Landmark Trees

ARBORICULTURAL IMPACT ASSESSMENT REPORT FOR:

1 Steele's Studio

Haverstock Hill

London

NW3 4RN

INSTRUCTING PARTY:

James Gorst Architects

16A Crane Grove

London

N7 8NN

REPORT PREPARED BY

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MSc ARB MICFor FArbor A MRICS C Env

Ref: JGA/1STS/AIA/01c

Date: 20th June 2019

PART 1: MAIN TEXT

PART 2 - APPENDICES

PART 3 - PLANS

Caveats

This report is primarily an arboricultural report. Whilst comments relating to matters involving built structures or soil data may appear, any opinion thus expressed should be viewed as qualified, and confirmation from an appropriately qualified professional sought. Such points are usually clearly identified within the body of the report. It is not a full safety survey or subsidence risk assessment survey. These services can be provided but a further fee would be payable. Where matters of tree condition with a safety implication are noted during a survey they will of course appear in the report.

A tree survey is generally considered invalid in planning terms after 2 years, but changes in tree condition may occur at any time, particularly after acute (e.g. storm events) or prolonged (e.g. drought) environmental stresses or injuries (e.g. root severance). Routine surveys at different times of the year and within two - three years of each other (subject to the incidence of the above stresses) are recommended for the health and safety management of trees remote from highways or busy access routes. Annual surveys are recommended for the latter.

Tree works recommendations are found in the Appendices to this report. It is assumed, unless otherwise stated ("ASAP" or "Option to") that all husbandry recommendations will be carried out within 6 months of the report's first issue. Clearly, works required to facilitate development will not be required if the application is shelved or refused. However, necessary husbandry work should not be shelved with the application and should be brought to the attention of the person responsible, by the applicant, if different. Under the Occupiers Liability Act of 1957, the owner (or his agent) of a tree is charged with the due care of protecting persons and property from foreseeable damage and injury.' He is responsible for damage and/or nuisance arising from all parts of the tree, including roots and branches, regardless of the property on which they occur. He also has a duty under The Health and Safety at Work Act 1974 to provide a safe place of work, during construction. Tree works should only be carried out with local authority consent, where applicable.

Inherent in a tree survey is assessment of the risk associated with trees close to people and their property. Most human activities involve a degree of risk, such risks being commonly accepted if the associated benefits are perceived to be commensurate.

Risks associated with trees tend to increase with the age of the trees concerned, but so do many of the benefits. It will be appreciated, and deemed to be accepted by the client, that the formulation of recommendations for all management of trees will be guided by the cost-benefit analysis (in terms of amenity), of tree work that would remove all risk of tree related damage.

Prior to the commencement of any tree works, an ecological assessment of specific trees may be required to ascertain whether protected species (e.g. bats, badgers and invertebrates etc.) may be affected.

1.0 SUMMARY

Client / Agent:	James Gorst Architects	**Case Ref:**	JGA/1STS/AIA/01c
Local Authority:	LB Camden	**Date:**	16/52019
Site Address: 1 Steele's Studio, Haverstock Hill, London NW3 4RN			
Proposal: Demolition of existing structure and construction of new dwelling with basement level			

Report Checklist	**Y/N**		**Y/N**
Arboricultural constraints on site	Y	Trees removal proposed	N
Tree Survey	Y	Topographical Survey	Y
BS5837 Report	Y	Conservation Area	Y
Tree Preservation Orders	N/k		
Tree Protection Plan:	N/a	(Include in future method statement)	
Tree Constraints Plan:	Y		
Arboricultural Impact Assessment:	Y		

Site Layout				
Site Visit	Y	Date: 20/11/17	Access Full/Partial/None	F
Trees on Site	Y		Off-site Trees	Y
Trees affected by development	Y		O/s trees affected by development	Y
Tree replacement proposed:	N/a		On or off-site trees indirectly affected by development	N

Trees with the potential to be affected

Trial pit evidence shows only minor impacts to T5 from basement level – manual excavation with pre-emptive root pruning and soil remediation proposed as mitigation.

Remaining impacts theoretical only (confirmed by trial pit) but comprise the following:

Increased footprint of proposed dwelling encroaches within RPA of T1 by 17%, T3 by 2.6% and T4 by 1.7%, assessed as being of low / very low impact – use of low-invasive foundations proposed as mitigation.

Basement encroachment of theoretical RPA of T1, T3 & T4 requires precautionary excavation of top 750mm with pre-emptive root pruning.

Comments

Recommended works for 3 trees regardless of development, but also pertinent to maintaining a safe work site.

Recommendations

1	Proposal will mean the loss of important trees (TPO/CA)	N
2	Proposal has sufficient amelioration for tree loss	Y
3	Proposals provide adequate tree protection measures	Y
4	Proposal will mean retained trees are too close to buildings	N
5	Specialist demolition / construction techniques required	Y
6	The Proposal will result in significant root damage to retained trees	N
7	Further investigation of tree condition recommended	Y

RPA= Root Protection Area
TPP= Tree Protection Plan
AMS= Arboricultural Method Statement
AIA = Arboricultural Implication Assessment
BS5837: 2012 'Trees in relation to design, demolition and construction – Recommendations'

2. INTRODUCTION

2.1 Terms of Reference

2.1.1 LANDMARK TREES were asked by James Gorst Architects to provide a survey and an arboricultural impact assessment of proposals for the site: 1 Steele's Studio, Haverstock Hill, London NW3 4RN. The report is to accompany a planning application.

2.1.2 The proposals are for the demolition of the existing structure and construction of a new dwelling with basement level.

2.1.3 This report will assess the impact on the trees and their constraints, identified in our survey. Although the proposals were known at the time of the survey, Landmark Trees endeavour to survey each site blind, working from a topographical survey, wherever possible, with the constraints plan informing their evolution.

2.1.4 I am a Registered Consultant and Fellow of the Arboricultural Association and a Chartered Forester, with a Masters Degree in Arboriculture and 25 years' experience of the landscape industry - including the Forestry Commission and Agricultural Development and Advisory Service. I am a UK Registered Expert Witness, trained in single and joint expert witness duties. I am also Chairman of the UK & I Regional Plant Appraisal Committee, inaugurated to promote international standards of valuation in arboriculture.

2.2 Drawings Supplied

2.2.1 The drawings supplied by the client and relied upon by Landmark Trees in the formulation of our survey plans are:

Existing site survey: 6467_00

Proposals: TH16_Version15

2.3 Scope of Survey

2.3.1 As Landmark Trees' (LT) arboricultural consultant, I surveyed the trees on site on 20th November 2017, recording relevant qualitative data in order to assess both their suitability for retention and their constraints upon the site, in accordance with British Standard 5837:2012 Trees in relation to design, demolition and construction – Recommendations [BS5837:2012].

2.3.2 Our survey of the trees, the soils and any other factors, is of a preliminary nature. The trees were SURVEYED on the basis of the Visual Tree Assessment method expounded by Mattheck and Breloer (The Body Language of Trees, DoE booklet Research for Amenity Trees No. 4, 1994). LT have not taken any samples for analysis and the trees were not climbed, but inspected from ground level.

2.3.3 A tree survey is generally considered invalid in planning terms after 2 years, but changes in tree condition may occur at any time, particularly after acute (e.g. storm events) or prolonged (e.g. drought) environmental stresses or injuries (e.g. root severance). Routine surveys at different times of the year and within two - three years of each other (subject to the incidence of the above stresses) are recommended for the health and safety management of trees remote from highways or busy access routes. Annual surveys are recommended for the latter.

2.3.4 The survey does not cover the arrangements that may be required in connection with the laying or removal of underground services.

2.4 Survey Data & Report Layout

2.4.1 Detailed records of individual trees are given in the survey schedule in Appendix 1 to this report. General husbandry recommendations are distinguished at Appendix 2 from the minimum requirements to facilitate development / form part of the planning application at Appendix 3. The former may still be relevant to providing a safe site of work, of course. Similarly, if for whatever reason the development does not go ahead, our recommendations in Appendix 2 would still apply.

2.4.2 A site plan identifying the surveyed trees, based on the Instructing Party's drawings / topographical survey is provided in Part 3 of this report.

2.4.3 This plan also serves as the Tree Constraints Plan with the theoretical Recommended Protection Areas (RPA's), tree canopies and shade constraints, (from BS5837: 2012) overlain onto it. These constraints are then overlain in turn onto the Instructing Party's proposals to create a second Arboricultural Impact Assessment Plan in Part 3. General observations and discussion follow, below.

3.0 OBSERVATIONS

3.1 Site Description

Photograph 1: Aerial view of 1 Steele's Studio, Haverstock Hill, London NW3 4RN (Source: Google Maps)

3.1.1	This property is located in the Belsize Ward, falling within the Eton Conservation Area of the London Borough of Camden. It is located approximately 300m to the south-east of Belsize Park station.
3.1.2	The site is relatively level although there is a significant level change to the immediate west with trees T1 – 4 standing 2m above the ground level within the site, beyond a retaining wall.
3.1.3	In terms of the British Geological Survey, the site overlies the London Clay Formation (see indicated location on Fig.1 plan extract below). The associated soils are generally, highly shrinkable clay; e.g. slowly permeable seasonally waterlogged fine loam over clay. Such highly plastic soils are prone to movement: subsidence and heave. The actual distribution of the soil series are not as clearly defined on the ground as on plan and there may be anomalies in the actual composition of clay, silt and sand content.
3.1.4	Clay soils are prone to compaction during development with damage to soil structure potentially having a serious impact on tree health. The design of foundations near problematic tree species will also need to take into consideration subsidence risk. Further advice from the relevant experts on the specific soil properties can be sought as necessary.

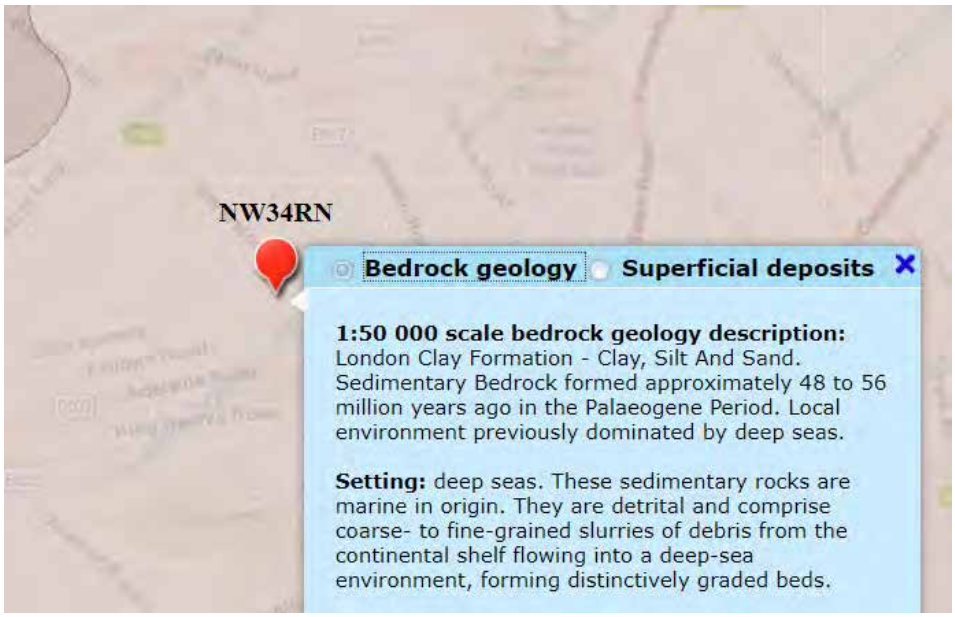

Figure 1: Extract from the BGS Geology of Britain Viewer

3.2 Subject Trees

3.2.1	Of the 8 surveyed trees 1 is A category *(High Quality), 4 are B category *(Moderate Quality), 3 are C category *(Low Quality) and none are U category *(Unsuitable for Retention).
3.2.2	The tree species found on site comprise common lime, wild cherry, horse chestnut and sycamore.
3.2.3	In terms of age demographics there are 2 early mature specimens with 1 semi-mature and 5 mature trees on or adjacent to the site.

3.2.4	Full details of the surveyed trees can be found in Appendix 1 of this report.
3.2.5	There are recommended works for 3 trees (T4, T6 and T7). These are listed in Appendix 2.

3.3 Planning Status

3.3.1	We are not aware of the existence of any Tree Preservation Orders, but understand the site stands within the Eton Conservation Area, which will affect the subject trees: it is a criminal offence to prune, damage or fell such trees without permission from the local authority.
3.3.2	Relevant local planning policies comprise Policy 7.21 of the London Plan 2015 and Policies A3, A5, D1 and D3 of the Camden Local Plan (adopted 3rd July 2017).

4.0 DEVELOPMENT CONSTRAINTS

4.1 Primary Constraints

4.1.1 BS5837: 2012 gives Recommended Protection Areas (RPA's) for any given tree size. The individual RPA's are calculated in the Tree Schedule in Appendix 1 to this report, or rather the notional radius of that RPA, based on a circular protection zone. The prescribed radius is 12-x stem diameter at 1.5m above ground level, except where composite formulae are used in the case of multi-stemmed trees.

4.1.2 Circular RPA's are appropriate for individual specimen trees grown freely, but where there is ground disturbance, the morphology of the RPA can be modified to an alternative polygon, as shown in the diagram below (Figure 2). Alternatively, one need principally remember that RPA's are area-based and not linear – notional rather than fixed entities.

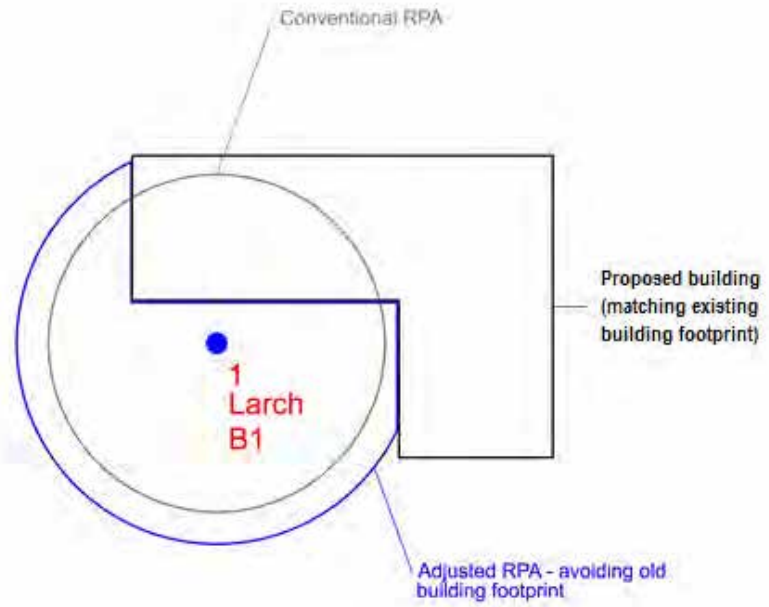

Figure 2 – Generic BS 5837 RPA Adjustments

4.1.3 In BS5837, paragraph 4.6.2 states that RPA's should reflect the morphology and disposition of the roots; where pre-existing site conditions or other factors indicate that rooting has occurred asymmetrically, a polygon of equivalent area should be produced. Modifications to the shape of the RPA should reflect a soundly based arboricultural assessment of likely root distribution.

4.1.4 **No *a priroi* modifications have been made in this instance, though site investigations have confirmed our previous hypothesis that the level change and retaining wall to the west of the site have significantly inhibited root development by T1-4 into the application site. Further investigations have also shown limited rooting by T5 into the site. Full details of these investigations are provided within Appendix 3.**

4.1.5 The quality of trees will also be a consideration: U Category trees are discounted from the planning process in view of their limited service life. Again, Category-C trees would not normally constrain development individually, unless they provide some external screening function.

4.1.6 At paragraph 5.1.1. BS5837: 2012 notes that "Care should be exercised over misplaced tree preservation; attempts to retain too many or unsuitable trees on a site are liable to result in excessive pressure on the trees during demolition or construction work, or post-completion demands on their removal."

4.1.7 In theory, only moderate quality trees and above are significant material constraints on development. However, the low quality trees would comprise a constraint in aggregate, in terms of any collective loss / removal, where replacement planting would be appropriate, though no such collective impact is proposed.

4.1.8 In this instance, the moderate quality trees present have the potential to pose significant constraints upon the development of the site although the aforementioned level change and retaining wall are highly likely to remove any constraint from T1-4.

4.2 Secondary Constraints

4.2.1 The second type of constraint produced by trees that are to be retained is that the proximity of the proposed development to the trees should not threaten their future with ever increasing demands for tree surgery or felling to remove nuisance shading (Figure 3), honeydew deposition or perceived risk of harm.

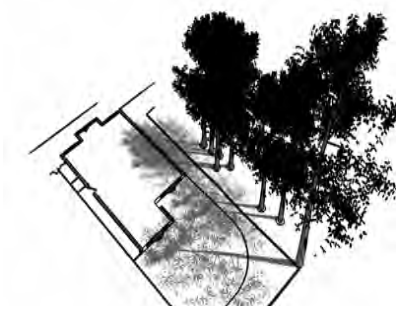

Figure 3 –
Generic Shading Constraints

4.2.2 The shading constraints are crudely determined from BS5837 by drawing an arc from northwest to east of the stem base at a distance equal to the height of the tree, as shown in the diagram opposite. Shade is less of a constraint on non-residential developments, particularly where rooms are only ever temporarily occupied.

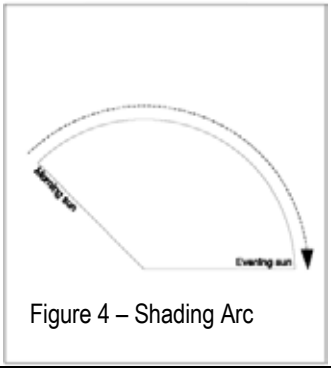

Figure 4 – Shading Arc

4.2.3	This arc (see Figure 4) represents the effects that a tree will have on layout through shade, based on shadow patterns of 1x tree height for a period May to Sept inclusive 10.00-18.00 hrs daily.

4.2.4	Assuming that they will be retained, the orientation of the on- and off-site trees will ensure that shading constraints and levels of leaf deposition and honey-dew are likely to be as they are today.

Note: Sections 5 & 6 will now assess the impacts upon constraints identified in Section 4. Table 1 in Section 5 presents the impacts in tabular form (drawing upon survey data presented in Appendices 1 & 2). Impacts are presented in terms of whole tree removal and the effect on the landscape or partial encroachment (% of RPA) and its effect on individual tree health. Section 6 discusses the table data, elaborating upon the impacts' significance and mitigation.

5.0

Table 1: Arboricultural Impact Assessment

(Impacts assessed prior to mitigation and rated with reference to Matheny & Clark (1998))

Hide irrelevant | Show All Trees

Ref: JGA_1STS_AIA

B.S. Cat.	Tree No.	Species	Impact	Tree / RPA Affected	Age	Growth Vitality	Species Tolerance	Impact on Tree Rating	Impact on Site Rating	Mitigation
B	1	Lime, Common	Building Construction within RPA Building Construction within Canopy	33.5 m^2 17 %	Mature	Normal	Good	Low	Low	Low-invasive foundation design
B	3	Lime, Common	Building Construction within RPA Building Construction within Canopy	1.6 m^2 2.58 %	Early Mature	Moderate	Good	Very Low	Very Low	Low-invasive foundation design
C	4	Chestnut, Horse	Building Construction within RPA Building Construction within Canopy	7.7 m^2 1.89 %	Mature	Moderate	Moderate	Very Low	Very Low	Low-invasive foundation design
B	5	Sycamore	Basement Construction within RPA Note: trial pits have shown only minor rooting within basement footprint	m^2 N/A %	Early Mature	Normal	Moderate	Very Low	Very Low	Hand dig top 750mm of basement line thro' RPA

6.0 DISCUSSION

6.1 Rating of Primary Impacts

6.1.1 The principal impact in the current proposals comprises the encroachment of the RPA of T5 by the new building and basement level. Trial pit findings have confirmed that this will disturb 2 x 30mm diameter roots, 3 x 20mm diameter roots and a small number of fibrous roots. Whilst BS5837: 2012 considers roots over 25mm diameter significant, that the 2 30mm roots are only just over this watershed strongly suggests that their severance will not be of significance to the health of T5. Impacts arising from this root severance will be mitigated by the manual excavation of the top 750mm of the basement line through the RPA in conjunction with pre-emptive root pruning. They will be further mitigated through the provision of a mulched bed around the tree in conjunction with air injection and biochar application. Subject to the adoption of these measures, the impact to the tree is assessed as being likely to be very low.

6.1.2 Further impacts to retained trees are considered to be theoretical only as a result of the inhibition of root development into the site by the retaining wall along its western boundary, this assessment has been confirmed by site investigations. Notwithstanding this, paragraphs 6.1.4 and 6.1.5 detail mitigation measures that will be employed.

6.1.3 It should be noted that the theoretical encroachments cited in Table 1 comprise those resulting from the increased footprint of the new dwelling rather than the gross figure, the distribution of an RPA below the existing building is in principle, unjustified: notwithstanding a reduced probability of rooting below significant structures, the principle of protecting and promoting root colonisation below vulnerable building foundations conflicts with other responsibilities of / liabilities for the council.

6.1.4 Where the proposed basement level encroaches the theoretical RPAs of T1, T3 and T4, manual excavation of the top 750mm of the basement line in conjunction with pre-emptive root pruning will be required.

6.1.5 Where the structure encroaches within parts of RPAs not otherwise affected by the basement level, low-invasive foundations (i.e. discontinuous footings with suspended beam(s) / raft between) will be employed, therefore affecting a fractional net area of excavation, relative to the gross footprint / RPA encroachment. Flexibility of footing placement (relative to root location) will be built into the design, with the pit locations trial-excavated by hand under supervision. Subject to these measures, the overall impact is likely to be very low/low for all three trees.

6.1.6 Whilst the canopies of T1, T3 and T4 do overhang the proposed footprint, there is currently 3.5m clearance to the existing ground floor structure. Whist there is an increase in the height of the proposed building beneath the canopy of T4, this only amounts to approximately half a storey. Thus, provided due care is taken during the planning and carrying out of lifting operations during construction, no facilitation pruning is required.

6.1.7 It will be necessary to demolish the existing building in a controlled manner to avoid incidental damage to retained trees.

6.1.8 Any replacement hard surfacing within the RPAs of T4, T5 and T6 will require a no-dig construction methodology.

6.1.9 The principal of RPA encroachment is established within BS5837:2012 and supported by the source document, National Joint Utilities Guidelines 10 / Vol. 4 1995 / 2010. NJUG introduced the x12 diameter *Precautionary Zone* for supervised working and *Prohibited Zone* at a universal 1m from the base of the tree. RPA's are frequently confused with the NJUG Prohibited Zone, when they clearly correlate with the NJUG Precautionary Zone.

6.1.10 An RPA encroachment of <20% of RPA may be considered as low impact, given the permissive references to 20% RPA relocation and impermeable paving within BS5837:2012 and other published references to healthy trees tolerating up to 30-50% root severance (Coder, Helliwell and Watson in CEH 2006). The trees in question are healthy specimens of species with a good resistance to development impacts, and quite capable of tolerating these low impacts.

6.1.11 "**In practice 50% of roots can sometimes be removed with little problem**, provided there are vigorous roots elsewhere. Inevitably, this degree of root loss will temporarily slow canopy growth and even lead to some dieback" (Thomas 2000). LT do not recommend annexing such high proportions of the root system; rather that within the context of the published science, planning should not be unduly concerned by impacts that are well below the subcritical threshold – *tree health is not at stake.*

6.1.12 BS5837 recommends (at 5.3.a) that if operations within the RPA are proposed, the project arboriculturist should demonstrate that the tree(s) can remain viable and that the area lost to encroachment can be compensated for elsewhere, contiguous with its RPA. On the basis of Thomas et al, above, it is possible to demonstrate that the tree can remain viable, and on the basis that the tree will be rooting no less freely in the garden / lawn / border /pavement than within the proposed footprint, with the RPA encroachment compensated elsewhere on contiguous land. The guide also recommends (at 5.3.b) the arboriculturist propose a series of mitigation measures (to improve the soil environment that is used by the tree for growth). These are provided at 6.3 below.

6.2 Rating of Secondary Impacts

6.2.1 There will always be marginal secondary impacts of honeydew / litter deposition and partial shade on this site, regardless of development. The status quo is unlikely to change with further development, which is the salient point for planning to consider. Thus, the secondary impacts of development are minimal.

6.3 Mitigation of Impacts

6.3.1 All plant and vehicles engaged in demolition works should either operate outside the RPA, or should run on a temporary surface designed to protect the underlying soil structure. The demolition of the building should proceed inwards in a "pull down" fashion. Hard surfacing can be lifted with caution by a skilled machine operator again working away from the tree.

6.3.2 The building encroachments will require the use of specialised foundation techniques, such as mini-piling or pad and raised beam. The foundation pits within the RPA should be trial-excavated by hand using a double-headed spade ("shove-holer") or similar to minimise breadth of hole required for inspection.

6.3.3 The path of basement foundations through RPAs will be manually excavated to 750mm depth under arboricultural supervision; any roots encountered within the trenches / pits will be cleanly pruned back to an appropriate junction with a sharp pruning saw or secateurs back to a junction. Roots larger than 25mm diameter may only be cut in consultation with an arboriculturalist.

6.3.4 The replacement paving/hard landscaping will require a no-dig construction technique, either using a cellular confinement system with no fines aggregate for the sub-base or simply building upon the existing sub-base without disturbing the ground below. The degree of encroachment (circa 20% of RPA) means that a permeable paving surface (e.g. gravel or block paving) is required. Choice of construction method will initially depend upon root penetration within the existing sub-grade. The key principle is not to excavate in the presence of roots and to provide a porous surface to promote healthy soil water relations for future root growth. A further consideration in the use of a more expensive cellular confinement system or similar, may be the claimed reduction in risk of possible future slab / surface displacement by roots of trees growing in paved areas.

6.3.5 Nuisance deposition can be further mitigated with routine maintenance, light pruning / deadwooding and the fitting of filtration traps on guttering (see Figure 5 below).

6.3.6	The shading impacts can be mitigated by building design, with the provision of dual aspect windows and choice of room layout. Some minor crown reduction may be necessary, but not such as to impose a burden of frequent, repetitive management.

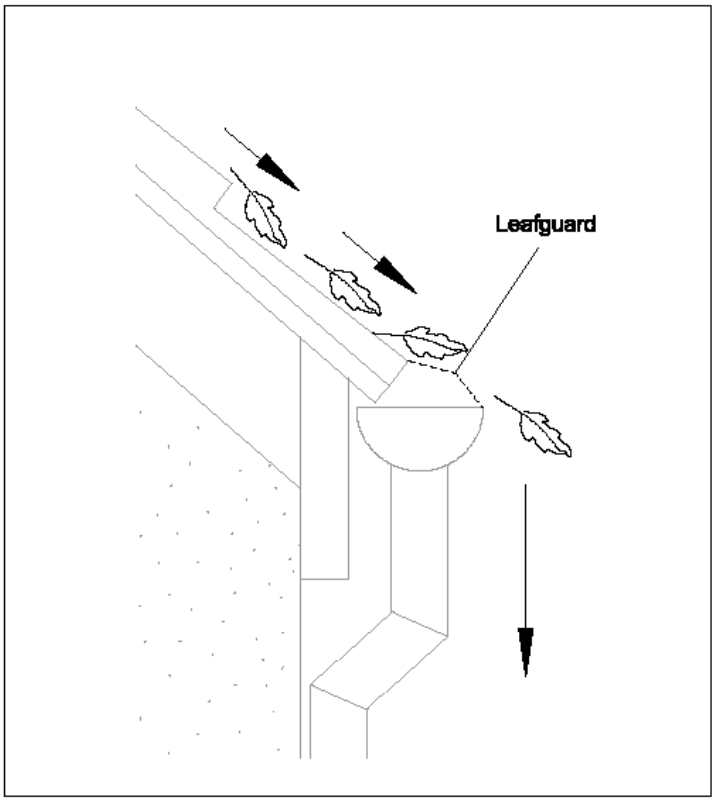

Figure 5: Filtration traps, as shown left, could be fitted on the gutters which can easily be maintained at 2-3m above ground.

7.0 CONCLUSION

7.1 The trial pit findings show that potential impacts of development are all very low in terms RPA encroachments of trees retained, no trees are to be removed to facilitate the proposals.

7.2 The full potential of the impacts can be largely mitigated through design and precautionary measures. These measures can be elaborated in Method Statements in the discharge of planning conditions.

7.3 The species affected are generally tolerant of root disturbance / crown reduction and the retained trees are generally in good health and capable of sustaining these reduced impacts.

7.4 In our view, the sycamore tree (T5) in particular is of a species, age and condition sufficient to remain viable in the circumstances, given that the area lost to encroachment can be compensated for elsewhere, contiguous with the RPA, and provided the series of mitigation measures outlined in this report are followed to both reduce the immediate impact of working methods and also improve the soil environment that is used by the tree for growth. Supervision and monitoring of such measures will also be essential. Subject to these provisos the net impacts are assessed as being low

7.5 Therefore, the proposals will not have any significant impact on either the retained trees or wider landscape thereby complying with Policy 7.21 of the London Plan 2015 and Policies A3, A5, D1 and D3 of the Camden Local Plan (adopted 3rd July 2017). Thus, with suitable mitigation and supervision the scheme is recommended to planning.

8.0 RECOMMENDATIONS

8.1 Specific Recommendations

8.1.1	Tree works recommendations in Appendix 2 are not part of the current application, but requirements of general maintenance that will need to be applied for (subject to para. 3.3 of this report and any other relevant constraints in planning or leasehold) by the client separately. Consent for the current planning application does not impart any consent for the Appendix 2 maintenance works. Please note, though, the owner and / or manager of a property have a duty to maintain a safe site of work and to protect occupiers of the surrounding land / members of the public from tree hazards. Works recommended in this report should be enacted in a timely fashion by the relevant party regardless of the progress of the development.
8.1.2	Excavation and construction impacts within the RPA's of trees identified in Table 1 above, will need to be controlled by method statements specifying mitigation methods suggested in para 6.3 above and by consultant supervision as necessary. These method statements can be provided as part of the discharge of conditions.

8.2 General Recommendations for Sites Being Developed with Trees

8.2.1 Any trees which are in close proximity to the proposed development should be protected with a Tree Protection Barrier (TPB). Protective barrier fencing should be installed immediately following the completion of the tree works, remaining in situ for the entire duration of the development unless otherwise agreed in writing by the Council. It should be appropriate for the intensity and proximity of the development, usually comprising steel, mesh panels 2.4m in height ('Heras') and should be mounted on a scaffolding frame (shown in Fig 2 of BS5837:2012). The position of the TPB can be shown on plan as part of the discharge of conditions, once the layout is agreed with the planning authority. The TPB should be erected prior to commencement of works, remain in its original form on-site for the duration of works and be removed only upon full completion of works.

8.2.2 A TPB may no longer be required during soft landscaping work but a full arboricultural assessment must be performed prior to the undertaking of any excavations within the RPA of a tree. This will inform a decision about the requirement of protection measures. It is important that all TPBs have permanent, weatherproof notices denying access to the RPA.

8.2.3 The use of heavy plant machinery for building demolition, removal of imported materials and grading of surfaces should take place in one operation. The necessary machinery should be located above the existing grade level and work away from any retained trees. This will ensure that any spoil is removed from the RPAs. It is vital that the original soil level is not lowered as this is likely to cause damage to the shallow root systems.

8.2.4 Any pruning works must be in accordance with British Standard 3998:2010 Tree work [BS3998].

8.2.5 Where sections of hard surfacing are proposed in close proximity to trees, it is recommended that "No-Dig" surfacing be employed in accordance with BS5837:2012 and 'The Principles of Arboricultural Practice: Note 1, Driveways Close to Trees, AAIS 1996 [APN1]'.

8.2.6 If the RPA of a tree is encroached by underground service routes then BS5837:2012 and NJUG VOLUME 4 provisions should be employed. If it is deemed necessary, further arboricultural advice must be sought.

8.2.7 Numerous site activities are potentially damaging to trees e.g. parking, material storage, the use of plant machinery and all other sources of soil compaction. In operating plant, particular care is required to ensure that the operational arcs of excavation and lifting machinery, including their loads, do not physically damage trees when in use.

8.2.8 To enable the successful integration of the proposal with the retained trees, the following points will need to be taken into account:

1) Plan of underground services.
2) Schedule of tree protection measures, including the management of harmful substances.
3) Method statements for constructional variations regarding tree proximity (e.g. foundations, surfacing and scaffolding).
4) Site logistics plan to include storage, plant parking/stationing and materials handling.
5) Tree works: felling, required pruning and new planting. All works must be carried out by a competent arborist in accordance with BS3998.
6) Site supervision: the Site Agent must be nominated to be responsible for all arboricultural matters on site. This person must:
   - be present on site for the majority of the time;
   - be aware of the arboricultural responsibilities;
   - have the authority to stop work that is causing, or may cause harm to any tree;
   - ensure all site operatives are aware of their responsibilities to the trees on site and the consequences of a failure to observe these responsibilities;
   - make immediate contact with the local authority and/or a retained arboriculturalist in the event of any tree related problems occurring.

8.2.9 These points can be resolved and approved through consultation with the planning authority via their Arboricultural Officer.

8.2.10 The sequence of works should be as follows:

i) initial tree works: felling, stump grinding and pruning for working clearances;
ii) installation of TPB for demolition & construction;
iii) installation of underground services;
iv) installation of ground protection;
v) main construction;
vi) removal of TPB;
vii) soft landscaping.

9.0 REFERENCES

- Barlow JF & Harrison G. 1999. Shade By Trees, Arboricultural Practice Note 5, AAIS, Farnham, Surrey.
- British Standards Institute. 2012. Trees in Relation to Design, Demolition and Construction - Recommendations BS 5837: 2012 HMSO, London.
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- Mattheck C. & Breloer H. 1994. Research for Amenity Trees No.2: The Body Language of Trees, HMSO, London.
- Thomas P, 2000 & 2014. Trees: Their Natural History, Cambridge University Press, Cambridge.
- Trowbridge J & Bassuk N (2004) Trees in the Urban Landscape: Site Assessment, Design, and Installation; J Wiley & Sons inc. NJ USA

Landmark Trees

PART 2 – APPENDICES

APPENDIX 1

TREE SCHEDULE

Botanical Tree Names

Cherry, Wild cherry /Gean	: Prunus avium	Lime, Common	: Tilia x europea
Chestnut, Horse	: Aesculus hippocastanum	Sycamore	: Acer pseudoplatanus

Notes for Guidance:

1. Height describes the approximate height of the tree measured in metres from ground level.
2. The Crown Spread refers to the crown radius in meters from the stem centre and is expressed as an average of NSEW aspect if symmetrical.
3. Ground Clearance is the height in metres of crown clearance above adjacent ground level.
4. Stem Diameter (Dm) is the diameter of the stem measured in millimetres at 1.5m from ground level for single stemmed trees. BS 5837:2012 formula (Section 4.6) used to calculate diameter of multi-stemmed trees. Stem Diameter may be estimated where access is restricted and denoted by '#'.
5. Protection Multiplier is 12 and is the number used to calculate the tree's protection radius and area
6. Protection Radius is a radial distance measured from the trunk centre.
7. Growth Vitality - Normal growth, Moderate (below normal), Poor (sparse/weak), Dead (dead or dying tree).
8. Structural Condition - Good (no or only minor defects), Fair (remediable defects), Poor - Major defects present.
9. Landscape Contribution - High (prominent landscape feature), Medium (visible in landscape), Low (secluded/among other trees).
10. B.S. Cat refers to (British Standard 5837:2012 section 4.5) and refers to tree/group quality and value; 'A' – High, 'B' - Moderate, 'C' - Low, 'U' - Unsuitable for retention. The following colouring has been used on the site plans:
    - High Quality (A) (Green),
    - Moderate Quality (B) (Blue),
    - Low Quality (C) (Grey),
    - Unsuitable for Retention (U) (Red)
11. Sub Cat refers to the retention criteria values where 1 is Arboricultural, 2 is Landscape and 3 is Cultural including Conservational, Historic and Commemorative.
12. Useful Life is the tree's estimated remaining contribution in years.

Landmark Trees

Site: 1 Steele's Studio

Date: 20/11/ 2017

Appendix 1

BS5837 Tree Constraints Survey Schedule

Landmark Trees Ltd

020 7851 4544

Surveyor(s): Adam Hollis

Ref: JGA_1STS_AIA

Tree No.	English Name	Height	Crown Spread	Ground Clearance	Stem Diamete	Age Class	Protection Radius	Growth Vitality	Structural Condition	B.S. Cat	Sub Cat	Useful Life	Comments
1	Lime, Common	14	3122	5.0	660	Mature	7.9	Normal	Fair	B	2	20+	Pollarded
2	Cherry, Wild (Gean)		4223	2.0	180	Semi-mature	2.2	Moderate	Fair	C	2	20+	Cracks in stem Suppressed by nearby tree
3	Lime, Common	9	3,1.5,3,2	2.0	370	Early Mature	4.4	Moderate	Fair	B	2	20+	Topped at 7m
4	Chestnut, Horse	13	5631		950	Mature	11.4	Moderate	Poor	C	2	10+	Ganoderma decay fungi on stem Decay in limbs, lost limb 4m crown spread over roof
5	Sycamore	16	4423	4.0	410	Early Mature	4.9	Normal	Good	B	1	40+	Damaging wall Deadwood (minor) throughout crown
6	Sycamore	16	3514	3.5	560	Mature	6.7	Normal	Fair	C	2	20+	Ivy clad Leaning SW

Landmark Trees

Site: 1 Steele's Studio

Date: 20/11/ 2017

Appendix 1

BS5837 Tree Constraints Survey Schedule

Landmark Trees Ltd

020 7851 4544

Surveyor(s): Adam Hollis

Ref: JGA_1STS_AIA

Tree No.	English Name	Height	Crown Spread	Ground Clearance	Stem Diamete	Age Class	Protection Radius	Growth Vitality	Structural Condition	B.S. Cat	Sub Cat	Useful Life	Comments
7	Sycamore	16	5557	5.0	600	Mature	7.2	Normal	Fair	A	2	40+	Some decay in wounds/ stubs Ex-pollarded
8	Sycamore	15	4442	4.0	540	Mature	6.5	Normal	Good	B	2	20+	Entry wounds on trunk Top branch

APPENDIX 2

RECOMMENDED TREE WORKS

Notes for Guidance:

Husbandry 1 - Urgent (ASAP), 2 - Standard (within 6 months), 3 - Non-urgent (2-3 years)

CB - Cut Back to boundary/clear from structure.
CL# - Crown Lift to given height in meters.
CT#% - Crown Thinning by identified %.
CCL - Crown Clean (remove deadwood/crossing and hazardous branches and stubs)*.
CR#% - Crown Reduce by given maximum % (of outermost branch & twig length)
DWD - Remove deadwood.
Fell - Fell to ground level.
FInv - Further Investigation (generally with decay detection equipment).
Pol - Pollard or re-pollard.
Mon - Check / monitor progress of defect(s) at next consultant inspection which should be <18 months in frequented areas and <3 years in areas of more occasional use. Where clients retain their own ground staff, we recommend an annual in- house inspection and where practical, in the aftermath of extreme weather events.
Svr Ivy / Clr Bs - Sever ivy / clear base and re-inspect base / stem for concealed defects.

*Not generally specified following BS3998:2010

Landmark Trees

Site: 1 Steele's Studio
Date: 20/11/ 2017

Surveyor(s): Adam Hollis
Ref: JGA_1STS_AIA

Appendix 2

Recommended Tree Works

Hide irrelevant
Show All Trees

Tree No.	English Name	B.S. Cat	Height	Ground Clearance	Crown Spread	Recommended Works	Comments/ Reasons
4	Chestnut, Horse	C	13		5631	FInv Decay detection (drill / PICUS)	Ganoderma decay fungi on stem Decay in limbs, lost limb 4m crown spread over roof Recommended husbandry 2
6	Sycamore	C	16	3.5	3514	Svr Ivy	Ivy clad Leaning SW Recommended husbandry 2
7	Sycamore	A	16	5.0	5557	FInv Climbing inspection	Some decay in wounds/ stubs Ex-pollarded Recommended husbandry 2

APPENDIX 3

TRIAL PIT FINDINGS

2 STEELE'S STUDIOS

2 STEELE'S STUDIOS

2 STEELE'S STUDIOS

MEZZANINE ABOVE

LIVING ROOM

BATHROOM 1

BEDROOM 1

1A STEELE'S STUDIOS

TP1

TP2

TP3

TP4

T1

T2

T3

T4

T5

T6

T7

T8

STANBURY COURT

THE SIR RICHARD STEELE PUB

ELECTRICITY SUB STATION

N

SCALE (METRES)

0 1 2 3 4 5 10

REVISIONS:

NOTES:

APPLICATION BOUNDARY
TOTAL SITE AREA (GEA) 508 SQM

OWNERSHIP BOUNDARY
TOTAL SITE AREA (GEA) 352 SQM

EXTENT OF PROPOSED BASEMENT

TRIAL PIT (TP 1 - 4)

FORECOURT AREA 156 SQM

GARDEN AREA

EXISTING REAR GARDEN 084 SQM
EXISTING FRONT GARDEN 223 SQM

EXISTING TREES RETAINED

PROJECT:
1 STEELE'S STUDIOS

DRAWING TITLE:
EXISTING GROUND FLOOR PLAN
WITH BASEMENT AREA OVERLAID

STATUS:
PLANNING

NOTE:

Do not scale from the drawing. Any discrepancies to be reported to the architect.

All dimensions will be taken on site prior to ordering and construction.

JAMES
GORST
ARCHITECTS

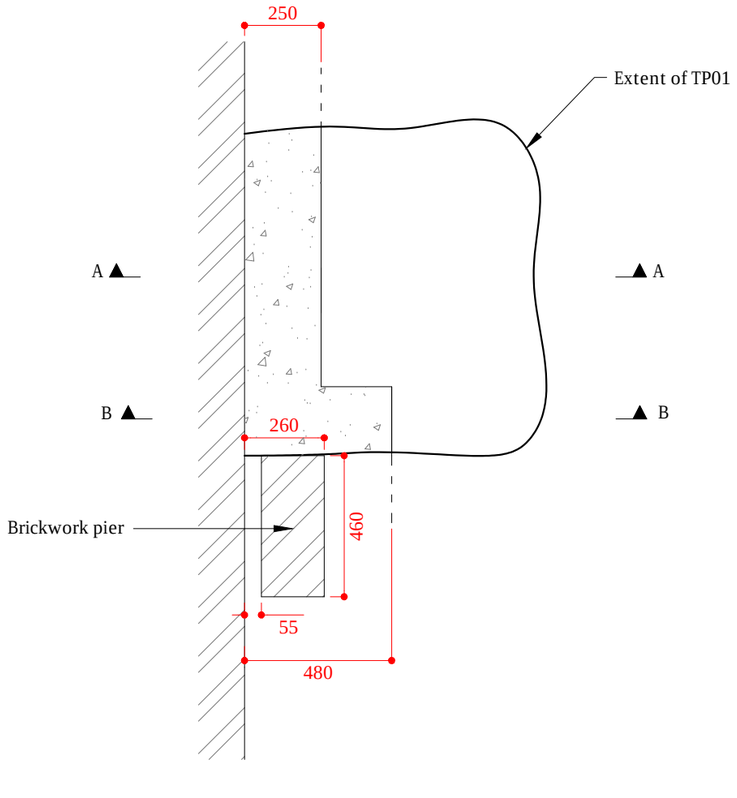
35 Lambs Conduit Street
London
WC1N 3NG

t 020 7336 7140
f 020 7336 7150
e info@jamesgorstarchitects.com

SCALE:	DRAWING NUMBER:	REVISION:
1:50 (A1) 1:100(A3)	TH16_GA_911	C

soiltechnics
environmental and geotechnical consultants

Plan



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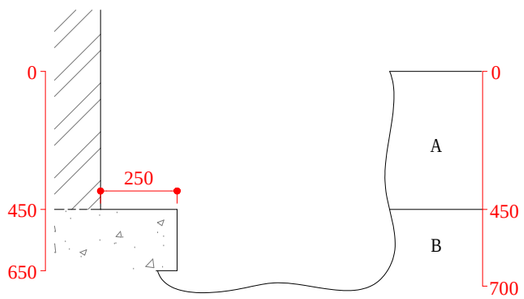

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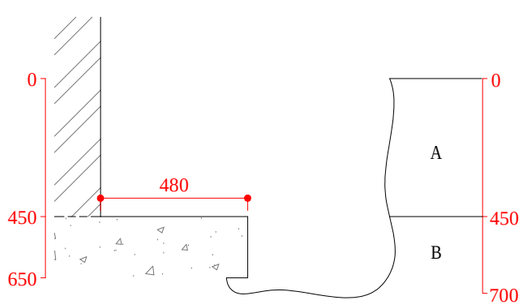


Photographic record

Key

A. Firm dark brown slightly gravelly silty sandy CLAY with frequent rootlets and roots up to 20mm in diameter. Gravel consists of flint, quartz and brick.
(MADE GROUND)

B. Firm brown sandy gravelly CLAY. Gravel consists of flint, brick, quartz (pea gravel).
(MADE GROUND)

Observed features
Assumed features

Denotes brickwork
Denotes concrete

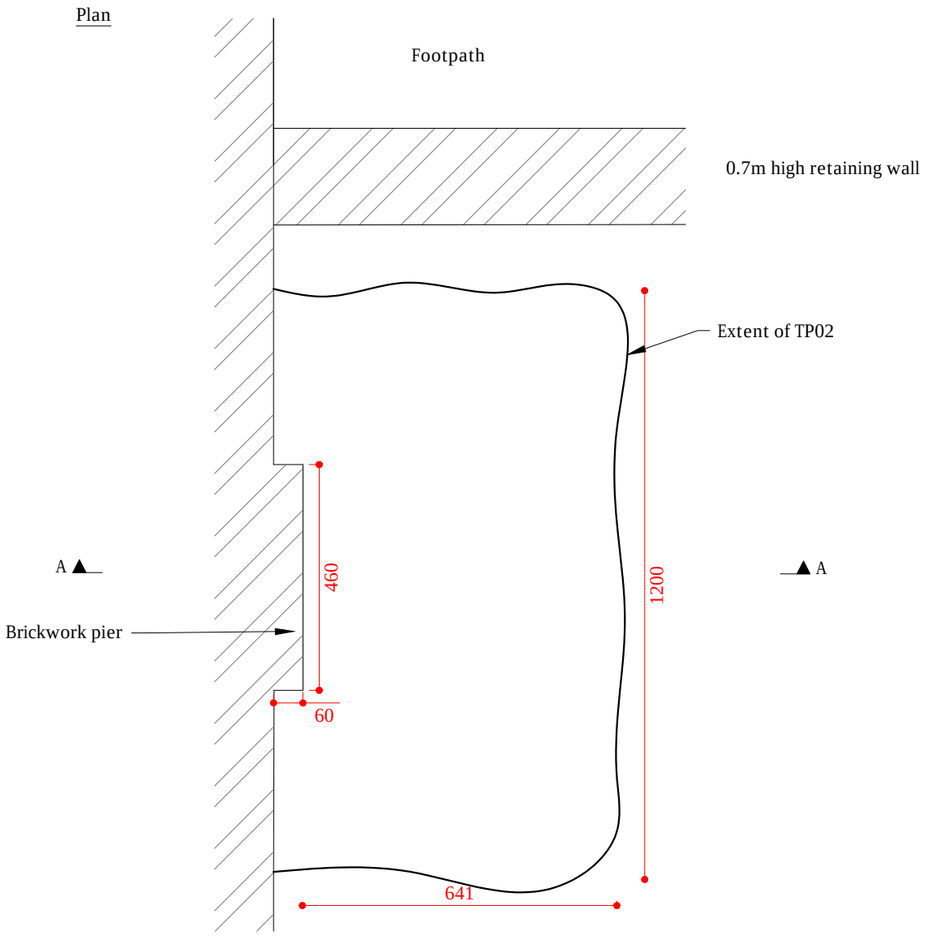
Notes

1. All dimensions shown in millimetres
2. Disturbed sample taken from 2.0m depth

Method of excavation		Title	Location reference
Hand tools		Trial pit record	TP01
Dimensions		Date of works	Location plan on drawing number
As shown		26/01/2018	02
Groundwater observations		Scale	Appendix
No groundwater encountered.		1:20 at A3	D

soiltechnics
environmental and geotechnical consultants

Plan



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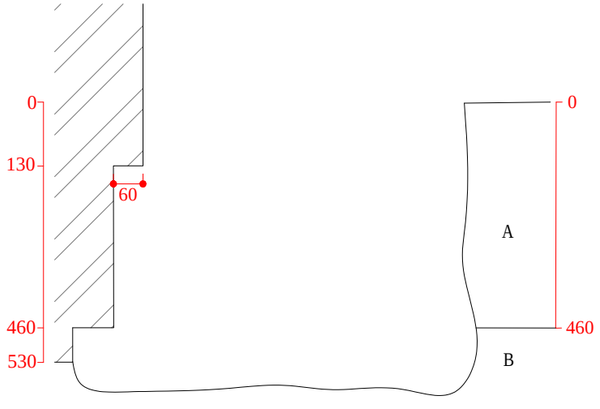


Photographic record

Key

A. Firm dark brown slightly gravelly silty sandy CLAY with frequent rootlets and roots up to 20mm in diameter. Gravel consists of flint, quartz and brick.
(MADE GROUND)

B. Firm brown sandy gravelly CLAY. Gravel consists of flint, brick, quartz (pea gravel).
(MADE GROUND)

Observed features
Assumed features

Denotes brickwork
Denotes concrete

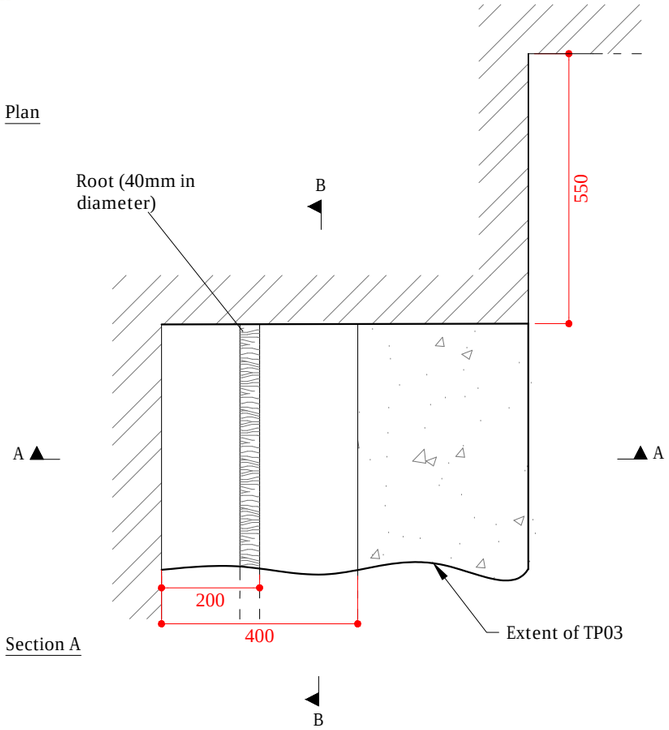
Notes

1. All dimensions shown in millimetres
2. Disturbed sample taken from 0.5m depth
3. Environmental sample taken from 0.2m depth

Method of excavation		Title	Location reference
Hand tools		Trial pit record	TP02
Dimensions		Date of works	Location plan on drawing number
As shown		26/01/2018	02
Groundwater observations		Scale	Appendix
No groundwater encountered		1:12.5 at A3	D

soiltechnics
environmental and geotechnical consultants

Plan



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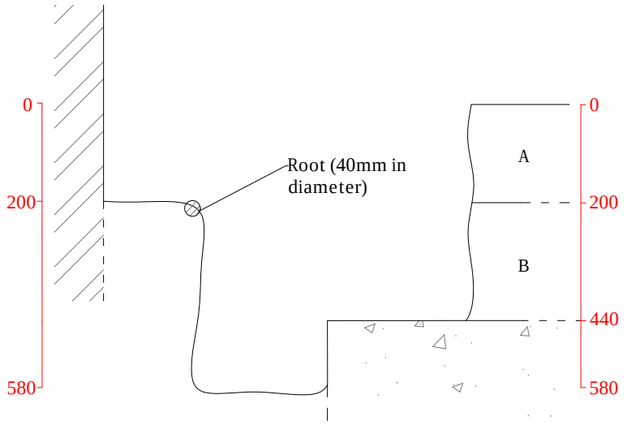

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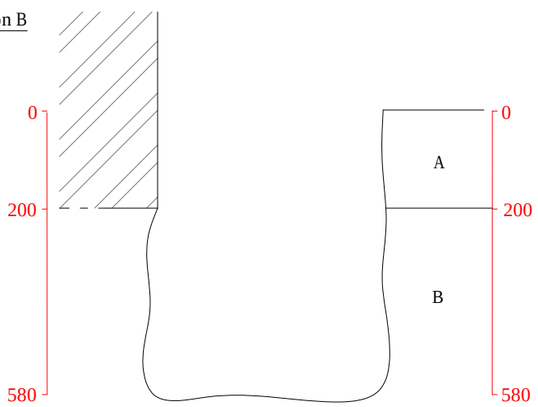


Photographic record

Key

A. Bituminous bound material.
(MADE GROUND)

B. Brown very sandy very gravelly CLAY. Gravel consists of brick, flint, bituminous crated material and concrete.
(MADE GROUND)

Observed features
Assumed features

Denotes brickwork
Denotes concrete
Denotes timber

Notes

1. All dimensions shown in millimetres

Method of excavation		Title	Location reference
Hand tools		Trial pit record	TP03
Dimensions		Date of works	Location plan on drawing number
As shown		26/01/2018	02
Groundwater observations		Scale	Appendix
No groundwater encountered		1:00 at A3	D

Root Excavation Report

Steele's Studios,

Belsize Park

London

NW3 4RN

Undertaken by

James Abbott

Arboraeration 8th October 2018

Introduction

Site Address: Steele's Studios, Belsize Park, London, NW3 4RN

Arboraeration were instructed to excavate a trial pit at the above property by Adam Hollis of landmark trees following a Tree Survey of the site.

Reason for trial pits

The trial pit was excavated on the property to establish the extent of rooting in relation to proposed construction. Plots were excavated using an air spade and manual digging tools.

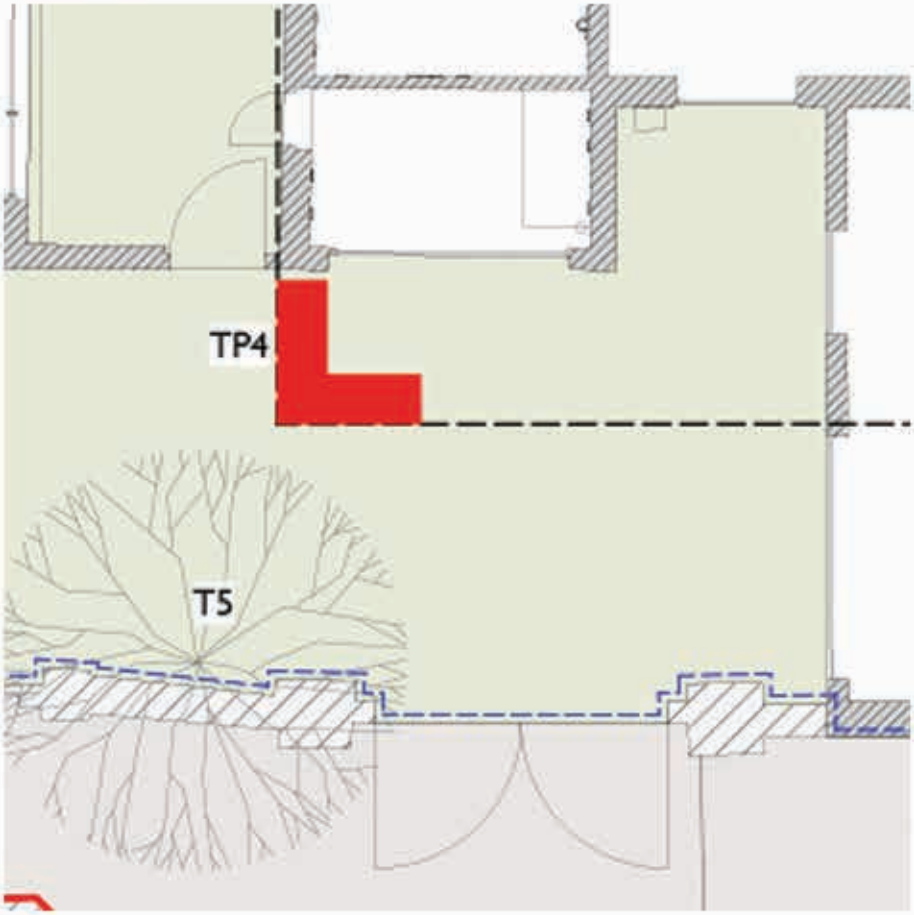
Trial Pit Results – numbered and located as per plans supplied

Trial Pit 4	1.2m Long x 1.2m Long x 0.4m Wide x 1m Deep (L shaped trench) 2x 30mm roots 3x 20mm roots, A small amount of fibrous roots

Further Information

The trial pit was extended 100mm away from the building to get around a waste pipe.
A total of 2 cover boards were left on site.

Site Overview



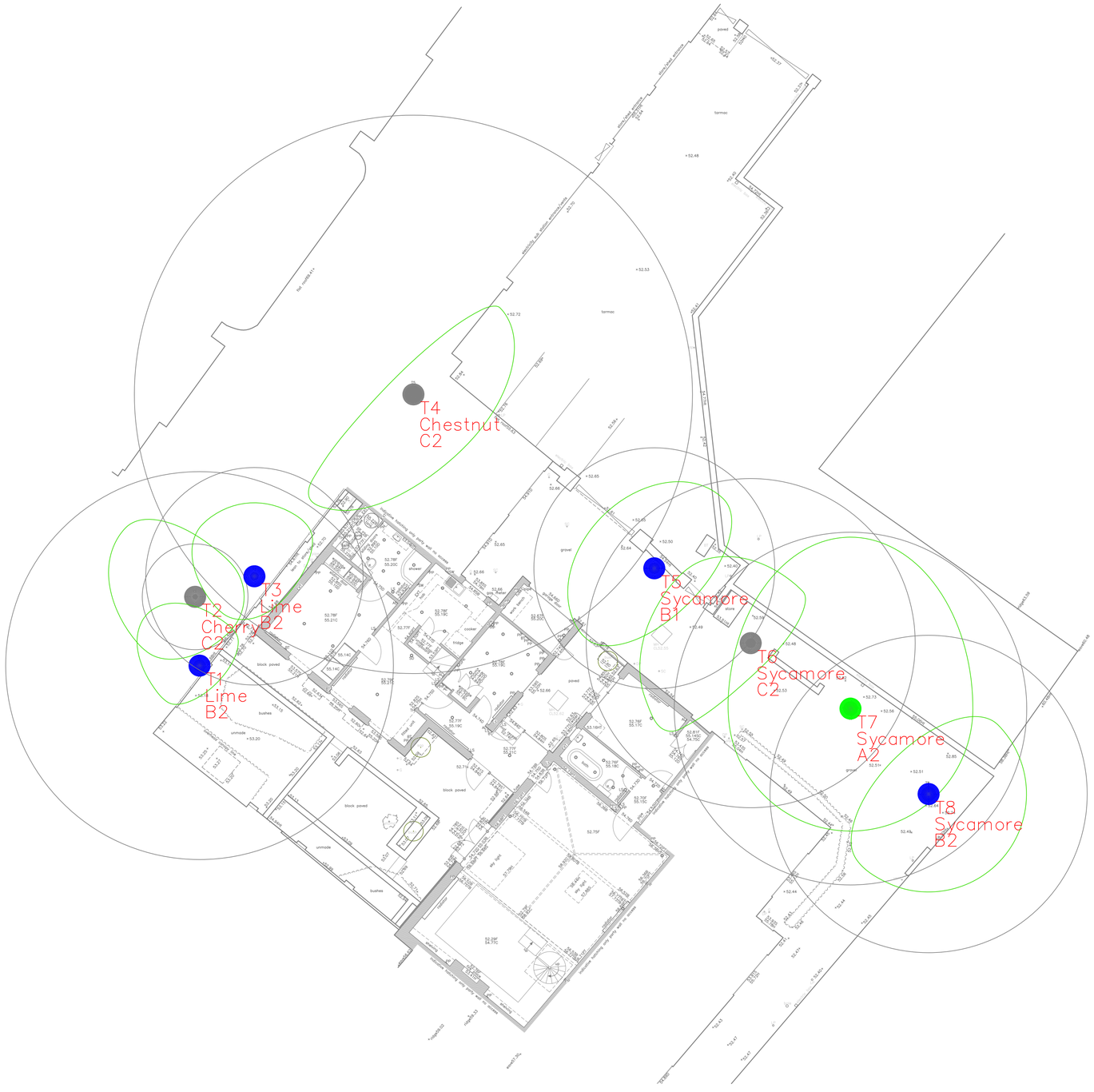
Trial pit 4

Landmark Trees

PART 3 – PLANS

PLAN 1

TREE CONSTRAINTS PLAN



NOTE:

This survey is of a preliminary nature. The trees were inspected from the ground only on the basis of the Visual Tree Assessment method. No samples were taken for analysis. No decay detection equipment was employed. The survey does not cover the arrangements that may be required in connection with the laying or removal of underground services.

Branch spread In metres is taken at the four cardinal points to derive an accurate representation of the crown.

Root Protection Areas (RPA) are derived from stem diameter measured at 1.5 m above adjacent ground level (taken on sloping ground on the upslope side of the tree base).

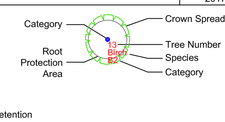
Landmark Trees

Landmark Trees
20 Broadwick Street, London, W1F 8HT
Tel: 0207 851 4544 Mobile: 07812 989928
e-mail: info@landmarktrees.co.uk Web: www.landmarktrees.co.uk

Site: 1 Steele's Studio	1:100@ A1
Drawing Title: Tree Constraints Plan	November 2017

Key:

- Category A High Quality
- Category B Moderate Quality
- Category C Low Quality
- Category U Trees Unsuitable for Retention



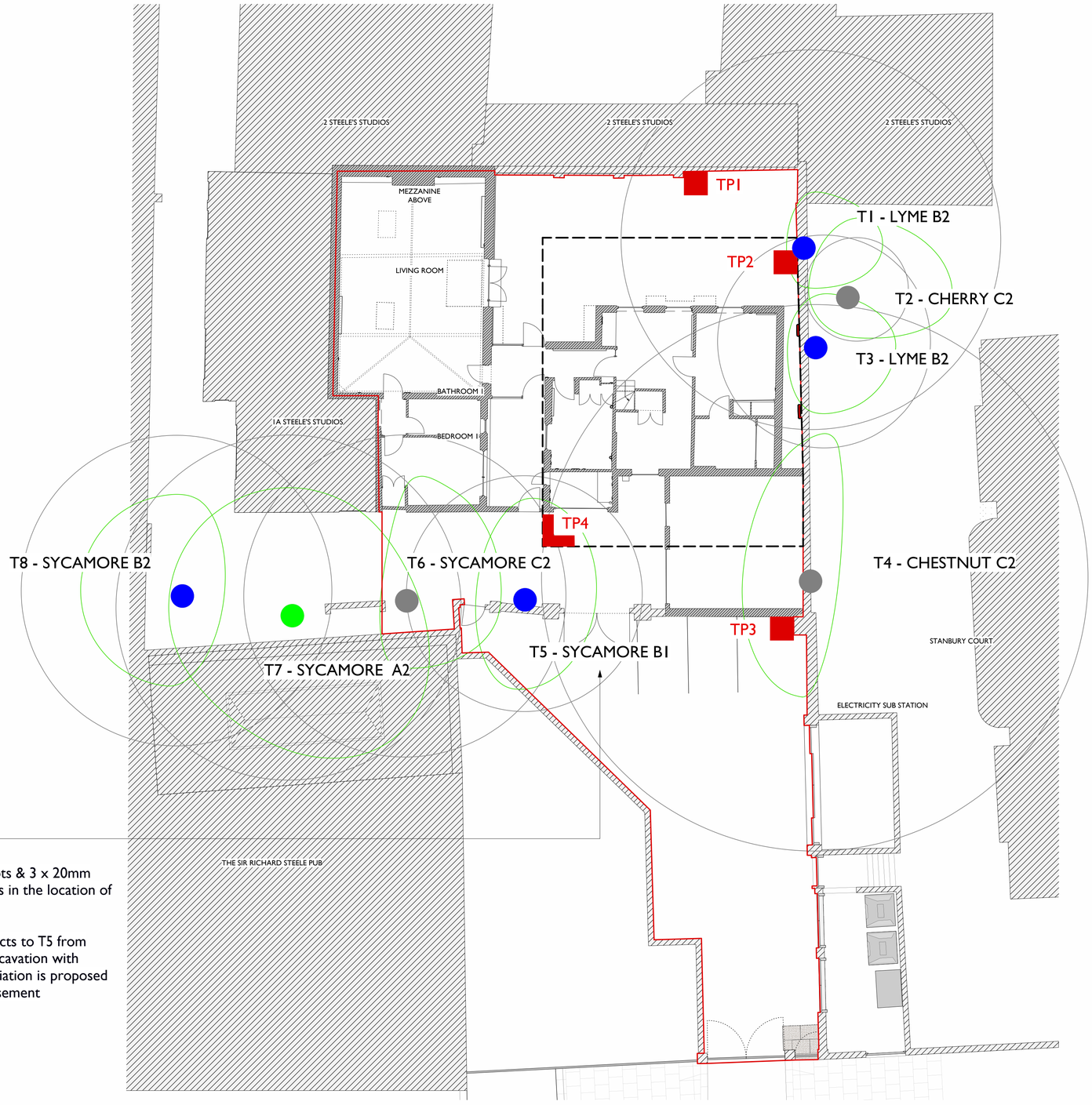
PLAN 2

ARBORICULTURAL IMPACT ASSESSMENT PLAN (S)

i. Ground Floor

GROUND FLOOR PLAN OF EXISTING BUILDING WITH EXISTING TREE LOCATIONS (TO BE RETAINED)

AREA OF BASEMENT EXTENSION SHOWN DOTTED



NOTES:

APPLICATION BOUNDARY
TOTAL SITE AREA (GEA) 508 SQM

EXTENT OF PROPOSED BASEMENT

TRIAL PIT (TP 1 - 4)

FORECOURT AREA 156 SQM

GARDEN AREA
EXISTING REAR GARDEN 084 SQM
EXISTING FRONT GARDEN 223 SQM

EXISTING TREES RETAINED

IMPACT ON T5 - SYCAMORE (B1)

TP4 investigation revealed 3 x 30mm roots & 3 x 20mm roots and a small amount of fibrous roots in the location of TP4

Trial pit evidence shows only minor impacts to T5 from basement level construction – manual excavation with pre-emptive root pruning and soil remediation is proposed as mitigation to the installation of the basement construction in this area.

NOTE:
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Tel: 0207 851 4544 Mobile: 07812 989928
e-mail: info@landmarktrees.co.uk Web: www.landmarktrees.co.uk

Site: 1 Steele's Studio | 1:100@ A1

Drawing Title: Arboricultural Impacts Assessment | Revised: June 2019

Key:
- Category A High Quality
- Category B Moderate Quality
- Category C Low Quality
- Category U Trees Unsuitable for Retention

Category | Crown Spread | Tree Number | Species | Category | Root Protection Area | 13 Birch B2

GROUND FLOOR PLAN OF PROPOSED BUILDING WITH EXISTING TREE LOCATIONS (TO BE RETAINED)

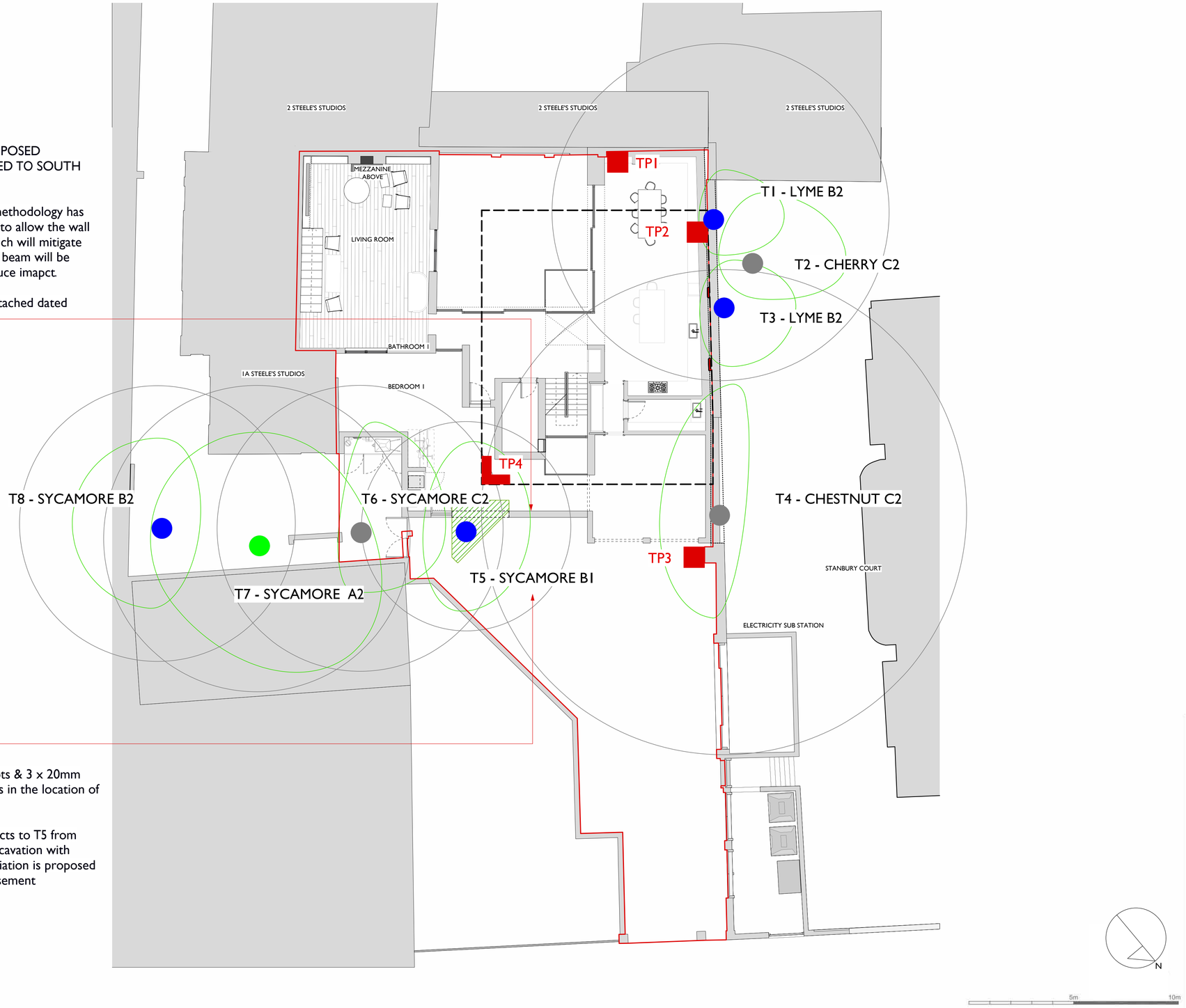
AREA OF BASEMENT EXTENSION SHOWN DOTTED

IMPACT ON T5 - SYCAMORE (B1)

CONSTRUCTION METHOD FOR PROPOSED BOUNDARY WALL (TO BE RE-LOCATED TO SOUTH WEST SIDE OF T5)

The structural design and constrcution methodology has been revised by the Structural Engineers to allow the wall to be constrcuted off a floating beam which will mitigate any impact on the roots of the tree. The beam will be supported on 100mm screw piles to reduce imapct.

Refer to Strcutural Engineers' drawing attached dated 20.06.2019



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NOTES:

APPLICATION BOUNDARY
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EXTENT OF PROPOSED BASEMENT

TRIAL PIT (TP 1 - 4)

FORECOURT AREA 156 SQM

GARDEN AREA
EXISTING REAR GARDEN 084 SQM
EXISTING FRONT GARDEN 223 SQM

EXISTING TREES RETAINED

NOTE:
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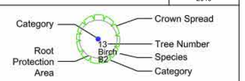
Tel: 0207 851 4544 Mobile: 07812 989928
e-mail: info@landmarktrees.co.uk Web: www.landmarktrees.co.uk

Site: 1 Steele's Studio	1:100@ A1
Drawing Title: Arboricultural Impacts Assessment	Revised: June 2019

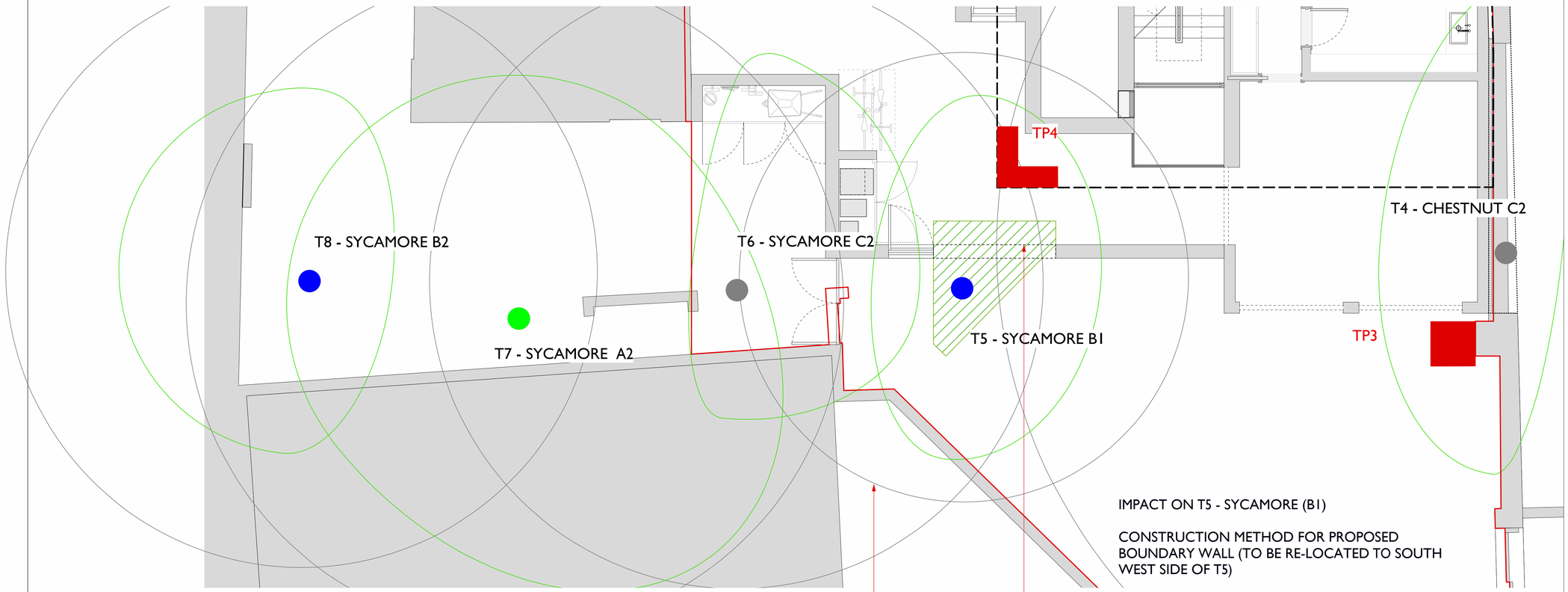
Key:

- Category A High Quality
- Category B Moderate Quality
- Category C Low Quality
- Category U Trees Unsuitable for Retention



GROUND FLOOR PLAN OF PROPOSED BUILDING WITH EXISTING TREE LOCATIONS (TO BE RETAINED)

AREA OF BASEMENT EXTENSION SHOWN DOTTED



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IMPACT ON T5 - SYCAMORE (B1)

CONSTRUCTION METHOD FOR PROPOSED BOUNDARY WALL (TO BE RE-LOCATED TO SOUTH WEST SIDE OF T5)

The structural design and constrcution methodology has been revised by the Structural Engineers to allow the wall to be constrcuted off a floating beam which will mitigate any impact on the roots of the tree. The beam will be supported on 100mm screw piles to reduce imapct.

Refer to Strcutural Engineers' drawing attached dated 20.06.2019

The section of wall dotted denotes an area where the beam runs above ground level - freeing the tree pit of structure and allowing the pit to be free draining.

The area hatched in green denotes the enlarged tree pit area which will be designed and installed in accordance with BS8545 with 75MM of mulch to pit to ensure free draininge of surface water.

No-Dig surfacing be employed beyoned the line of the tree pit in accordance with BS5837:2012 and
'The Principles of Arboricultural Practice: Note 1, Driveways Close to Trees, AAIS 1996
[APN1]'.

SCALE (METRES)

0 1 2 3 4 5 10

NOTES:

APPLICATION BOUNDARY
TOTAL SITE AREA (GEA) 508 SQM

EXTENT OF PROPOSED BASEMENT

TRIAL PIT (TP 1 - 4)

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EXISTING TREES RETAINED

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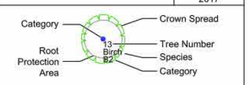
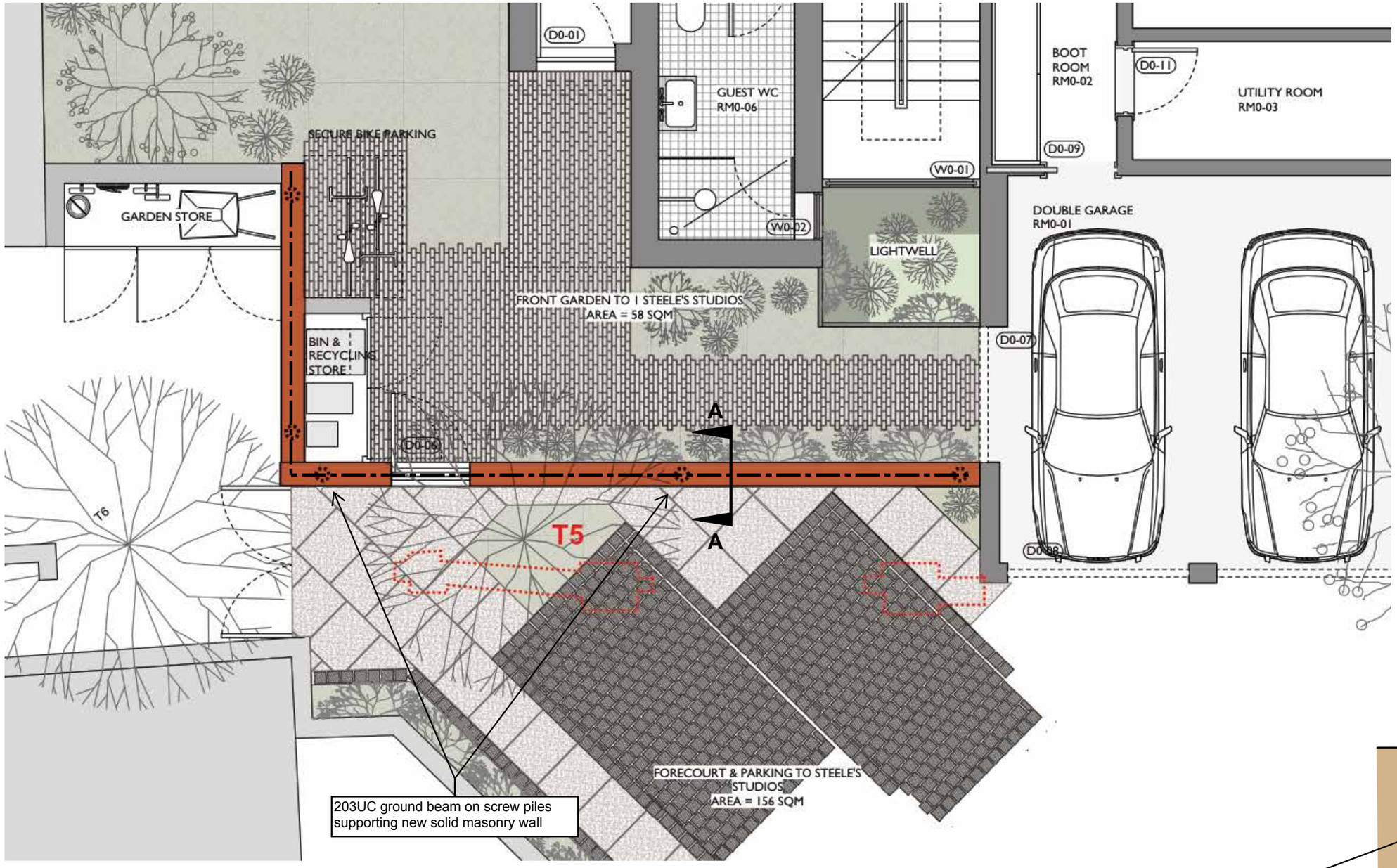
Site: 1 Steele's Studio	1:100@ A1
Drawing Title: Arboricultural Impacts Assessment	November 2017

Key:

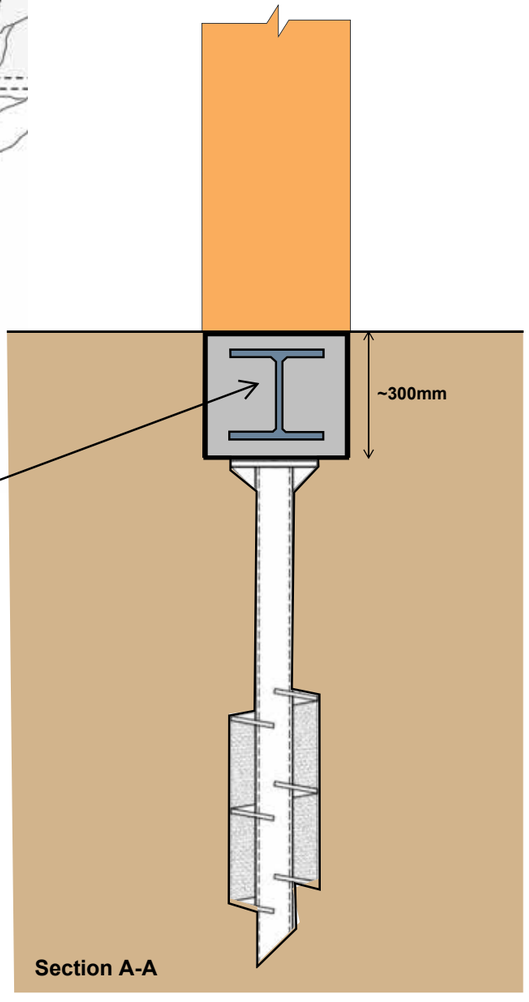
- Category A High Quality
- Category B Moderate Quality
- Category C Low Quality
- Category U Trees Unsuitable for Retention





Partial Plan Showing Garden Wall Re-built

Image of Screw pile installation



Hot dip galvanised 203UC encased in 50mm cover concrete and D49 wrapping mesh supported by screw piles at centres as shown on plan supporting 330wide solid masonry external garden wall. Spacing of screw piles to be agreed with Arboricultural Consultant and LBC requirements

Eckersley O`Callaghan

Steeles Studios
Sketch Tree (T5) Root Zone Mitigation
20.06.2019