Rootcause
Arboriculture

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BS 5837:2012 Tree Survey & Arboricultural Impact Assessment

Address: Site on Corner of Roseleigh Close & Cambridge Park, East Twickenham, TW1 2JT

Site Surveyed by Peter Holloway

Report prepared by
Peter Holloway CEnv, BSc. (Hons), FArborA

Date 28th August 2023

Report Prepared for Deon Lombard

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1. Introduction

1.1 I was instructed by Mr Deon Lombard.

1.2 My brief is to carry out a tree survey, prepare an Arboricultural Impact Assessment and tree protection methodology for construction of a new residential building.

1.3 The report aims to comply with British Standard 5837: 2012 'Trees in relation to design, demolition, and construction – Recommendations' April 2012. I surveyed all trees within the land and those on adjacent which might be affected by any construction work.

2. Summary

2.1 I surveyed nine individual trees, and I recorded one stump within the site or on adjacent land.

2.2 I did not recommend any work for imminent safety hazards, but I recommend that the low crowns on tree number T02 – T07 are raised to 4m.

2.3 There are no direct impacts of construction on the principal trees, but the young Holly and Elm (T08 and T09 respectively) should be removed as they are close to the new building and the existing garage.

2.4 Tree protection will need to be provided for the retained trees to prevent damage during construction.

3. Documents

3.1 I was provided with several plans, but I have principally used the following documents:

i. Proposed 3No. Maisonettes, 19.001_P2, dated January 2023.

ii. SUDS & Water Storage Strategy, 19.001_P2RS, dated January 2023.

iii. Ecological & Landscape Plan, 19.001_P2EL, dated January 2023.

iv. Typical Cross Section, 19.001_S1, dated January 2023.

4. Background

4.1 This report includes:

i. Standard BS5837 Methodology (Appendix 1).
ii. Tree Survey Data (Appendix 2).
iii. Proposed Site Plan with Tree Constraints (Appendix 3).
iv. Tree Protection Method Statement (Appendix 4)
v. Tree Protection Plan (Appendix 5)

4.2 The trees were surveyed from ground level using a visual tree assessment method. No detailed tree examinations were undertaken during the survey.

4.3 I looked at the site on Wednesday 16th August 2023 and surveyed the trees on the land or near the site boundary. I did not have access to T08, T09 and T10 so their dimensions were estimated. The location of the trees is shown on the plans and their details are recorded in the tree survey table (Appendix 2), as recommended in BS5837:2012.

4.4 The London Brough of Richmond upon Thames planning portal says that the address is not in a conservation area. I understand that the stump (T01) and T02-T06 are included in Tree Preservation Order, but I have not seen the Order. The status of tree protection can change so it should be checked before carrying out any tree work. Any tree pruning to protected trees will require written permission from the Local Planning Authority.

4.5 The Wildlife and Countryside Act 1981(as amended), the Conservation (natural habitats etc.) Regulations 1994, and the Countryside and Rights of Way Act 2000 provide protection for many species of animal that live in trees. Prior to carrying out any tree work the contractor must ensure that no protected species will be affected.

4.6 The Geology at this site is likely to be a bedrock of London Clay (as indicated British Geological Survey Geoindex). There are superficial deposits of Kempton Park Gravel Member above the clay. Kempton Park Gravel averages 6m thick and a nearby borehole indicates gravel and sand geology to 18 feet deep. Soils and surface geology with clay and silt can be affected by compaction from heavy machinery and vehicles which affects the porosity of the soil to air and water which in turn can affect tree root growth and therefore tree health. The design of foundations will need to consider the geology at the site and the possibility of subsidence.

5. Tree Survey

5.1 The methodology for the tree survey is described in Appendix 1.

5.2 I surveyed nine trees and one stump on or adjacent to the site. About half of the site was covered in bramble, the remainder was mostly grass.

5.3 The existing site is vacant with no buildings so I have only showed the tree constraints on the proposed site plan.

5.4 **Tree Works**

5.4.1 The Horse Chestnut Trees within the site boundary T02-T06 have low foliage over the site and I recommend that the crowns are raised to 4m high.

5.4.2 The Highway Horse Chestnut (T07) has some low foliage and could also have the crown raised to 4 or 5m but that is the responsibility of the highway authority. This tree has a large branch wound on the limb over the road with many years regrowth. It would be prudent to reduce the weight on this limb, or remove the branch, but as above that is the responsibility of the highway authority.

5.5 **Tree Constraints**

5.5.1 The tree crown constraints are plotted on the plan in Appendix 3 and Appendix 5. Tree crown constraints are the maximum crown spread projected onto the ground in a two-dimensional shape created from the crown radius in four cardinal points.

5.5.2 These plans also show the Root Protection Area (RPA) of the tree as a notional circle calculated from the trunk diameter as described in BS5837:2012. The circular RPAs can be adjusted for obstructions to root growth, but I have not adjusted the RPAs for this site because the gravel geology will mean that roots can grow deeper than they would on clay geology and so the road construction does not present a barrier to root growth.

5.5.3 The tree crowns are shown in coloured circles according to the quality assessment of the tree. Green is good quality, Blue is moderate, Grey is low quality and red is unclassified. The quality assessment is based on the system described in BS5837.

5.5.4 The proposed site plan with tree constraints shows that the proposal will have not have a direct impact on the tree crowns or root protection area of the retained trees. The potential indirect impact from construction space is anticipated from experience.

6. Discussion of Arboricultural Impact

6.1 The proposed building is two storey with roof accommodation and a small basement.

6.2 The Holly (T08) will be located between the garage and the proposed building and could not be retained. The Elm (T09) is unlikely to have a long contribution at this site and is surrounded by permeable paving so it could not be retained. The Ash (T10) has permeable paving within 6m^2 (15%) of the RPA, which is tolerable, but the paving will have to be constructed using no-dig techniques above the existing ground levels.

6.3 The remaining Trees (T02-T07) are not directly affected by the proposal as there are no tree crowns or root protection areas that overlap the proposed building. The root protection area of tree number T03 overlaps a proposed pathway but the impact is negligible.

6.4 There will need to be new services to the building, but the service routes are not shown on the plan. The service routes are likely to be between the buildings and Roseleigh Close which will not affect any existing trees. If an alternative route is used it will need to be planned to avoid the RPAs of retained trees.

6.5 The retained trees and the areas for new planting should be protected during construction using ground protection and protective fencing to prevent soil compaction or contamination.

6.6 The proposed wildlife pond and storage pond do not affect the RPAs of any retained trees.

6.7 With suitable tree protection and work planning this proposal can be completed without causing any harm to retained trees and protect the ground for future landscaping.

7. Appendix 1: Standard Methodology

A.1 Survey

A1.1 All my observations were from ground level without detailed investigations, and I measured tree stem diameters where possible and estimated height and crown spread by pacing and using a clinometer. I do not normally have access to trees outside the boundaries and so my observations and comments on these trees are based on the visual assessment made from within the site or the surrounding public highway.

A.1.2 I surveyed all trees objectively without reference to any design proposals supplied or suggested by the client. The trees were located using the topographical survey where provided. If the topographical plan did not include all relevant trees, they would be added in their approximate positions.

A.1.3 As suggested in the BS 5837:2012 all single stem trees with a stem diameter of less than 75 mm at 1.5 m above ground level can be excluded from the survey as they are not deemed to be of significant size to be included. Multi stemmed trees were measured in accordance with the standard.

A.1.4 Trees and shrubs are living organisms whose health and condition can change rapidly, for this reason the BS 5837 grades, along with any conclusions or tree management recommendations can only remain valid for a period of 12 months.

A.1.5 Where possible, trees were assessed as individual specimens, however, where there were trees that formed distinctive groups of the same species within the landscape they can be assessed and graded as groups.

A.1.6 Trees on or adjacent to development sites are a material consideration that may have a significant impact on the future development and use of the site.

A.2 Use of survey data.

A.2.1 The British Standard 5837:2012 provides guidance on the principles to be applied to achieve a satisfactory juxtaposition of trees with structures.

A.2.2 The tree survey with minimum requirements of BS5837 is enclosed in the appendices of this report.

A.2.3 The British Standard 5837: 2012 'Trees in relation to design, demolition, and construction – Recommendations' provides guidance and specifies measures to be adopted to avoid or minimise damage to trees retained on or in proximity to construction sites. One of the key recommendations is that a Root Protection Area (RPA) should be established around each retained tree. The RPA is calculated as an area equivalent to a circle with a radius 12 times the stem diameter measured at 1.5 metres above ground level for a single stem tree. To prevent disturbance or contamination of the RPA they are usually enclosed by robust fencing.

A.2.4 Circular Root Protection Areas (RPAs) can be adjusted by an arboriculturist by considering obstructions for root growth, including building foundations, retaining walls, metalled roads, topography, soil type and tolerance of individual trees.

A.2.5 The British Standard recommends that trees within categories A-C (where A is highest quality) are a material consideration in the development process. Category U trees are trees that will not be expected to exist for long enough to justify their consideration in the planning process. The tree categories are used with the number 1, 2, or 3, which is shown in Table 1. These signify whether the justification for the category was made based on arboricultural values, landscape values or cultural/conservation values, respectively. The tree categories are shown on the tree constraints plan by colour coding. Category A trees are green, category B trees are blue, category C are grey and category U are dark red.

A.2.6 It is important to recognise that tree roots are particularly vulnerable during any adjacent construction operations. Tree roots grow where conditions are most favourable, this tends to be near the soil surface, for this reason most tree roots grow in the upper 600mm of the soil. This means that operations during construction such as shallow excavations, soil compaction by heavy plant or machinery or contamination by substances such as cement, diesel, or other chemicals, even water in excess, can be damaging to the root system.

A.2.7 The presence of walls, roads and retaining walls can affect the root distribution of trees within and around the site. Normally when a Root Protection Area is adjusted its shape is changed but the total area is maintained.

A.2.8 Approved tree work should be carried out in accordance with BS 3998:2010 by suitably qualified and experienced professional tree surgeons. Under no circumstances shall site personnel undertake any tree pruning operations. All tree works should also take into consideration The Wildlife and Countryside Act 1981(as amended), the Conservation (natural habitats etc.) Regulations 1994, and the Countryside and Rights of Way Act 2000 protected species of flora and fauna.

A.2.9 If the site is within a conservation area, then the local authority will need to be notified of your intention to prune the tree which they can prevent by making a Tree reservation Order. Some forms of tree work are exempt from this requirement and tree works directly required to accommodate a development that has planning permission would be exempt. However, I would recommend notifying the local authority before doing any tree work to avoid misunderstandings.

A.2.10 If individual trees are protected by Tree Preservation Orders, then written consent is required for tree pruning or tree removal except for a few exemptions and if the work is directly required to accommodate a development which has planning permission. As above, I would recommend applying for consent rather than assuming that works are exempt.

8. Appendix 2: Table 1 'Tree data'

Tree number: The number used in the table 1 corresponds to numbers on the plans.

Species: The Common and Botanical names of each tree.

Height and **branch spread** are estimated and listed in metres.

Stem diameter is usually measured at 1.5m above ground level (a.g.l.). It is listed in the table in mm.

Height of crown above ground level (a.g.l.):
This gives an indication of whether the crown extends to the ground or has low hanging branches. The height of the lowest branch and its direction will also be recorded.

Direction of Lowest Branch:
The direction is given as a compass direction however where all branches originate at the same point (like a pollarded tree) the letter 'CB' may be used, where the lower branches originate at the same height 'AR' for all 'round may be used.

Age class: This refers to the age of the individual tree relating to the average life expectancy of each species in a similar environment.

Physiological condition:
The general state of health of the tree, good (G), fair (F), poor (P) or dead (D).

Structural condition:
A description of any defects/habits/any previous management of note.

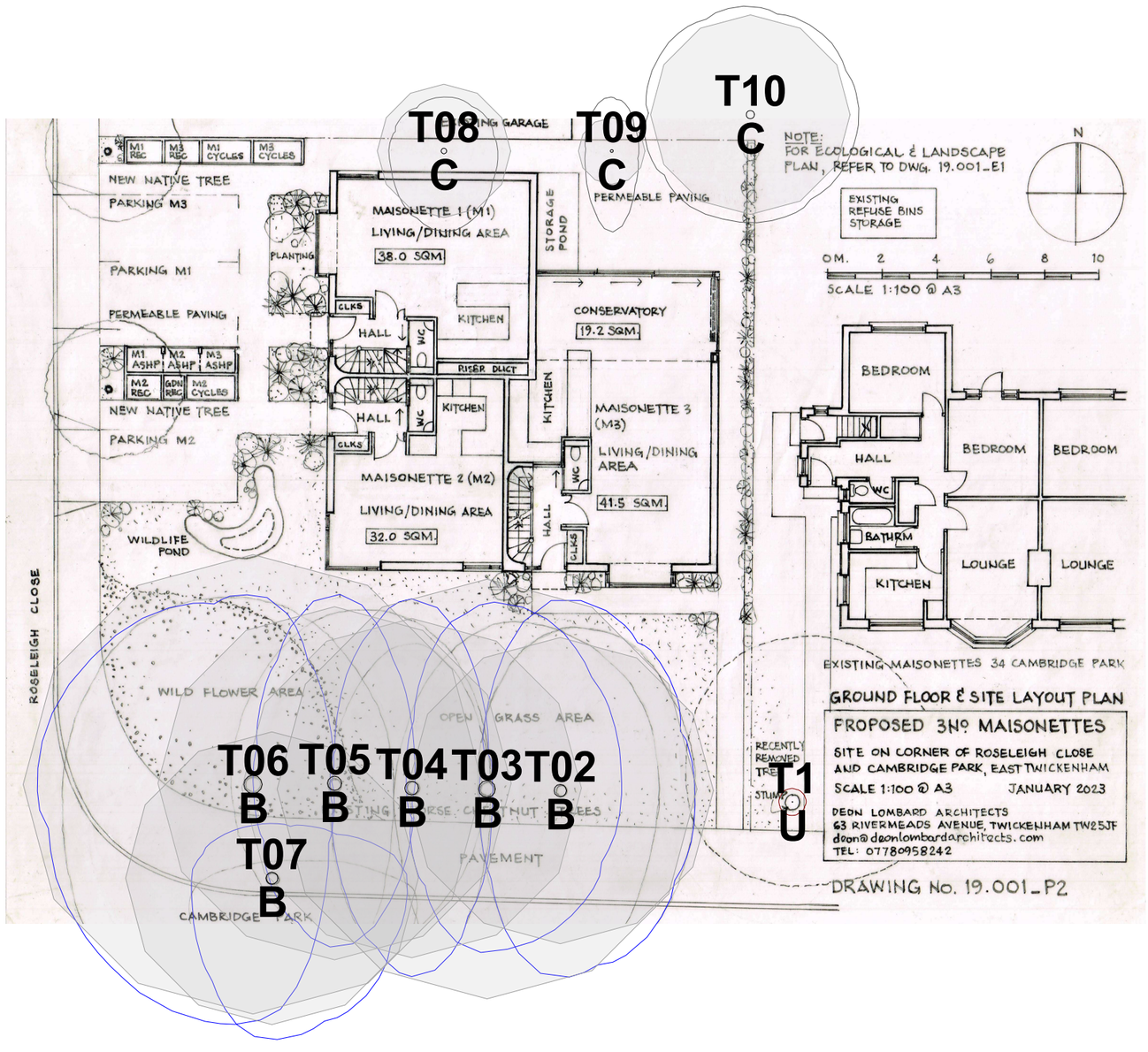
Remaining contribution in years:

This has been estimated by taking the age of the tree away from an estimate of the total number of years the tree may live for in current site conditions, it has listed in bands as recommended in BS5837:2012.

Retention category:
Each tree is placed in a category using the guidance in BS 5837:2012.

Table 1			Land on Corner of Roseleigh Close & Cambridge Park													16th August 2023	
Tree No.	Species		Height (m)	Stem Diameter (mm)	No. of Stems	Root Protection Area		Crown constraints							Age class	Observations		Remaining contribution years	Tree Category
	Common	Botanical				Radius m	Area m2	Crown height m	Lowest branch m	Direction lowest branch	North (m)	South (m)	East (m)	West (m)		Summary of Physiological condition	Structural Condition & General comments		
T01	Common Horse Chestnut	Aesculus hippocastanum	0.2	950	1										Dead	Dead	Dead stump.	0	U
T02	Common Horse Chestnut	Aesculus hippocastanum	20	460	1	5.5	96	2	4	E	7	7	5	3	Mature	Fair	Part of a group of 5 trees.	20 to 40 yrs	B1,2
T03	Common Horse Chestnut	Aesculus hippocastanum	20	630	1	7.6	179	2	4	N	7	6	5	3	Mature	Fair	Originally pollarded at 6m.	>40 yrs	B1,2
T04	Common Horse Chestnut	Aesculus hippocastanum	20	510	1	6.1	118	3	5	CB	7	7	3	3	Mature	Fair	Originally pollarded at 6m	20 to 40 yrs	B1,2
T05	Common Horse Chestnut	Aesculus hippocastanum	20	530	1	6.4	127	3	6	CB	7	6	3	3	Mature	Fair	Originally pollarded at 6m	20 to 40 yrs	B1,2
T06	Common Horse Chestnut	Aesculus hippocastanum	18	690	1	8.3	215	1	3	W	7	9	3	8	Mature	Fair	Originally pollarded at 6m. Low western limb at 4m.	20 to 40 yrs	B1,2
T07	Common Horse Chestnut	Aesculus hippocastanum	15	440	1	5.3	88	2	5	CB	2	6	5	3	Mature	Fair	Highway tree. Large tear out wound at 8-9m. Stem topped at 9m with several years regrowth.	10 to 20 yrs	C1
T08	Holm Oak	Quercus ilex	7	200	1	2.4	18	1.5	2	CB	2	3	2	2	Young	Good	Adjacent garage wall so low contribution.	10 to 20 yrs	C1
T09	Wych Elm	Ulmus glabra	7	100	1	1.2	5	2	3	S	2	3	1	1	Young	Good		10 to 20 yrs	C1
T10	Common Ash	Fraxinus excelsior	10	300	1	3.6	41	2	3	AR	4	4	4	4	Young	Fair	Offsite.	20 to 40 yrs	C1

9. Appendix 3: Proposed Site Plan with Tree Constraints



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Corner Roseleigh Close & Cambridge Park

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Reports/2023/Cambridge Park

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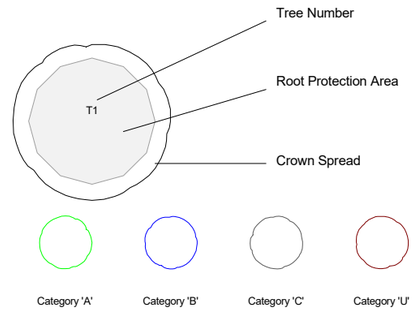
Map data supplied by the Architect



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10. Appendix 4: Arboricultural (Tree Protection) Method Statement

A4.1 Roles and Responsibilities

I have described the Roles and Responsibilities for Tree Protection at this site below. Tree protection details are reviewed as part of the site supervision procedure to ensure that tree protection is practical and that construction methods do not compromise tree protection.

Arboriculturist

Peter Holloway of Rootcause Ltd

Telephone 07862 245496, Email: Peter@rootcause.co.uk

To provide a watching brief over the works on site when there is a risk of damage to any tree or woody plant. To provide an advisory role to the contractor of how works are to be carried out, and the preparation of the agreed methodology with the Contractor. To complete a site visit report for the client after each visit which can be forwarded to the relevant Tree Officer.

Building Contractor

Not appointed yet

Site Manager TBC.

Contact details TBC.

To manage the works on site as per the agreed methodology. The contractor is responsible for all operatives on site and how the works are to be executed. The contractor must work closely with the project arboriculturist and endeavour to comply with all aspects of the methodology when working on or near trees.

The construction contractor will incorporate a section in their site induction about site constraints and procedures for tree protection in relation to site access and working near trees.

A4.2 Tree Work

A4.2.1 There proposed tree pruning for trees within the site is as follows.

Tree No.	Tree Species	Proposed Tree Work
T02	Horse Chestnut	Raise low canopy to 4m above ground level
T03	Horse Chestnut	Raise low canopy to 4m above ground level
T04	Horse Chestnut	Raise low canopy to 4m above ground level
T05	Horse Chestnut	Raise low canopy to 4m above ground level
T06	Horse Chestnut	Raise low canopy to 4m above ground level
T08	Holly	Remove tree and stump
T09	Elm	Remove tree and stump

A.4.2.1 T02, T03, T04, T05 and T06 are protect by a Tree Preservation Order and because the work is not directly required to accommodate the proposal you will need separate permission to carry out work on a preserved tree from the Local Planning Authority unless this is specifically included in the planning consent.

A4.3 Provision of information for all site operatives

A4.3.1 A copy of the arboricultural method statement will be provided to site managers and key staff.

A4.3.2 Managers and Key staff will attend a pre-start induction meeting on Tree protection during this project with the Arboriculturist.

A4.4 Erection of protective fencing and ground protection

A.4.4.1 Tree Protective fencing will be erected where indicated in the tree protection plan. Tree protective fencing normally will consist of 2m tall by 3m long weldmesh panels fixed to a scaffold framework or stakes so they cannot be easily moved or breached. Braces for protective fences must not be fixed to any part of a tree.

A4.4.2 Ground protection will be used where shown on the Tree Protection Plan. Ground protection can take many forms, so the physical description of ground protection is impractical. However, ground protection must be constructed in such a way to prevent compaction in relation to the anticipated loads from vehicles, plant, or pedestrians.

BS5837 recommends the following but suitable alternatives are acceptable:

a) for pedestrian movements only, a single thickness of scaffold boards placed either on top of a driven scaffold frame, so as to form a suspended walkway, or on top of a compression-resistant layer (e.g. 100 mm depth of woodchip), laid onto a geotextile membrane;

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

c) for wheeled or tracked construction traffic exceeding 2 t gross weight, an alternative system (e.g. proprietary systems or pre-cast reinforced concrete slabs) to an engineering specification designed in conjunction with arboricultural advice, to accommodate the likely loading to which it will be subjected.

A4.5 **Construction**

A4.5.1 Tall machinery or plant must be controlled so that no part of them can contact aerial parts of any retained trees.

A4.5.2 No materials should be stored within the Root Protection Area (RPA) of retained trees unless ground protection is used. Materials can also create a source of combustible material where an accidental fire could destroy the tree. Where it is necessary to use space beneath retained trees for storage, additional precautions are required. Where possible combustible materials should be kept at least 10m from the crown of retained trees in case of accident. If not practical, suitable fire-fighting equipment must be kept on the worksite while work is in progress.

A4.5.3 Many building materials are harmful to trees. Cement, cement washings, wastewater, diesel fuel and even clean water in excess can kill or seriously damage trees. Any runoff or spillages must be controlled so that they do not contaminate the ground within RPAs of retained trees or landscape areas.

A4.5.4 The only excavations anticipated are for the foundations of the building and limited excavations will be necessary for hard landscaping. No excavations may take place within the root protection areas of retained trees, particularly for the permeable paving below T10.

A4.5.5 Trenches for services (electricity, gas, water etc.) can damage tree roots. If new services need to be installed within the RPAs of retained trees this must consider that roots may be present. If required, it will be necessary to undertake excavations by hand and all roots of 25mm diameter or larger must be retained.

A.4.5.6 Wherever applicable, excavations and removal of hard surfaces within RPAs should be carried out using hand tools. Where practicable excavations and level changes within the RPAs of retained trees will be carried out in accordance with section A4.7.2 of this method statement. Where workers feet can compact exposed soil and grass, ground protection should be installed as described in paragraph A4.4.2.

A4.6 Site Supervision

A4.6.1 The Local Tree Officer or a Planning Enforcement Officer could visit the site at any time to check that the planning conditions, including this method statement are being followed.

A4.6.2 Independent arboricultural supervision is sometimes a condition of planning permission to ensure that the trees are not damaged or at risk during the works. An example of the site supervision record is attached in Appendix 6 which would be completed by the arboriculturist after each supervision visit and provided to The Project Manager and usually copied to the local tree officer if required by the planning condition.

A4.6.3 Estimated Site Supervision Schedule if required.

Arboricultural Site Supervision – estimated schedule			
Stage		**Estimated date**	**Reason**
Prestart	Review of Tree Protection with key site staff	6th November 2023	To make sure that protection requirements are understood. and practical.
Construction	Tree Protection Installed	6th November 2023	To ensure that Tree Protection is installed as specified.
	Site clearance and approved tree removal	13th November 2023	To ensure no retained trees damaged and that only approved tree removal takes place.
	Foundation Construction	20th November 2023	Check Tree Protection. Site inspections periodically from this point – initially monthly.
	Building construction	8th January 2023	Check Tree Protection.
	Tree Protection dismantled	September 2023	To ensure no tree damage has occurred.
Landscaping	Hard & Soft Landscaping	September 2024	Check working methodology.

A4.7 Hard & Soft Landscaping

A4.7.1 The ground protection and protective fencing will need to be removed for hard and soft landscaping so this should be carried out after all other construction work is complete. Note that the porous paving within the RPA of T10 must be no-dig construction with minimal ground level changes.

A4.7.2 Method for Hand Excavations within Root Protection Areas.

The purpose of the excavation is to establish the presence/absence of significant roots within the RPA's of retained trees when any excavations are necessary within Root Protection Areas so these roots can be retained without damage.

Method:

a) The excavation is within the existing surface layers of the soil to the maximum depth required for the structure or purpose.

b) The existing soft landscape will be excavated using hand tools like forks, spades, and shovels. Power tools must not be used.

c) During excavations, any roots less than 25mm diameter can be cut cleanly to the sides of the excavation with a pair of secateurs or a handsaw.

d) Tree roots 25mm in diameter or greater will be left in situ and protected from damage during the work (see f.).

e) Tree roots will be growing within the soil below the excavations. Therefore, it is important to avoid compaction and contamination of the soil within, below or in the sides of any excavations.

f) If excavations are necessary close to retained roots, then the roots must be protected with cut sections of plastic pipe, covered with sharp sand and boards, or similar, to prevent physical damage. Roots to be retained which are exposed for longer than an hour will be covered with sharp sand or hessian to prevent damage from high (above 25 °C) or low temperatures (under 5 °C) and sun scorch (depending on the ambient weather conditions). At high temperatures or during very dry weather the roots, and their coverings must be kept moist but not saturated with water.

11. Appendix 5: Tree Protection Plan

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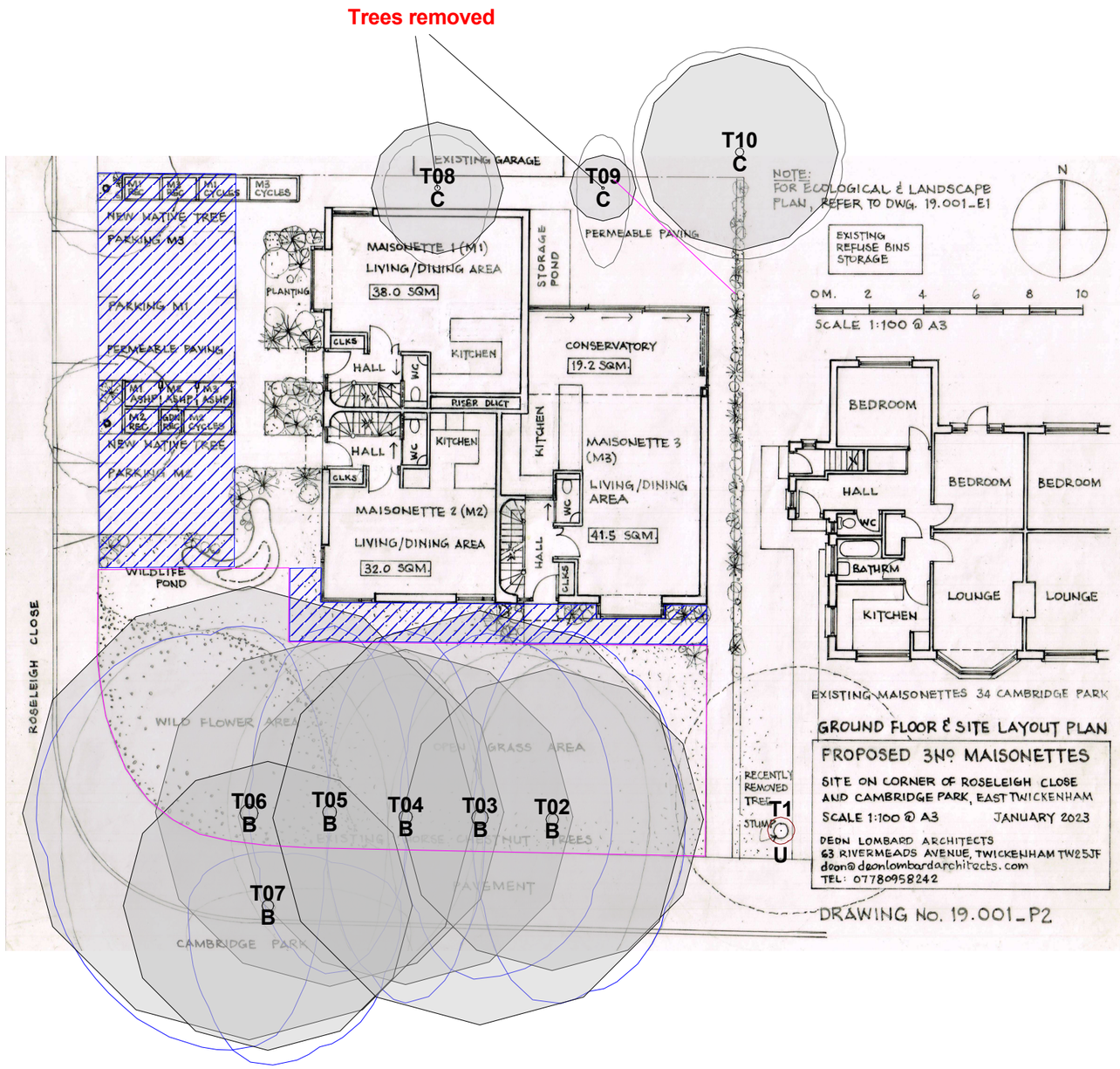
Corner Roseleigh Close & Cambridge Park
Tree Protection Plan

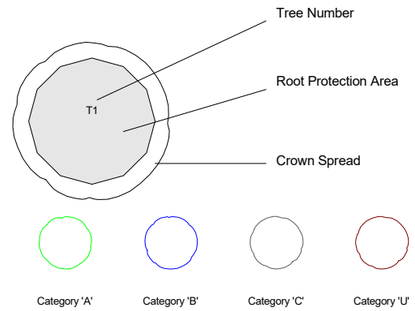
SCALE : 1 : 200 @ A3

DATE : 24/08/2023

MAP FILENAME : Reports/2023/Cambridge Park

Map data supplied by the architect





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Ground Protection

Protective fencing

12. Appendix 6: Site Supervision Record

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Tree Protection Monitoring Record

Reason for visit	**S**tage/**P**lanned/**U**nplanned/**E**mergency		**Planned**
Site:		**Site Manager:**	
Site visit by:		**Client:**	
Date of visit:		**Time of visit:**	

Tree Protection Element	**Comments/Action**	Rating*
Site Access routes		
Location of Site Accommodation/ Car Parking etc.		
Tree Protective Fencing		
Ground Protection		
Planned Construction Exclusion Zone		
Site Storage		
Soil contamination		
Excavations/ level changes		
Tree Condition		
Plant used on site		
Landscaping		
General Observations		
Document Review Required		
Signed:	Overall Site Rating	

*Rating: Poor is inadequate, Fair is adequate but not as specified, Good is as specified or better