Landmark Trees

ARBORICULTURAL IMPACT ASSESSMENT REPORT FOR:

33 Belsize Avenue

London

NW3 4BL

INSTRUCTING PARTY:

Vikki Done

33 Belsize Avenue

London

NW3 4BL

REPORT PREPARED BY

Adam Hollis

MSc ARB MICFor FArbor A MRICS C Env

Ref: KSR/33BLS/AIA/01a

Date: 16th February 2018

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:	Vikki Done	**Case Ref:**	KSR/33BLS/AIA/01a
Local Authority:	LB Camden	**Date:**	16/02/2018
Site Address: 33 Belsize Avenue, London NW3 4BL			
Proposal: Rear basement extension, ground floor extension and internal refurbishment			

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: 25/07/17	Access Full/Partial/None	F/P
Trees on Site		Y	Off-site Trees	Y
Trees affected by development		Y	O/s trees affected by development	N
Tree replacement proposed:		N/a	On or off-site trees indirectly affected by development	N

Trees with the potential to be affected
Existing site layout and trial pit findings indicate arboricultural impacts of scheme are theoretical only.

Comments
Works recommended to 3 off-site trees in the interest of sound husbandry 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	N/a
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	N

RPA= Root Protection Area
TPP= Tree Protection Plan
AMS= Arboricultural Method Statement
AIA = Arboricultural Implication Assessment

2. INTRODUCTION

2.1 Terms of Reference

2.1.1 LANDMARK TREES were asked by Vikki Done to provide a survey and an arboricultural impact assessment of proposals for the site: 33 Belsize Avenue, London NW3 4BL. The report is to accompany a planning application.

2.1.2 The proposals are for the extension of the basement under the existing garden, with the construction of swimming pool as well as extension of the ground floor and internal refurbishment to all floors.

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: X010

Proposals: FloorPlan-01ProposedLowerGround & P100

2.3 Scope of Survey

2.3.1 As Landmark Trees' (LT) arboricultural consultant, David Gardner surveyed the trees on site on 25th July 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: 33 Belsize Avenue, London NW3 4BL

3.1.1	This property comprises a large detached dwelling with an existing basement level and large rear garden. It is located within the Belsize Ward, approximately 150m west of Belsize Park Station.
3.1.2	The site slopes gently from the rear boundary to the front with significant level changes arising from the existing landscaping and basement.
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.

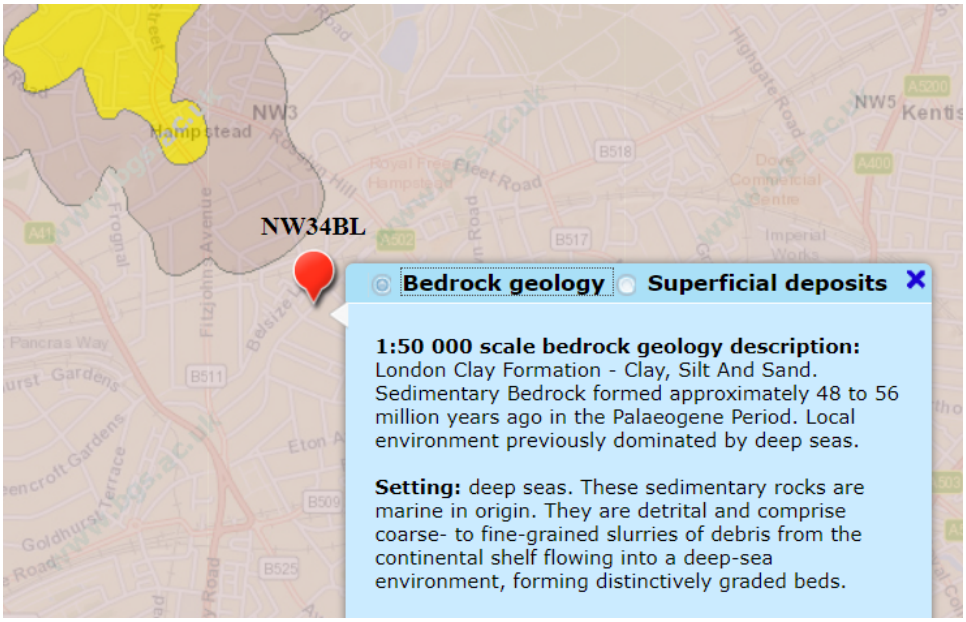


Figure 1: Extract from the BGS Geology of Britain Viewer

3.2 Subject Trees

3.2.1	Of the 12 surveyed trees 3 are A category *(High Quality), 3 are B category *(Moderate Quality), 4 are C category *(Low Quality) and none are U category *(Unsuitable for Retention). The remaining 2 specimens, the pittosporum T3 and the winter flowering cherry T8, are not considered constraints within the planning system and thus have not been accorded a category of retention.
3.2.2	The tree species found on site comprise common lime, common ash, common walnut, apple, gleditsia, silver birch, sycamore, winter flowering cherry and Chusan palm.
3.2.3	In terms of age demographics there is a broadly even mix of mature, early mature and semi-mature specimens on site with no young trees present.

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 off-site tree (T2, T4 and T5 – third party trees). 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 Belsize Park 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.

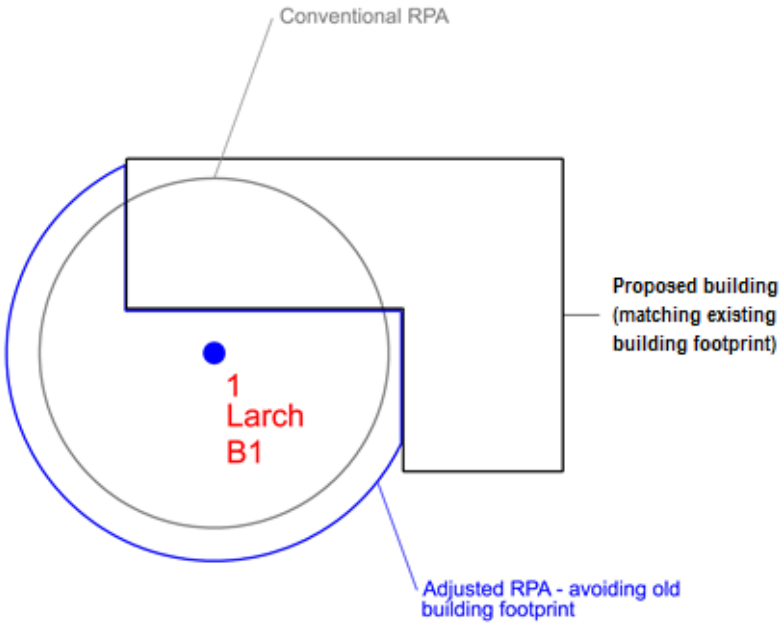


Figure 2 – Generic BS 5837 RPA Adjustments

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 due to the difficulties in accurately determining root distribution although the trial pit findings detailed in Appendix 5 show no rooting within the proposed footprint by T4 and the existing basement will have prevented rooting by T2 beyond it.**

4.1.5 **It should be noted that whilst a 70mm diameter root was discovered in Trial Pit 2, this immediately turns at right angles to run parallel to the boundary wall whose footings extend to at least 700mm depth.**

4.1.6 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.

4.1.7 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, whilst the high and moderate quality trees present have the potential to pose significant primary constraints upon development, their distribution around the periphery of the site means that these constraints are significantly tempered provided it will not be necessary to build right up to the boundaries.

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.

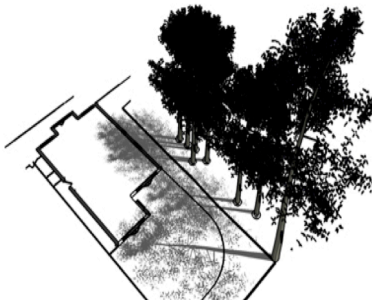


Figure 3 –
Generic Shading Constraints

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.

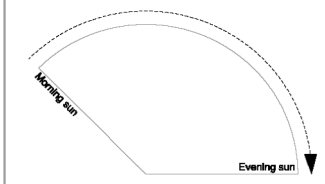


Figure 4 – Shading Arc

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 are minimal, with leaf deposition and honey-dew likely to be as it is 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: KSR/33BLS/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	2	Ash, Common	Basement Construction within conventional RPA Note: existing basement means no impact in practice	m^2 N/A %	Mature	Normal	Moderate	N/A	N/A	Hand dig top 750mm of basement line thro' RPA
B	4	Walnut, Common	Garden Wall Construction within conventional RPA Note: trial pit findings show no impact	m^2 N/A %	Early Mature	Moderate	Moderate	N/A	N/A	Airspade / manual excavation

6.0 DISCUSSION

6.1 Rating of Primary Impacts

6.1.1 The arboricultural impacts of the proposals are theoretical only. Whilst the basement extension encroaches within the conventional, circular RPAs of T2 and the new hard landscaping within that of T4, the existing basement will have prevented root development by T2 into the proposed footprint whilst the trial pit findings indicate no significant rooting by T4 into the footprint. Notwithstanding this, it is proposed as a precautionary measure to manually excavate the top 750mm of the basement line through the conventional RPA of T2 and to manually excavate line of the garden walls within the conventional RPA of T4 in conjunction with pre-emptive root pruning.

6.1.2 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.

6.1.3 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.

6.1.4 "**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.*

6.1.5 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 subterranean 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 The path of foundations through the RPA of T2 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.

6.3.2 The limits of excavation within the RPA of T4 will be undertaken manually; any roots encountered will be cleanly pruned back to an appropriate junction with a sharp pruning saw or secateurs. Roots larger than 25mm diameter may only be cut in consultation with an arboriculturalist.

6.3.3 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. 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.

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

6.3.5 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.

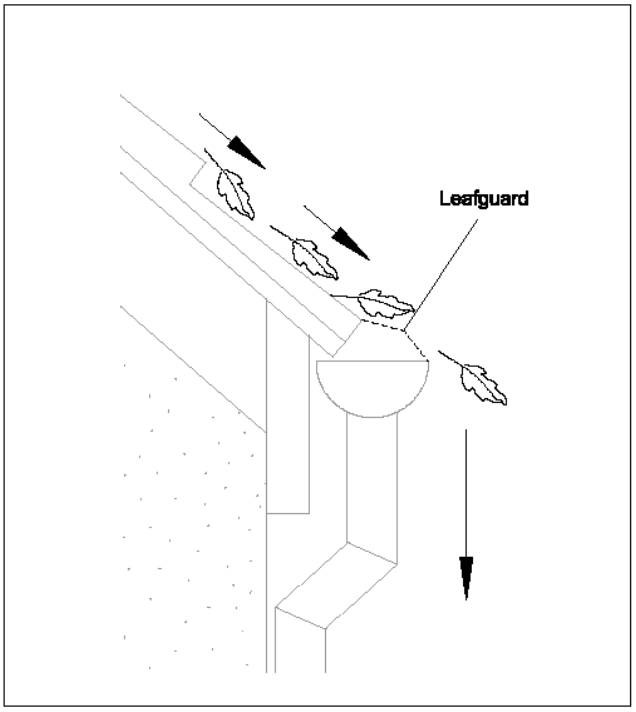


Figure 5: Filtration traps, as shown above, could be fitted on the gutters which can easily be maintained at 2-3m above ground.

7.0 CONCLUSION

7.1	The pre-existing site conditions and trial investigations have shown that impacts are theoretical only.
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	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.
- Centre for Ecology & Hydrology. 2006. Tree Roots in the Built Environment, HMSO, London.
- Helliwell R (1980) Provision for New Trees; Landscape Design; July/August issue
- International Society of Arboriculture (ISA). 1994. The Landscape Below Ground. ISA, Champaign, Ilinois. USA.
- Lonsdale D 1999. Research for Amenity Trees No.7: Principles of Tree Hazard Assessment and Management, HMSO, London.
- Matheny, N; Clark, J. R.1998. Trees and Development: A Technical Guide to Preservation of Trees during Land Development. ISA, Champaign, Ilinois. USA.
- 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

Apple	: Malus sp	Lime, Common	: Tilia x europea
Ash, Common	: Fraxinus excelsior	Palm, Chusan	: Trachycarpus fortunei
Ash, Claret	: Fraxinus Fraxinus angustifolia	Pittosporum	: Pittosporum sp
Birch, Silver	: Betula pendula	Sycamore	: Acer pseudoplatanus
Cherry, flowering	: Prunus spp	Walnut, English	: Juglans regia
Gleditsia	: Gleditsia triacanthos		

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: 33 Belsize Avenue

Date: 25/07/17

Appendix 1

BS5837 Tree Constraints Survey Schedule

Landmark Trees Ltd

020 7851 4544

Surveyor(s): David Gardner

Ref: KSR/33BLS/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	19	8,7,7.5, 7	5.0	650	Mature	7.8	Moderate	Fair	A	2	>40	Deadwood (minor) throughout crown Assessed as A category in the context of the streetscene, B category as an individual
2	Ash, Common	20	6676	5.0	650	Mature	7.8	Normal	Fair	B	2	20+	Restricted rooting Decay in old pruning wounds RS only. Previously pollarded, now twin-stemmed from pollard head. Growing in poor long-term position
3	Pittosporum	5	1	1.0			0.0						Remote survey only (RS) Does not constitute planning constraint
4	Walnut, Common	13	4636	4.0	500	Early Mature	6.0	Moderate	Fair	B	2	20+	Remote survey only (RS) Of indifferent form
4a	Apple	5	3123	3.0	150	Semi-mature	1.8	Moderate	Fair	C	2	10+	Remote survey only (RS)
5	Gleditsia	12	5	3.0	350	Early Mature	4.2	Moderate	Fair	C	2	20+	A sparser than normal canopy Deadwood (minor) throughout crown

Landmark Trees

Site: 33 Belsize Avenue

Date: 25/07/17

Appendix 1

BS5837 Tree Constraints Survey Schedule

Landmark Trees Ltd

020 7851 4544

Surveyor(s): David Gardner

Ref: KSR/33BLS/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
6	Birch, Silver	10	2424	2.0	210	Semi-mature	2.5	Normal	Fair	C	2	>40	A tree with insignificant defects
7	Sycamore	13	6366	3.0	420	Early Mature	5.0	Normal	Fair	B	2	>40	May cause issues with proximity to boundary wall
8	Cherry, Winter Flowering	4	2				0.0						Does not constitute a planning constraint. Overhangs boundary by approx 1m
9	Palm, Chusan	6	2	4.0	250	Early Mature	3.0	Moderate	Fair	C	2	20+	Remote survey only (RS)
10	Lime, Common	20	8,12,11, 9	8.0	720	Mature	8.6	Normal	Fair	A	2	40+	Deadwood (minor) Entry wounds
11	Lime, Common	20	7	8.0	660	Mature	7.9	Normal	Fair	A	2	40+	Deadwood (minor) Entry wounds

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: 33 Belsize Avenue
Date: 25/07/17

Surveyor(s): David Gardner
Ref: KSR/33BLS/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
2	Ash, Common	B	20	5.0	6676	Mon	Restricted rooting Decay in old pruning wounds RS only. Previously pollarded, now twin-stemmed from pollard head. Growing in poor long-term position Recommended husbandry 3
4	Walnut, Common	B	13	4.0	4636	FInv Confirm accuracy of stem diameter	Remote survey only (RS) Of indifferent form Recommended husbandry 2
5	Gleditsia	C	12	3.0	5	Mon	A sparser than normal canopy Deadwood (minor) throughout crown Remote survey only (RS) Recommended husbandry 3

APPENDIX 3: TRIAL PIT FINDINGS

Root Excavation Report

33 Belsize Avenue

London

NW34BL

Undertaken by

James Abbott

Arboraeration

21st and 22nd Septemer 2017

Introduction

Site Address: 33 Belsize Avenue, London NW34BL

Trial pits were excavated on the property within the RPAs of several trees to establish the extent of rooting in relation to proposed construction. Plots were excavated using an air spade and manual digging tools.

Reason for trial pits

All plots were excavated to find evidence of root growth from several trees within the property ahead of proposed building works.

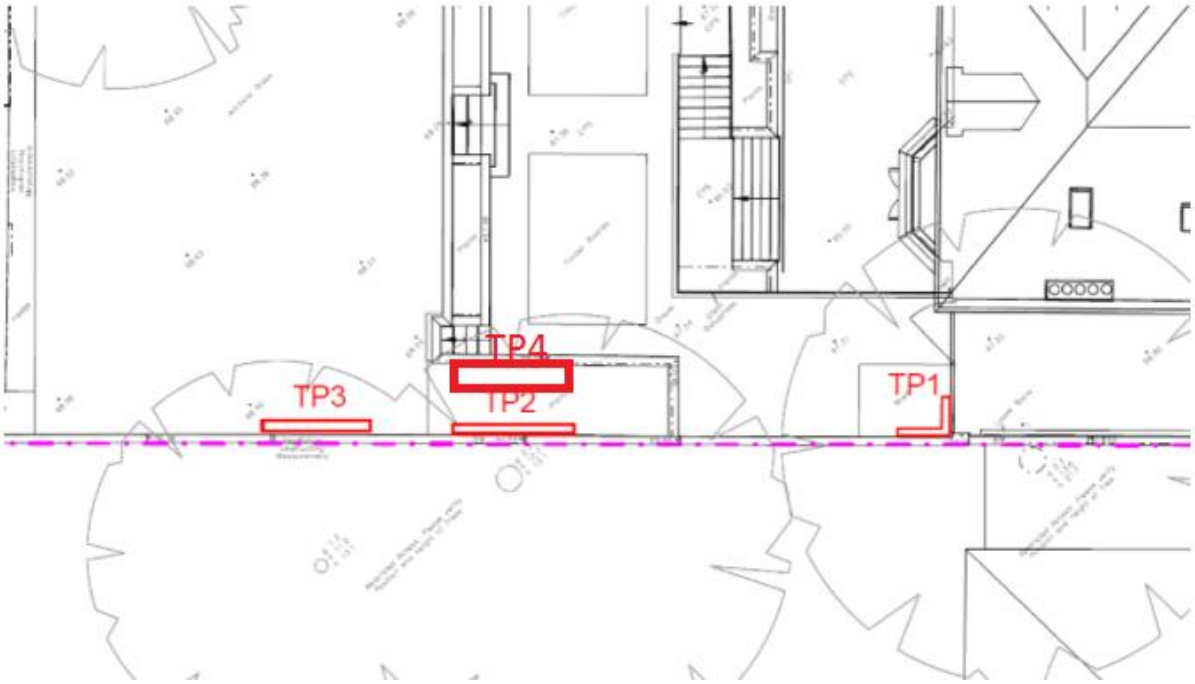
Trial Pit Results – numbered and located as per plans supplied

Trial Pit 2	1.2m long x 0.4m Wide x 0.8m Deep Mass of fibrous roots, 1x 70mm root 1x 32mm root
Trial Pit 3	1.2m long x 0.4m Wide x 0.8m Deep 1x 30mm root
Trial Pit 4	1.m long x 0.4-0.6m Wide x 1m Deep No significant rooting

Further Information

Trial Pit 1 was not excavated after consultation.
Trial pit 2 was halted due to the large root at 700mm below surface level and trial pit 3 was added in closer to the centre of the property.

Site overview



Not to scale

Trial Pit 2

Trial Pit 3

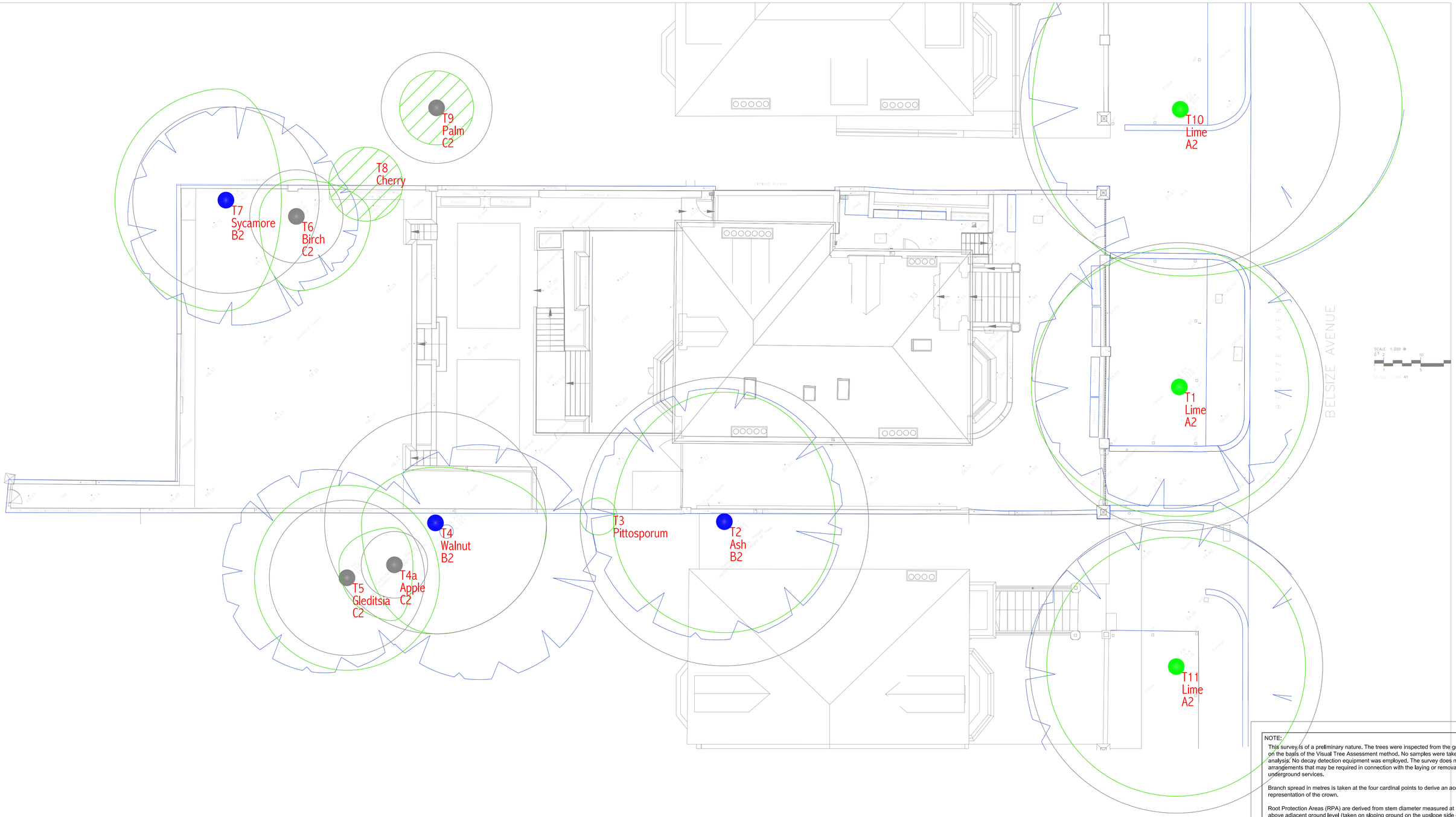
Trial Pit 4

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.

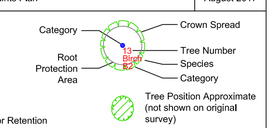
Root Protection Areas (RPA) are derived from stem diameter measured at 1.5 m above adjacent ground level (taken on sloping ground on the upslope side of the tree base).

Landmark Trees
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: 33 Belsize Avenue	1:100@ A1
Drawing Title: Tree Constraints Plan	August 2017

Key:

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

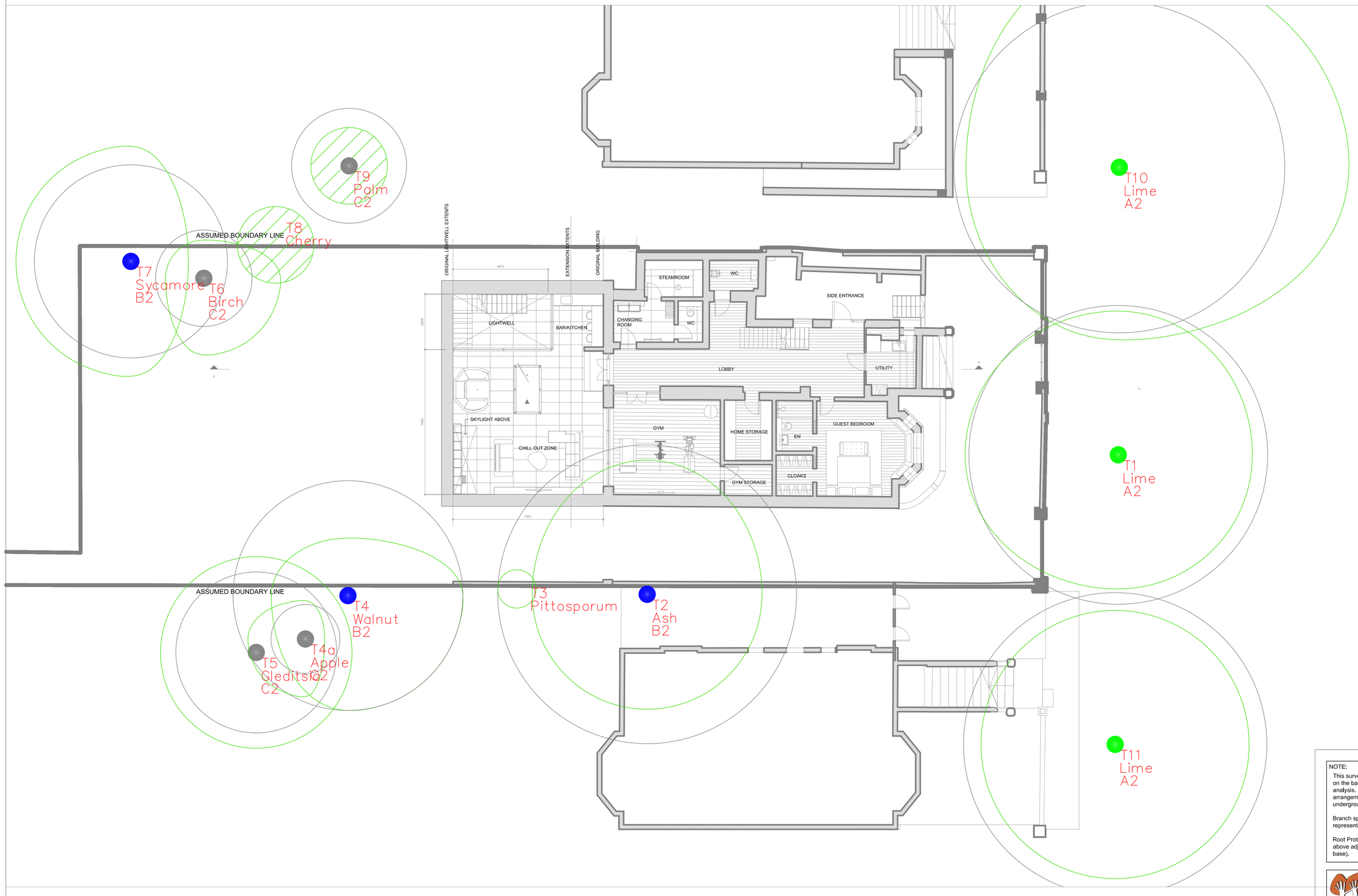


Tree Position Approximate (not shown on original survey)

PLAN 2

ARBORICULTURAL IMPACT ASSESSMENT PLAN (S)

i. Lower Ground Floor
ii. Ground Floor



Proposed Lower Ground Floor 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).

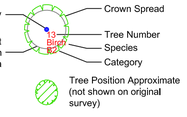
Landmark Trees

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

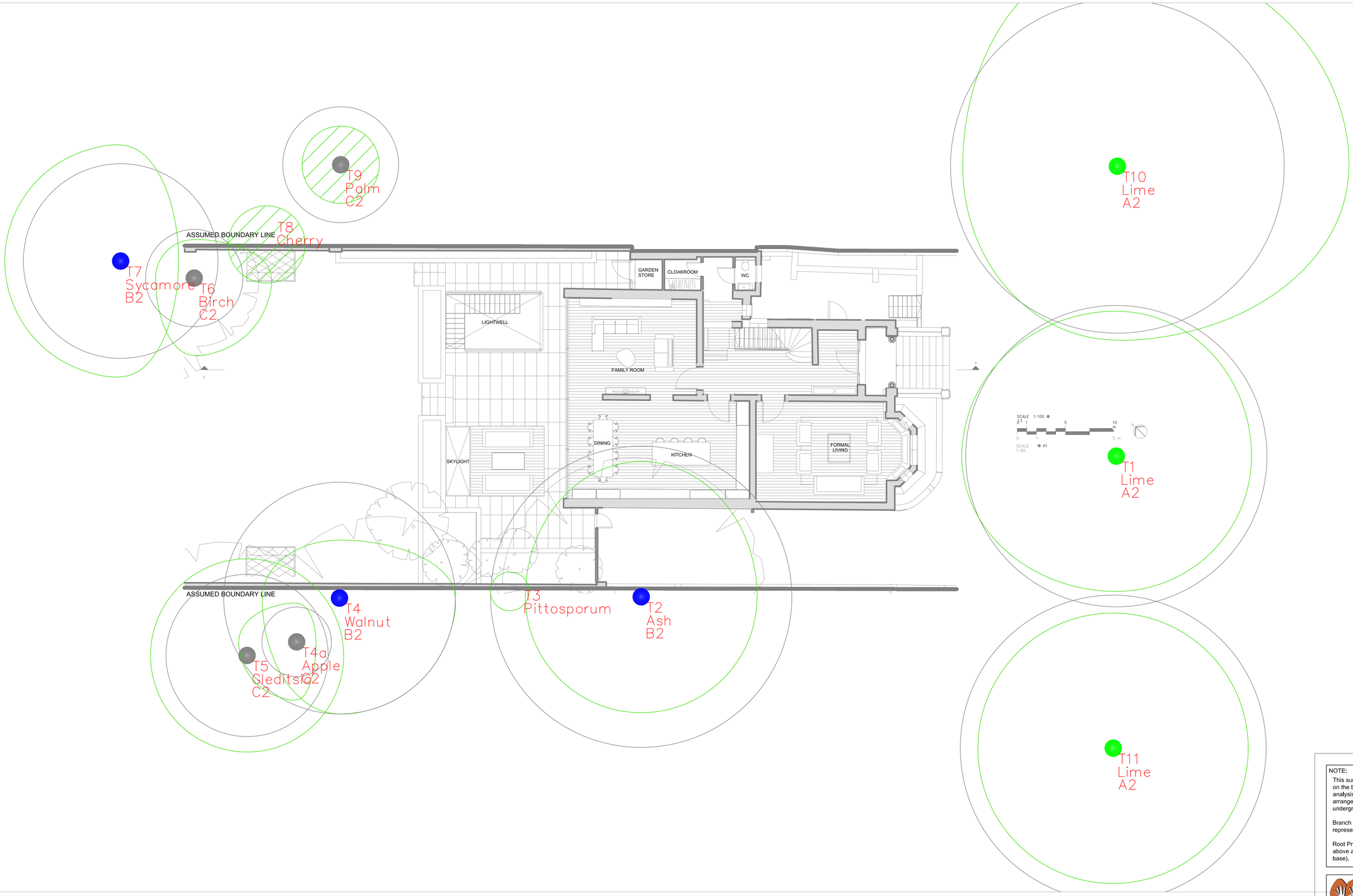
Site: 33 Belsize Avenue	1:100@ A1
Drawing Title: Arboricultural Impacts Assessment	February 2018

Key:

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



Tree Position Approximate (not shown on original survey)



Proposed Ground Floor 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

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: 33 Belsize Avenue	1:100@ A1
Drawing Title: Arboricultural Impacts Assessment	February 2018

Key:

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

Category — Crown Spread
Root Protection Area — Tree Number
Species
Category
T3 Birch B2

Tree Position Approximate (not shown on original survey)