the presence of Tree Preservation Orders or conservation areas. All works and processes must comply with all relevant Planning, Wildlife, Environmental, Conservation and Health and Safety legislation. All works and processes are to comply with all relevant Planning, Wildlife, Environmental, Conservation and Health and Safety legislation.

Sp1. Crown reduction will include reducing the height and spread of a tree's canopy (branching structure) whilst retaining the tree's natural tree form (species determined). The amount of reduction is described in linear metres e.g. 2m (from 6m to 4m radial spread) or 3m (from 15m to 12m tree height). Crown reduction work will be undertaken for a specific purpose, which may include containing tree growth in a given location or reducing wind purchase and stress.
NOTE: Crown Reduction via thinning ('drop-crotching') work will reduce the overall height and spread of the tree crown by specified linear metres and will not equate to exceeding 30%, and more generally not exceeding 20% of the overall height and spread of the tree. This will be carried out by shortening selected leading branches by pruning back to suitable growing point, (which will be a subordinate side branch not less than 30% the diameter of the leading branch). The pruning will be undertaken in a way to preserve the natural form and the proportion of the tree species. Much of the work will be undertaken using specialised hand saws rather than motorised chain saws because it is to be recognised that this type of crown pruning is a delicate and sympathetic operation. The operation of crown reduction via thinning is a matter of judicious pruning and will not be construed as 'lopping or topping'.

Sp6.Felling involves the careful removal of a tree to ground level (or other specified height), either in sections or in one unit (straight felling). The method of felling will be suited to the constraints of the site and judged by the competent operator undertaking the task. Removing the stump may be part of the requirements and this will be carried out using a mechanical stump grinder where accessible.

Sp8.Root protection and pruning is to be carried out or supervised by a competent person (arboricultural contractor). Only sharp and specific pruning tools will be used for the root pruning exercise. No roots are to be pruned if it is considered that their loss (or shortening) will adversely impact upon tree condition or anchorage, immediately or in the future. Any exposed roots will be covered with a material to prevent desiccation. All exposed cut root surfaces will be made as small as possible. If possible roots will be pruned back to side shoot.

Table 4 Summary of Impact of Proposed Construction on Trees*

Tree Ident.*	Landscape Contribution	Implications /Impact	Mitigation measures	***Tolerance[1,2,6]	Impact Assessment**
T6, T17	Low/None	Fell to enable construction	1. Replacement tree planting possible	-	Positive
T7	Low	Excavations within 30% of RPA	1. Install all tree protection 2. Supervised manual dig out 3. Professional root treatment as necessary 4. Root zone mitigation	Medium	Neutral
T11 & T15	Medium	Construction over RPA	1. Install all tree and ground protection 2. Supervised initial dig outs 3. Protect roots of 25mm diam. and over 4. Monitor tree protection	High	Neutral

* Main trees selected for comment included above. Refer to previous notes on other trees.
** Negative – adverse impact upon trees and landscape; Neutral – no material impact (negative or positive); Positive – improvement (potential) to tree quality and landscape
******* Tolerance to proposed work within extent of RPA, in association with proposed tree protection – High - No adverse impacts; Medium - Temporary reduction in vitality only; Low - Susceptible to longer-term reduction in vitality and likely to require follow-up management.

3.0 Summary and Conclusions

3.1 The proposed construction requires the removal of one live tree, a small Judas Tree (T6) and a dead Lilac (T17), which is shrubby. The removal of these trees will have neutral and ultimately positive impact upon the locality, owing to the ability to replace trees within this project and conservation area.

3.2 Excavations within the rooting area of a further ornamental cherry tree may encounter some roots. With the usual care however, the tree can be retained and protected for the future. Modest pruning will be prudent management.

3.3 Subject to the implementation of the tree protection measures from the outset of construction, there will be a neutral impact upon the trees of importance to the local landscape.

3.4 Opportunities for new tree and shrub planting are possible around the site, which would be a positive contribution to the landscape now and for the future.

PART TWO – Trees and their Protection

4.0 Recommended Tree Protection Methods

4.1 In order to afford protection from general construction processes associated with the building of the single storey extension and out building, it will be necessary to erect robust tree protection barriers (normally wire mesh panels) in the position indicated on the Tree Protection Plan at **Appendix 2** (TPP1_ER_13). A recommended example of the type BS grade tree protection is included at **Appendix 3**.

4.2 Following erection of the tree protection barriers and following the completion of the tree works, I recommend installing the ground protection (refer to the TPP for its location), to ensure that roots under the surface are not damaged by compaction during regular passing by operatives and light machinery. **Note**: where ground protection is to be installed, no excavations are to take place in this location. I have included recommended examples of suitable ground protection at **Appendix 3** also.

4.3 With regard to creating the new patio area, manual digging in the root protection area of T7 is recommended as well as part of the RPA for T15. The methods of manual digging near trees are described within **Appendix 5** but for clarity I have set out the procedure below, which is to be overseen by the appointed arboricultural consultant:

i) Clearly mark out the area for hand dig (using biodegradable marker paint) (see TPP)
ii) Use hand tools (forks and spades) to remove the spoil and deposit beyond RPA.
iii) Identify roots to be retained by brushing or the use of compressed air
iv) Unless after professional assessment permits pruning, roots in excess of 25mm Ø are to be retained in-situ by manually clearing around (with compressed air for example), wrapping with non-woven geotextile (e.g.Terram), covering with a void former e.g. split, rigid polythene piping.

v) Unless after professional assessment permits pruning, retention of roots 50mm Ø or more will be by the use of void-formers (see **Appendix 5**).

vi) Roots <25mm Ø will be pruned using sharp pruning tools ensuring that no splits or tears occur and that the pruning wound is made as small as possible. Roots will be pruned back to a side shoot where possible or to a suitable position.

NOTE: THE APPOINTED ARBORICULTURAL SUPERVISOR IS TO BE CONSULTED BEFORE ANY WORK, EITHER SCHEDULED OR UNSCHEDULED, IS CONSIDERED WITHIN THE EXCLUSION ZONE OR ROOT PROTECTION AREAS OF ANY RETAINED TREE. FAILURE TO DO SO MAY LEAD TO ENFORCEMENT ACTION BY THE LPA.

4.4 The rooting environment for the retained trees T7 (and other retained trees) can be improved by manual aeration using hand tools to 'fork over' the upper 200mm of soil and the addition of well-rotted wood chip mulch to a maximum depth or 75mm and maintained for the duration of the build. The mulch is to be maintained in a moist but not water-logged condition. Refer to Appendix 6.

4.5 In order to ensure that the tree protection measures are implemented effectively, a site monitoring exercise will be undertaken to confirm:

i) The efficacy and accuracy of the fencing and ground protection
ii) The root inspection and treatment exercise
iii) Effective maintenance of tree and ground protection

An example of a site record (tree protection) is provided at **Appendix 4**. In this case, the form will be used as confirmation that all practical precautions have been undertaken in accordance with this method statement.

4.6 A copy of this method statement is to be retained on site for the duration of the build process together with a scaled, colour copy of the Tree Protection Plan.

4.7 The details pertaining to tree protection as set out in this method statement, specifically include:
i) erection of tree protection barriers:
ii) the installation of ground protection;
iii) lines of communication and incident reporting,

are to be explained to the Site Agent at the pre-commencement site meeting. It will be the responsibility of the Site Agent to ensure that all personnel working on site are aware to the tree protection measures processes. A copy of this method statement is to be retained on site for the duration of the build process together with a scaled, colour copy of the Tree Protection Plan.

4.8 Key times for site supervision include:

1. Completion of agreed/necessary tree works
2. Erection of tree protection barriers
3. Installation of ground protection
4. Works within RPAs of retained trees
5. Landscaping

4.9 Effective site monitoring will be undertaken from the outset of the project and at agreed intervals thereafter. The frequency of monitoring may well decrease following the proper installation of all tree protection measures. Below is a recommended programme of arboricultural supervision. (This programme may alter dependent upon site circumstances or by agreement.)

4.10 The process for recording the tree protection measures will involve:

i) Site Agent to contact Arboricultural Supervisor with a minimum of 5 days' notice of any site work commencement.
ii) Arboricultural Supervisor to monitor site to agree tree protection fencing
iii) When all tree protection is installed in accordance with the tree protection plan, the Arboricultural Supervisor is to arrange with LPA tree officer and relevant contractors **the pre-commencement site meeting** in order to agree the tree protection and subsequent works within RPAs of retained trees and importantly the lines of communication between the on-site contractors, the Arboricultural Supervisor and the LPA tree officer and incident reporting,
iv)Arboricultural Supervisor to record all site visits and distribute reports to LPA tree officer and contractors for their records
v)Subsequent to completion, Arboricultural Supervisor to sign-off and complete.
vi) Any incidents resulting in potential tree damage are to be reported in line with the 'Incident Reporting Flow Chart in **Appendix 4**.

Table 5 Preliminary site supervision schedule

Stage	Action	Arboricultural Supervisor (AS) (Required – Y/N)	Notes
1	Pre-commencement meeting*	Y	Site Agent(SA) and LPA tree officer, contractor to attend
2	Tree works	Y	Following completion of tree works
3	Installation of tree protection and ground protection	Y	PRIOR to ground/demolition works
4	Initial manual dig exercise and any root treatment	Y	SA to advise AS prior to commencement
5	Ground works and Construction phase	Y	AS to monitor tree protection at agreed and suitable intervals
6	Remove tree/ground protection	N	No tree protection to be removed without prior agreement with the AS
7	Tree planting/landscaping	Y	Brief landscape company & sign off

4.11 The frequency of tree protection monitoring depends upon the nature of the project. In this case, it will be appropriate for the SA to organise with the AS monitoring visits to be twice in the initial 28 days from commencement and thereafter once every 28 days for two months.

Table 6 Contact List (to be completed **PRIOR** to commencement)

Interested Party	Name	Company/LPA	Contact Number(s)	Comment/ Responsibilities
Planning Consultant(s)	Mr M Harradine	AZ Urban Studio		Planning submissions & Conditions
Site Agent	TBA To be Advised			Day to day site management; co-ordination of timings; **contact with project Arboriculturist**
Main Contractor	TBA			Legal and administrative running of the project; finance; appointment of and liaison with all project consultants
Arb. Supervisor	TBA			Tree protection and management; dissemination of tree-related information
LPA Tree Officer	N Bell	L B Camden		Tree protection and enforcement
Site Engineers	TBA			Technical advice and design
Architects	M Groves	Groves Natcheva Architects		Design

***Pre-commencement means i) before any works including tree felling or pruning and ii) before any ground works or demolition commences and upon completion of the initial installation of the tree protection, including ground protection.**

5.0 Precautions during Landscape Work

5.1 The following steps (both general and site specific), are advisable in relation to implementing any landscape works, which may have the potential to affect retained and or protected trees:

1. Advise arboricultural supervisor of intended time frame of landscape work in advance of commencement.
2. Re-locate existing tree protection fencing/ground protection to enable landscape work to proceed.
3. With bio-degradable spray paint or site pins with plastic tape, mark out the position of the relevant tree root protection areas (RPA) as per the tree protection plan.
4. Within the RPAs, avoid using any mechanical tools or vehicles (e.g. tracked or wheeled machinery).
5. Spread any mulch or top soil manually, with the use of wheel barrows and hand tools. It will be acceptable to use of the back actor of a tracked excavator to spread piled top soil or mulch into the RPAs of protected trees provided the bucket does not come in contact with the ground and that the power unit is positioned outside of the RPAs at all times.
6. Any planting pits are to be excavated manually within the RPAs of any retained trees.
7. Multiple passes within the RPAs along one route, pedestrian and with wheel barrows will require some ground protection to be installed prior to working. Ground protection can be scaffold boards over wood chip for example.
8. A record of the landscape working method is to be made and provided to the Council for their file.
9. Hard landscaping features will be constructed under supervision within the RPA of retained trees and will avoid, where possible, the re-grading of soil.

6.0 General site care (trees)

6.1 No fires will be lit on site.

6.2 No access will be permitted to within the fenced or otherwise protected areas (unless for site accommodation or Authorised agreement) at any stage during construction.

6.3 No materials, equipment or debris will be stored within the fenced areas unless agreed with the arboricultural supervisor.

6.4 Areas for mixing are to be located beyond RPAs of trees and contained to prevent leaching into the soil.

6.5 A copy of this report and the Tree Protection Plan is to remain on site at all times.

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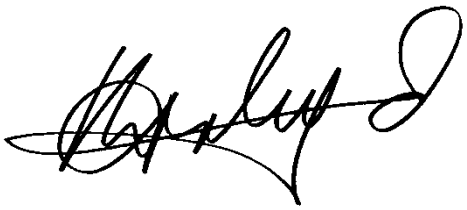

Hal Appleyard
Date: 27th April 2021

References:

1. Matheny. N, Clark. J. R, 1998. 'Trees and development; A technical guide to the preservation of trees during land development'. ISA
2. Costello, L.R, Jones. K. S, 2003. 'Reducing infrastructure damage by roots: A compendium of strategies.' ISA Western Chapter.
3. Roberts. J, Jackson. N, Smith. M, 2006. 'Tree roots in the built environment.' TSO DCLG
4. Lindsey, P. Bassuk, N. 1991 'Specifying soil volumes to meet the water needs of mature urban street trees and trees in containers'. Journal of Arboriculture vol. 17 No 6.
5. Harris et al, 1999 'Arboriculture, Integrated Management of Trees, Shrubs and Vines' Third Edition Prentice Hall
6. Watson, G.W., Costello, L., Scharenbroch, B. & Gilman, E. 2008 The landscape below ground III The international society of arboriculture
('Tree root system response to woody root severing and fine root desiccation' – 'The root severing location producing the greatest decay or discolouration varied among species. Defect development as a result of severing roots of any size root at any distance is not likely to result in a threat to the health or the stability of the tree.')

APPENDIX 1

ACS (Trees) Consulting
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No.	Species	Height	Trunk Dia.	Radial Crown Spread	Crown Clear-ance	Height to 1st Branch	Life Stage	Physi-ology	Struct. Condition	Landscape Value	Est. Years	Cate-gory	Comments	RPA Radius	RPA m2
1	London plane *(Platanus X acerifolia)*	13m	585mm	N5m E4.5m S3.75m W4m	6m	4m	Semi-mature	Normal	Good	High	40+	B (12)	Off-site street tree; subject of cyclical pruning regime	7.0m	154.8m²
2	Beech *(Fagus sylvatica)*	15m	770mm	N8.25m E6.5m S5.75m W5m	W5m	7m	Mature	Normal	Fair	High	20-40	B (2)	Off-site tree; large, open cavity at 3m on W aspect, extent of internal decay unknown; dominant canopy; street scene tree	9.2m	268.2m²
3	Lilac *(Syringa vulgaris)*	3m	135mm est. @1m 120mm est. @1m	N2.75m E3.75m S2.5m W2.5m	2m	1.25m	Young	Normal	Good	Low	40+	C (1)	Ornamental screening value.	2.2m	14.8m²
4	Apple *(Malus sp.)*	4.5m	160mm	N3.25m E2.25m S3m W2.75 m	2.5m	2.5m	Semi-mature	Normal	Good	Low	20-40	C (1)	Domestic fruit tree.	1.9m	11.6m²
5	Flowering cherry *(Prunus sp.)*	5.5m	4 stems @ 100mm est.	N2.5m E3.5m S2.75m W2m	3m	3m	Semi-mature	Normal	Good	Low	40+	C (1)	Multi-stemmed from base; small ornamental.	2.4m	18.1m²
6	Judas tree *(Cercis siliquastrum)*	9m	185mm 240mm ivy	N3m E3.5m S3.5m W2.75 m	3m	2m	Semi-mature	Normal	Good	Low	40+	C (1)	Growing in a bed adjacent to retaining wall; no significant evidence of root growth related damage to wall.	3.6m	41.5m²
7	Flowering cherry *(Prunus sp.)*	5m	380mm	N3m E3.75m S3.75m W4.25 m	2m	2m	Mature	Normal	Good	Low	20-40	C (1)	Medium sized ornamental.	4.6m	65.3m²
8	Lilac *(Syringa vulgaris)*	4.5m	100mm @1.25m	N2m E0.5m S1m W3.25 m	1.5m	1m	Young	Normal	Good	Low	40+	C (1)	Small suppressed tree.	1.2m	4.5m²

Note: Trunk Diameter (e) = Estimated

Refer also to 'Notes to the Schedules'

No.	Species	Height	Trunk Dia.	Radial Crown Spread	Crown Clear-ance	Height to 1st Branch	Life Stage	Physi-ology	Struct. Condition	Landscape Value	Est. Years	Cate-gory	Comments	RPA Radius	RPA m2
9	Magnolia *(Magnolia soulangiana)*	7.5m	150mm 140mm	N2.5m E3m S3.25m W2.75 m	W2.5m	2m	Semi-mature	Normal	Good	Low	40+	C (1)	Medium sized ornamental.	2.5m	19.0m²
10	Tree of Heaven *(Ailanthus altissima)*	8.5m	250mm est.	N3m E3m S2.25m W3.25 m	W2.5m	2.5m	Semi-mature	Normal	Good	Low	40+	C (1)	Off-site tree; makes a limited contribution to the immediate landscape.	3.0m	28.3m²
11	Black mulberry *(Morus nigra)*	12m	305mm 310mm 255mm	N7.5m E5.5m S5.5m W5m	3m	2.5m	Semi-mature	Normal	Good	Low	40+	C (1)	Three stemmed from base; unbalanced crown biased to the N due to suppression.	6.0m	115.0m²
12	Common lime *(Tilia x europaea)*	20m	500mm est.	N4m E3.5m S6m W4m	W4m	5m	Mature	Normal	Good	Medium	40+	B (12)	Off-site tree; restricted access and views; visible across Primrose Hill to the S; member of a group of limes	6.0m	113.1m²
13	Sycamore *(Acer pseudoplatanus)*	16m	500mm est.	4.5m	E5m S2m	3m	Mature	Normal	Fair	Medium	40+	B (12)	Off-site tree; crown has been previously heavily reduced to 8m; visible in long-range views from the S without conferring significance to the landscape.	6.0m	113.1m²
14	Maidenhair *(Ginkgo biloba)*	8m	105mm	2m	3m	3m	Young	Normal	Good	Low	40+	C (1)	Small, recently planted tree.	1.3m	5.0m²
15	English oak *(Quercus robur)*	21m	950mm est.	N8m NE8.5m E4m S7m W9m	5m	4m	Mature	Normal	Good	Medium	40+	B (12)	Off-site tree; observations made from No. 13 only; canopy has been reduced in the past;	11.4m	408.3m²
16	Azara	4m	205mm	1.5m	1.75m	3m	Semi-mature	Normal	Poor	Low	20-40	C (12)	Crown has been previously heavily and poorly reduced.	2.5m	19.0m²
17	Lilac *(Syringa vulgaris)*	3m	120mm est.	N0m NE3.75 m E2m S0m W0m	NE1m	2m	Semi-mature	Dead	Poor	Low	<10	U	Dead tree.	1.4m	6.5m²

Note: Trunk Diameter (e) = Estimated

Refer also to 'Notes to the Schedules'

Notes to the tree survey schedule

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Notes:

1. No refers to the tree identification number e.g. T1, T2 etc. numbers preceded by 'G' refer to Groups and 'H' refer to Hedges
2. Species refers to the tree name as an English and botanical. (Sometimes the botanical name will not be included)
3. Height describes the approximate height of the tree in meters from ground level.
4. Trunk Diameter is the diameter of the stem/trunk measured in millimetres at 1.5m from ground level. The diameter may be estimated (e), where access is restricted. An average (a) may be taken for tree groups. A full inspection is always recommended.
5. Radial Crown Spread refers to the crown's radius in meters from the stem centre. This dimension is estimated.
6. Crown Clearance is the height in meters of crown clearance above ground level together with the height and direction of the lowest branch
7. Height to first branch is the height in metres from ground level to the first main branch
8. Life stage is the tree's maturity **Y**oung; **S**emi **M**ature, **E**arly **M**ature, **M**ature, **O**ver **M**ature, **V**eteran
6. Physiology describes the tree's general vitality as **Good** (normal), **Fair** (sub normal), **Poor** (weak), **Dead**.
8. Structural Condition - **Good** (no or only minor defects), **Fair** (remediable defects), **Poor** - Major defects present or suspected.
9. Landscape Value (Contribution) - **High** (prominent landscape feature), **Medium** (visible in landscape), **Low** (secluded/among other trees).
10. Estimated Years – Estimated remaining useful years: **10yrs+**, **20yrs+**, **40yrs+**
11. Category - refers to the British Standard 5837:2012 Table 1 Category and refers to the tree/group quality and value; **'A'** - **High**, **'B'** - **Moderate**, **'C'** - **Low**, **'U'** - **Remove or very poor quality**. The sub-category in brackets refers to the retention criteria values where **1** is **Arboricultural**, **2** is **Landscape** and **3** is **Cultural** including **Conservation/ecological, historic and commemorative**.
12. Comments include observations regarding tree condition, setting and function/properties and characteristics
13. RPA radius refers to the radial distance measured in metres from the trunk centre. It is a function of the tree's diameter (s). RPA means root protection area
14. RPA m^2 means the area of the BS standard root protection area derived from the RPA radius.

NB: Column headings may alter and some of the above notes are not applicable to the schedule in question.

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 2

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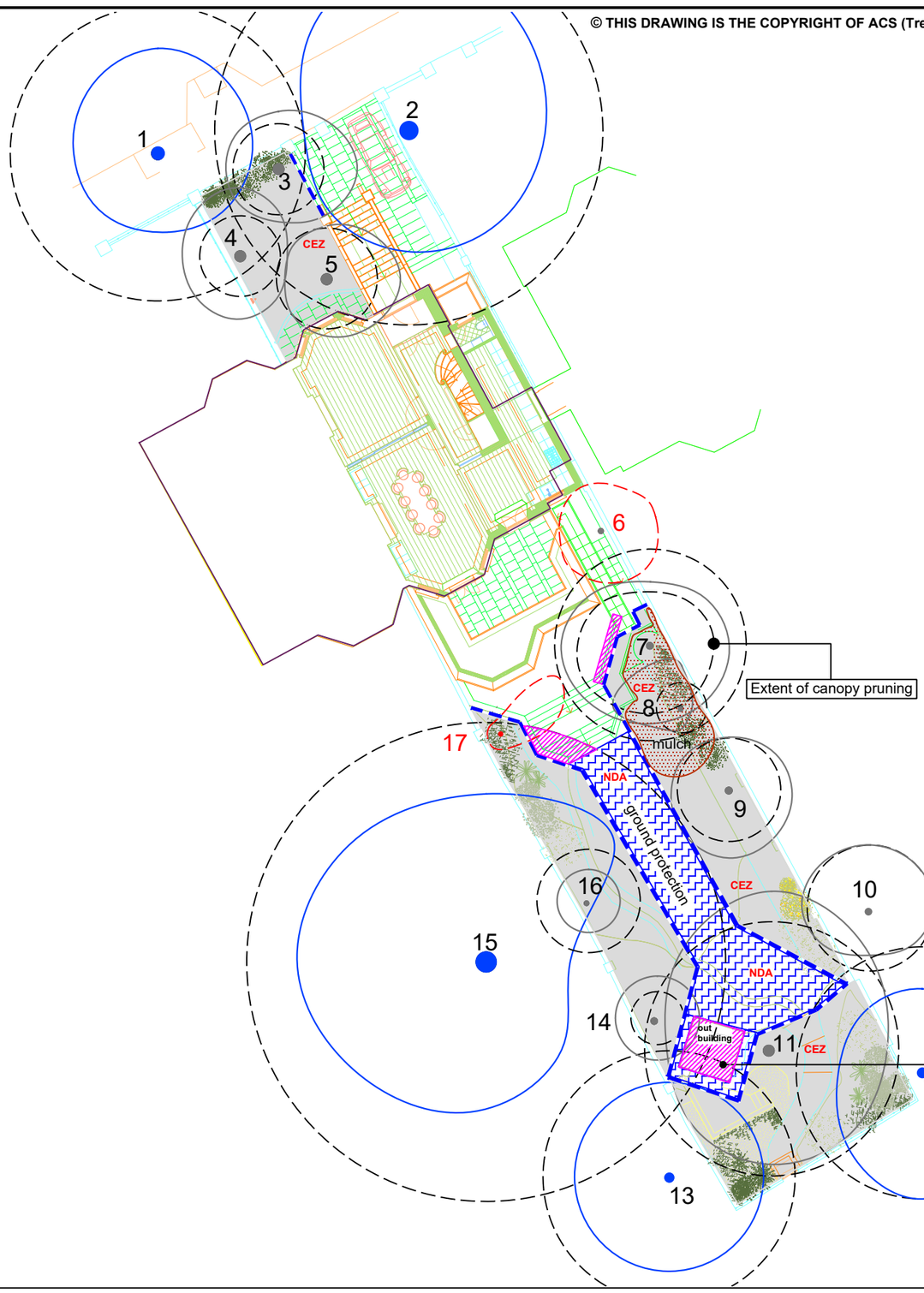
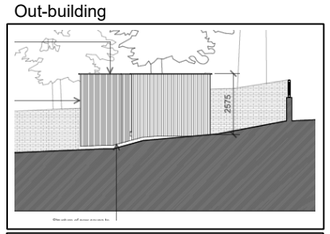


Out-building



Extract from drwg no 100 024 to show ground level is retained and floor slab is supported by micro piles, positioned to avoid root conflict.

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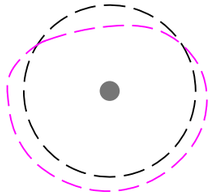

BS Root Protection Area, (RPA) shown uniform (above left) but site features such as roadways, retaining walls and foundations, may modify root patterns and therefore the RPA shape.

Indicative

A grade trees

C grade trees

B grade trees

U grade trees

Trees to be removed

Approx. canopy pruning

CEZ — Position of tree protection barriers; denotes Construction Exclusion Zone for the duration of the project.

NDA — Area for effective ground protection suitable for the project - No Dig Area

Area identified for manual excavations. All work to be supervised by an arborist. Professional consultation prior to any root pruning.

Recommended area for max. 75mm depth of wel-rotted woodchip mulch or similar.

Tree Management Methods to be adopted on site.

1. Undertake pre-commencement site meeting to agree tree protection methods and timings.
2. Carry out any permitted tree works - ask before beginning.
3. Install all tree and ground protection (see Appendix 3).
4. Undertake demolition and ground works.
5. Construction phase.
6. Remove tree protection and carry out landscaping.

0 5 m 10 m 25 m

Scale: 1:250

Client : -		
Project : 13 Elsworthy Road London NW3 3DS		
Title : Tree Protection Plan		
Scale : 1: 250 A3	Dwg No : TPP1_ER_13	Rev : -
Date : April 2021		

Do not scale from this drawing. Any discrepancies are to be reported to ACS (Trees) Consulting.
This drawing is to be used when printed to scale & in colour.

ACS (Trees) Consulting
Consultants in the Management of Trees and Woodlands
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TEL: 01737 244819 | 07770 820105
ALSO At:
Office Eighty Five | 272 Kensington High Street | London | W8 6ND
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www.acstrees.co.uk

ACS (TREES) Consulting
Urban & rural tree management

APPENDIX 3

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Tree Protection Barriers

Specifications (specifically identified by outline box and shading)

2.4m Hoarding

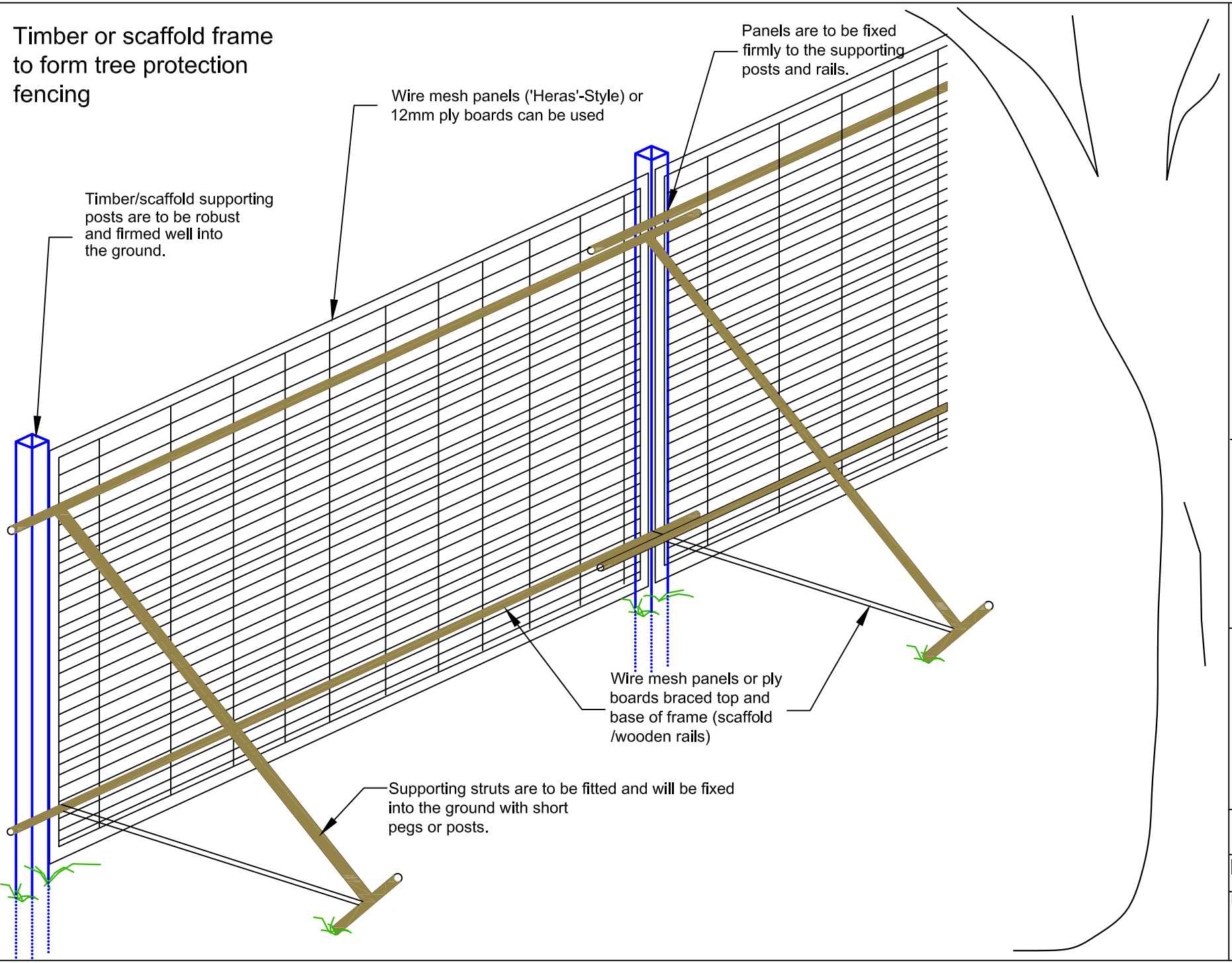
3.0m 100 X 100mm square wooden posts
3 X 38 X 87mm wooden rails affixed to posts
2.4m X 1200 outside grade ply panels (12mm) affixed to rails.
50 X 100mm angled supporting struts affixed internally (quantity as required).

(Supporting posts fixed into position using concrete. All post holes to be hand excavated. Post holes to be no larger than 300 X 300mm.)

'Heras' (Style) Fencing

'Heras' fencing describes the 2.4m galvanised steel mesh panelled fencing normally supplied with block bases and block trays. Block bases are to be used in conjunction with angled scaffold struts only. The use of blocks only is not effective. For extra barrier vertical stability, scaffold poles set at a 45^0 angle upon the 'tree-side' of the barrier and fixed to the ground at the end of each panel. Up-right supporting posts will be braced at the top and the base for added support.

Timber or scaffold frame to form tree protection fencing



ACS Consulting (London)

Tree Management Consultants

Justin Plaza 3
341 London Road
Mitcham
CR4 4BE

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E: info@treebiz.co.uk

Title:

Example of Tree Protection Fencing

Note:

Steel scaffold or timber can be used to support boards or wire mesh panels

Date: Jan. 07

Ref:

Note: Sketch Plan Only - Not to Scale

Tree Protection Fencing

Scaffold Framework supporting ‘Heras’ type panels with signs attached.

Wooden Framework with ‘Heras’ type panels attached.

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www.treebiz.co.uk

Fig. 1 Ground protection – hoarding over sharp sand and wood chip

Installing heavy-duty OSB boarding over a depth (min. 50mm) of sharp sand and/or wood chip between the tree protection fencing and the foundation line of new development is effective in protecting roots, which grow in the soil beyond the position of the fencing.

Fig.2 Side-butting scaffold boards and covered and fixed with 20mm OSB boarding

Ground/root protection with these ‘SignaRoad mats’. Specially-designed proprietary products to afford the ground and associated roots effective protection from compression or soil compaction during construction.

Image courtesy of Signature Systems

Interlocking system prevents buckling or slippage to afford lasting and effective ground and root protection.

The high density polythene sheets dissipate loads of 400psi to prevent soil compaction from vehicle traffic of all kinds used in construction.

APPENDIX 4

ACS (Trees) Consulting
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Arboricultural Site Supervision

ACS CONSULTING

Site:	Project Site Address/Name
Inspected By:	Arboricultural Supervisor (AS)
Client:	Client
Site Agent:	Site Agent's Name (SA)
Date of Inspection:	24/02/2017
Time of Inspection:	8:15:00

Tree Protective Fencing

Tree protection in correct location

Comments/Action

Ground protection - temporary concrete and existing paving

Agreed Construction Exclusion Zone

No debris within construction exclusion zone

Comments/Action

Robust hoarding and temporary concrete ground protection

Amendments to Documentation Required

No amendments required

Comments/Action

Tree protection Hoarding and ground protection over sharp sand.

Remedial Works

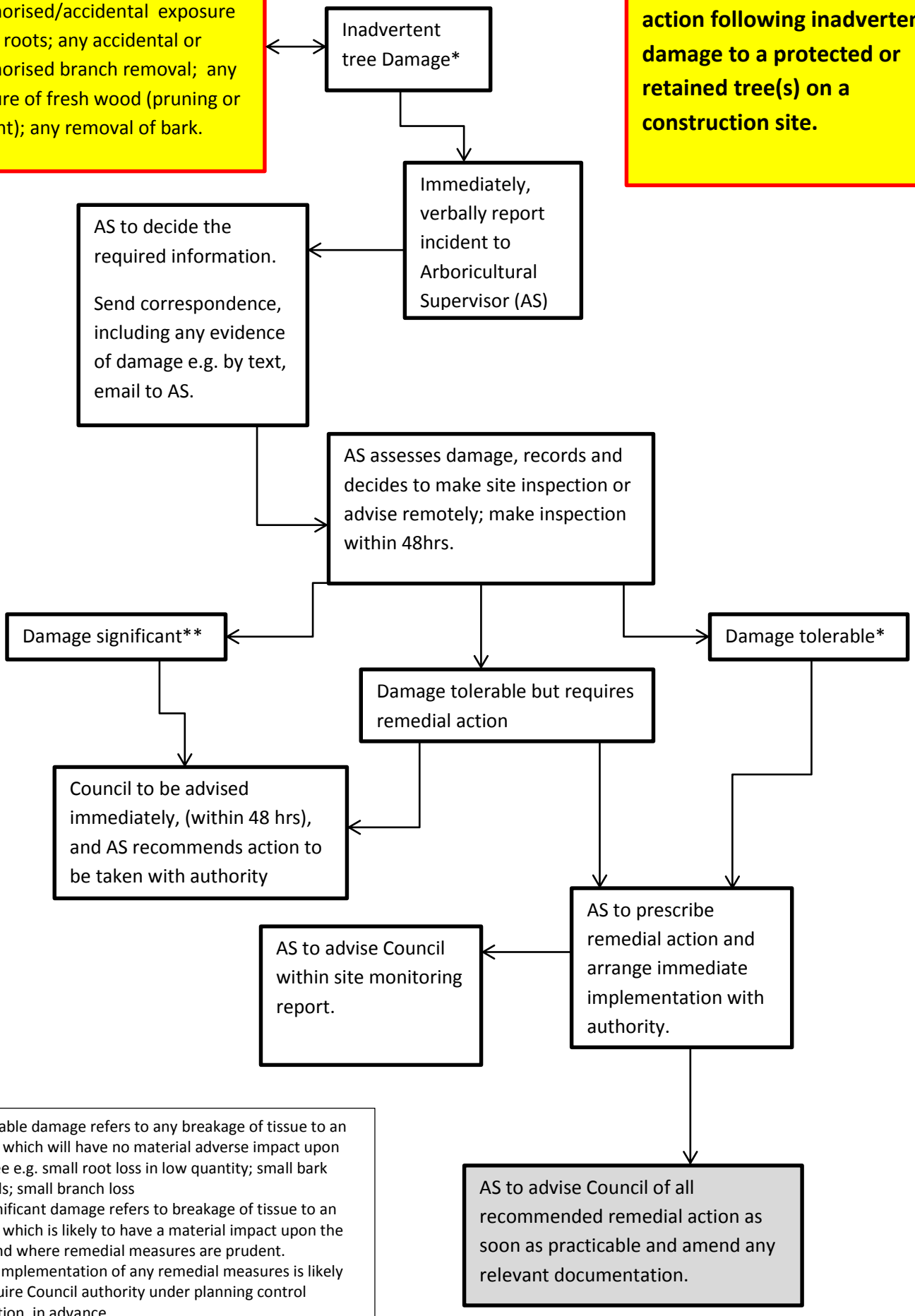
General Comments

1. Tree protection in position and effective
2. Position of site huts used as tree protection for T7 and T10
3. Temporary concrete used for ground protection for T10
4. Hoarding style tree and ground protection effective and in position

Next Inspection April 2017

*Tree Damage is defined as: any unauthorised/accidental exposure of tree roots; any accidental or unauthorised branch removal; any exposure of fresh wood (pruning or accident); any removal of bark.

Procedure for reporting and action following inadvertent damage to a protected or retained tree(s) on a construction site.



*Tolerable damage refers to any breakage of tissue to an extent which will have no material adverse impact upon the tree e.g. small root loss in low quantity; small bark wounds; small branch loss
** Significant damage refers to breakage of tissue to an extent which is likely to have a material impact upon the tree and where remedial measures are prudent.
Note: Implementation of any remedial measures is likely to require Council authority under planning control legislation, in advance.

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Also at: Office Eighty Five, 272 Kensington High Street, London W8 6ND | Tel: 0208 687 1214
E: hal@acstrees.co.uk | Partners: H.Appleyard and A. Appleyard

APPENDIX 5

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Manual Digging in the Vicinity of Trees - Method Statement

1.0 Introduction

1.1 Within and adjacent to areas of construction, trees valued as important landscape assets may exist. It is possible such trees are protected by legislation in the form of a Tree Preservation Order, conservation area or by planning conditions. In either case, disregard of the tree's well being by causing damage to the roots, trunk or branches may be an offence. Consent from the Local Planning Authority may be required to undertake works that may have an impact on the tree prior to commencement.

1.2 Whilst the trunk and branches of a tree can be seen and therefore more easily avoided, tree roots are concealed beneath the ground. Their hidden nature can lead to inadvertent damage from construction processes. Dependant upon the extent of any root damage, the whole tree can be adversely affected. It is for this reason that it is necessary to ensure adequate precautions are adopted when considering construction in the vicinity of trees.

1.3 Hand digging rather than excavation by mechanical means has proved to be an effective way of limiting the effects of construction on nearby trees. It is often considered impractical, time consuming and costly to excavate by hand when machinery exists specifically for the purpose of digging. However, avoidance of unsustainable damage being caused to important trees through hand digging may far out weigh subsequent costs associated with legal penalties and loss of amenity.

1.4 Below are detailed the basic principles to acknowledge in respect of tree roots and the practical steps that can be taken to effectively avoid causing unsustainable damage to trees.

1.5 It is assumed that all operations are commenced only AFTER having undertaken and recorded appropriate risk assessments in line with current and relevant Health & Safety legislation, common industry practice and guidance.

2.0 Tree/Root Damage – How it can occur

2.1 The majority of tree roots exist in the upper **600mm to 1000mm** of soil. Excavations of the soil in the vicinity of trees, to this depth, can be harmful to tree roots and consequently the tree.

2.2.1 Tree root systems comprise two main root types, those that **anchor** the tree in the ground and those that **supply** the tree with water and elements. Roots that support the tree are woody and those that are involved with the **conduction** of water and nutrients are non-woody or fibrous. Both types of roots can be damaged directly by severing or crushing.

Fibrous roots can die from asphyxiation by **soil compaction** and/or soil contamination. Trees differ in their tolerance of root loss or disturbance, according to their species and condition or both.

2.2.2 Normally, the greater the diameter of the damaged root, the greater the adverse impact upon the tree.

Fig. 1 Damage to roots can both kill and destabilise a tree. Planning work and care can avoid root damage

3.0 Hand Digging in the Vicinity of Trees – The Process

3.1 First it is necessary to consider all available options to construct beyond the likely range of influence on the tree's condition – always beyond 1m from the tree's trunk an by referring to an area (distance) calculated using the formulae at para 4.6.1 of BS 5837:2012 'Trees in relation to design, demolition and construction - Recommendations'. The simple calculation is 12 x the trunk diameter at 1.5m above ground level. The NJUG Volume 4 Issue 2 method is 4 x the trunk circumference/girth. The resulting area is called the Root Protection Area or Precautionary Zone. **When it is established that no options are available other than to construct within this zone, hand digging will be needed.** When considering hand digging, an appointed specialist supervisor/consultant will be able to advise during construction and must be on site at the commencement of works.

3.2 Before beginning to dig, mark out the tree's precautionary area with ground marker paint, clearly on the ground. This will identify the area within which hand digging must take

place. **For safety and before beginning to dig, ensure there are no underground services or objects that may cause injury if damaged**. Any existing protection fencing is to be located to the nearest position of construction and fixed in place, between the tree and area of construction. It will be clearly visible to operators thereafter where hand digging will need to be undertaken. The use of mechanical digging equipment to remove the top surface layer (50-100mm) is to be avoided and hand tools are required for this exercise too.

3.3 When hand digging, using typical hand tools, carefully work around roots, retaining as many as possible. Using a brush or compressed air will expose roots cleanly before deciding whether it will be necessary to prune. Care must be taken not to damage roots including the roots' bark.

Fig. 2 Roots exposed, retained and protected during manual digging exercise

3.4 Retain all roots with a diameter greater than 25mm. Where such roots must be removed, after consulting a trained arboriculturalist (e.g. Local Authority Tree Officer or the appointed Arboricultural Consultant), these roots must be pruned with sharp cutting tools such as a handsaw, secateurs or pruners. The cut must leave the smallest wound possible and the root must be left as long as practicably possible. Roots in excess of 50mm diameter are to be retained and protected by surrounding the root with uncompacted sharp sand, void-formers or other compressible materials.

3.5 Where roots do not exist, e.g. beyond the depth of the rooting area, mechanical excavation should not be considered without specialist supervision.

3.6 All spoil is to be deposited beyond the precautionary zone. Soil build-up can cause roots to die.

3.7 As soon as practicable, exposed roots are to be covered with loose backfill material such as soil/sand mix or a hessian-type material to offer immediate protection from drying winds and desiccation. When excavating for the introduction of posts, pads or piles, the sides of the pits should be lined with a geotextile material to prevent the potential for lime scorching of small diameter roots.

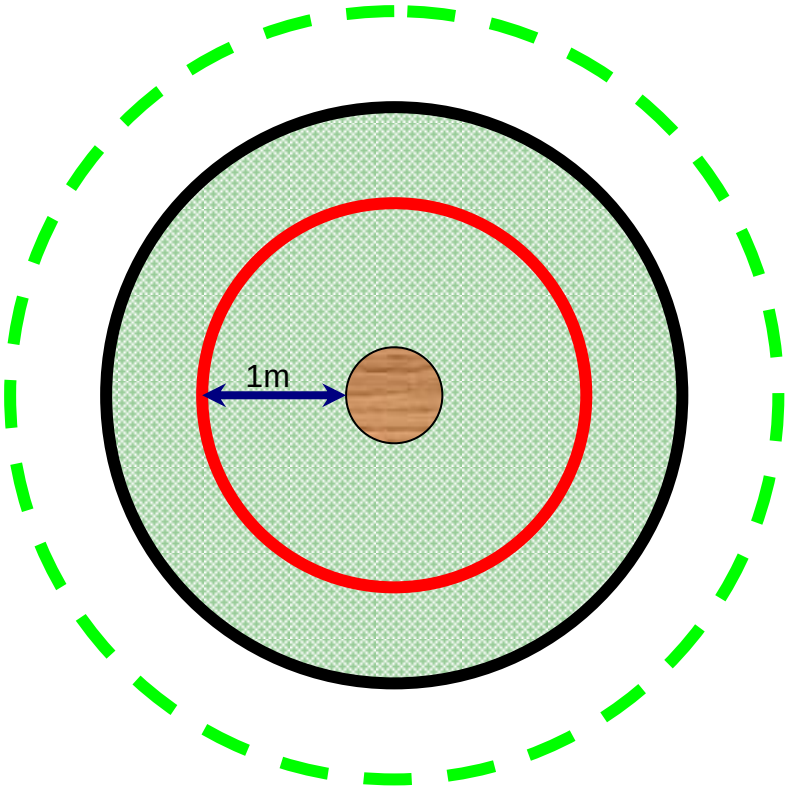
3.8 Where it is impossible to avoid completing the construction in one day for example, any exposed roots or their cut ends are to be covered with sacking material over night to prevent drying out and to add protection. This is particularly important in winter months, where frost can cause further damage to roots.

3.9 Upon completion of the hand digging, where appropriate protection fences are to be re-located and fixed in their original position.

Attached is an extract from the National Joint Utilities Group publication V4 2007, 'Guidelines for the planning installation and maintenance of utility services in proximity to trees'.

Before considering hand digging and determining precautionary zones or root protection areas, specialist arboricultural advice should be sought.

Fig. 3 Trees can be destabilised by poor planning and root damage



TREE PROTECTION ZONE

Key to Diagram

Trunk of Tree

Spread of canopy or branches

PROHIBITED ZONE – 1m from trunk. Excavations of any kind must not be undertaken within this zone unless full consultation with Local Authority Tree Officer is undertaken. Materials, plant and spoil must not be stored within this zone.

PRECAUTIONARY ZONE – 4 x trunk circumference. Where excavations must be undertaken within this zone the use of mechanical excavation plant should be prohibited. Precautions should be undertaken to protect any exposed roots. Materials, plant and spoil should not be stored within this zone. Consult with Local Authority Tree Officer if in any doubt.

PERMITTED ZONE – outside of precautionary zone. Excavation works may be undertaken within this zone however caution must be applied and the use of mechanical plant limited. Any exposed roots should be protected.

DAMAGE TO TREES

Tree roots keep a tree healthy and upright. Most roots are found in the top 600mm of soil and often grow out further than the tree's height. The majority of these roots are very fine; even close to a tree few will be thicker than a pencil. Most street tree roots grow under the footway but may also extend under the carriageway. If roots are damaged the tree may suffer irreversible harm and eventually die.

PROTECTING ROOTS - DO'S and DON'TS

There are three designated zones around a tree each of which has its own criteria for working practices.

THE PROHIBITED ZONE

Don't excavate within this zone.

Don't use any form of mechanical plant within this zone

Don't store materials, plant or equipment within this zone.

Don't move plant or vehicles within this zone.

Don't lean materials against, or chain plant to, the trunk.

Do contact the local authority tree officer or owner of the tree if excavation within this zone is unavoidable.

Do protect any exposed roots uncovered within this zone with dry sacking.

Do backfill with a suitable inert granular and top soil material mix as soon as possible on completion of works.

Do notify the local authority tree officer or the tree's owner of any damage.

THE PRECAUTIONARY ZONE

Don't excavate with machinery. Where excavation is unavoidable within this zone excavate only by hand or use trenchless techniques.

Don't cut roots over 25mm in diameter, unless advice has been sought from the local authority tree officer.

Don't repeatedly move / use heavy mechanical plant except on hard standing.

Don't store spoil or building material, including chemicals and fuels, within this zone.

Do prune roots which have to be removed using a sharp tool (e.g. secateurs or handsaw). Make a clean cut and leave as small a wound as possible.

Do backfill the trench with an inert granular material and top soil mix. Compact the backfill with care around the retained roots. On non highway sites backfill only with excavated soil.

Do protect any exposed roots with dry sacking ensuring this is removed before backfilling.

Do notify the local authority tree officer or the tree's owner of any damage.

THE PERMITTED ZONE

Don't cut roots over 25mm in diameter, unless advice has been sought from the local authority tree officer.

Do use caution if it is absolutely necessary to operate mechanical plant within this zone.

Do prune roots which have to be removed using a sharp tool (e.g. secateurs or handsaw). Make a clean cut and leave as small a wound as possible.

Do protect any exposed roots with dry sacking ensuring this is removed before backfilling.

Do notify the local authority tree officer or the tree's owner of any damage.

Root exposure, pruning and protection measures during construction

Mark out area to be excavated by manually and set ground protection at the side of the excavation area

Expose the roots manually and with compressed air as necessary

Undertake root pruning (<25mmØ) using sharp pruning tools, avoiding tears or splits and making the pruning cut as small as possible. Roots in excess of 25mmØ may be pruned following arboricultural advice. Line the exposed soil with an impervious liner before protecting any retained roots.

Contd. Root exposure, pruning and protection measures during construction

Identify the roots for retention and prepare a void-former (root protection ‘sleeve’.

Wrap the identified roots in hessian before fitting the void-former and sealing with duct tape or similar.

Back-fill the construction area (e.g. footing or base slab) following root protection.

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3.5 Where roots do not exist, e.g. beyond the depth of the rooting area, mechanical excavation should not be considered without specialist supervision.

3.6 All spoil is to be deposited beyond the precautionary zone. Soil build-up can cause roots to die.

3.7 As soon as practicable, exposed roots are to be covered with loose backfill material such as soil/sand mix or a hessian-type material to offer immediate protection from drying winds and desiccation. When excavating for the introduction of posts, pads or piles, the sides of the pits should be lined with a geotextile material to prevent the potential for lime scorching of small diameter roots.

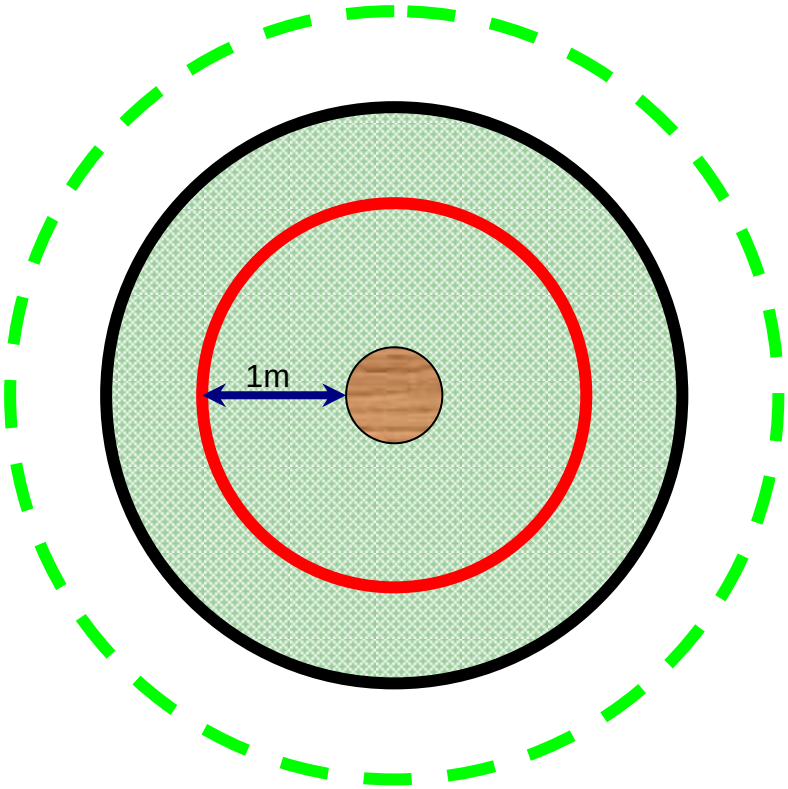
3.8 Where it is impossible to avoid completing the construction in one day for example, any exposed roots or their cut ends are to be covered with sacking material over night to prevent drying out and to add protection. This is particularly important in winter months, where frost can cause further damage to roots.

3.9 Upon completion of the hand digging, where appropriate protection fences are to be re-located and fixed in their original position.

Attached is an extract from the National Joint Utilities Group publication V4 2007, 'Guidelines for the planning installation and maintenance of utility services in proximity to trees'.

Before considering hand digging and determining precautionary zones or root protection areas, specialist arboricultural advice should be sought.

Fig. 3 Trees can be destabilised by poor planning and root damage



TREE PROTECTION ZONE

Key to Diagram

Trunk of Tree

Spread of canopy or branches

PROHIBITED ZONE – 1m from trunk. Excavations of any kind must not be undertaken within this zone unless full consultation with Local Authority Tree Officer is undertaken. Materials, plant and spoil must not be stored within this zone.

PRECAUTIONARY ZONE – 4 x trunk circumference. Where excavations must be undertaken within this zone the use of mechanical excavation plant should be prohibited. Precautions should be undertaken to protect any exposed roots. Materials, plant and spoil should not be stored within this zone. Consult with Local Authority Tree Officer if in any doubt.

PERMITTED ZONE – outside of precautionary zone. Excavation works may be undertaken within this zone however caution must be applied and the use of mechanical plant limited. Any exposed roots should be protected.

DAMAGE TO TREES

Tree roots keep a tree healthy and upright. Most roots are found in the top 600mm of soil and often grow out further than the tree's height. The majority of these roots are very fine; even close to a tree few will be thicker than a pencil. Most street tree roots grow under the footway but may also extend under the carriageway. If roots are damaged the tree may suffer irreversible harm and eventually die.

PROTECTING ROOTS - DO'S and DON'TS

There are three designated zones around a tree each of which has its own criteria for working practices.

THE PROHIBITED ZONE

Don't excavate within this zone.

Don't use any form of mechanical plant within this zone

Don't store materials, plant or equipment within this zone.

Don't move plant or vehicles within this zone.

Don't lean materials against, or chain plant to, the trunk.

Do contact the local authority tree officer or owner of the tree if excavation within this zone is unavoidable.

Do protect any exposed roots uncovered within this zone with dry sacking.

Do backfill with a suitable inert granular and top soil material mix as soon as possible on completion of works.

Do notify the local authority tree officer or the tree's owner of any damage.

THE PRECAUTIONARY ZONE

Don't excavate with machinery. Where excavation is unavoidable within this zone excavate only by hand or use trenchless techniques.

Don't cut roots over 25mm in diameter, unless advice has been sought from the local authority tree officer.

Don't repeatedly move / use heavy mechanical plant except on hard standing.

Don't store spoil or building material, including chemicals and fuels, within this zone.

Do prune roots which have to be removed using a sharp tool (e.g. secateurs or handsaw). Make a clean cut and leave as small a wound as possible.

Do backfill the trench with an inert granular material and top soil mix. Compact the backfill with care around the retained roots. On non highway sites backfill only with excavated soil.

Do protect any exposed roots with dry sacking ensuring this is removed before backfilling.

Do notify the local authority tree officer or the tree's owner of any damage.

THE PERMITTED ZONE

Don't cut roots over 25mm in diameter, unless advice has been sought from the local authority tree officer.

Do use caution if it is absolutely necessary to operate mechanical plant within this zone.

Do prune roots which have to be removed using a sharp tool (e.g. secateurs or handsaw). Make a clean cut and leave as small a wound as possible.

Do protect any exposed roots with dry sacking ensuring this is removed before backfilling.

Do notify the local authority tree officer or the tree's owner of any damage.

APPENDIX 6

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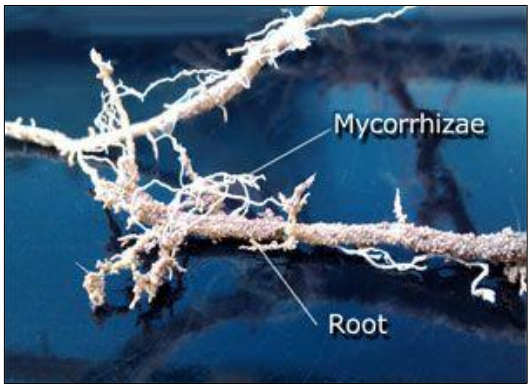
Tree rooting zone improvement

- Aeration
- Improve soil biosphere (microbial/mycorrhizal content and function)
- Improve soil structure, moisture content and fertility

Aeration of the soil improves soil structure and irrigation



Soil ameliorates can be added such as Organic Matter and Mycorrhizae (specialised fungi)

Simple applications of decomposed woodchip mulch over the bare earth under the canopy spread helps to retain moisture, suppress weed and grass competition and improve soil flora and fauna.