Landmark Trees

ARBORICULTURAL IMPACT ASSESSMENT REPORT:

36 Redington Road

London

NW3 7RT

REPORT PREPARED FOR:

Mr Zolf of Abbey properties

% Archetype

47 Queen Anne St.

London

W1G 9JG

REPORT PREPARED BY

Adam Hollis

MSc ARB MICForFArbor A MRICS C Env

Ref: ARC/36RDR/AIA/02

Date: 27th May 2015

Appendices

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.

Tree Constraints & Protection Overview

Client:	Mr Zolf of Abbey properties % Archetype	**Case Ref:**	ARC/36RDR/AIA/02
Local Authority:	Camden Council	**Date:**	27/05/2015
Site Address: 36 Redington Road, London, NW3 7RT			
Proposal: House reconstruction with a basement level (LFG)			

Report Checklist	**Y/N**		**Y/N**
Arboricultural constraints on site	Y	Trees removal proposed	Y
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: 17/04/14	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:	Y		On or off-site trees indirectly affected by development	N

Trees with the potential to be affected

Trial pits results have informed design – basement outline has been amended to reflect root distribution within the site. Impacts to off-site trees T5, T7 and T9 low, subject to mitigation.

T10 (category C): felled to facilitate development.

Low invasive foundations required for GF encroachment to T5 (note: all beneath existing building)

Elevational encroachment to off-site trees T5, T7 and T9 (note: recommended works below).

Comments

Recommended works to off-site trees require removal of epicormic shoots overhanging property – only limited additional pruning required to T9 to provide sufficient clearance from new elevations.

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	N

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'

1. SUMMARY

1.1 This report comprises an arboricultural impact assessment of the revised proposals for 36 Redington Road, London NW3 7RT, reviewing any conflicts between the proposals and material tree constraints identified in our survey.

1.2 There are 10 trees surveyed on or around the site, of which 1 is category A (High Quality), 3 are B category *(Moderate Quality), 6 are C category *(Low Quality) trees. 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. In this instance, no such collective impact is proposed.

1.3 The primary impacts of development have been reduced from the original scheme, with the current proposals requiring the felling of the category C tree T10 only. Other primary impacts remain as before, the medium/high theoretical encroachment from the proposed lower ground floor (LGF) to the off-site trees T5 (18.2% RPA), T7 (22.5% RPA) and T9 (21.5% RPA). Trial pits have determined that the actual root colonisation by the off-site trees within the majority of proposed development site has been limited by barriers such as the boundary wall, in addition to the existing buildings and driveway. Where significant roots were found (e.g. the north-eastern end of Trial Pit 1 as shown in Appendix 5), the LGF line remains as previously amended to ensure the impact is low.

1.4 The felling of the category C tree is rated as a low impact, with no significant effect on visual character of Redington Frognal Conservation Area. The replanting scheme will offer considerable enhancement with replacement trees having the advantage of being specifically selected for the proposed site, healthy and fit-for-purpose. Design can provide for a diverse range of native and ornamental species that will compliment rather than conflict with the proposals, so providing a more sustainable long-term resource for the future.

1.5 The demolition of the existing building will need to be undertaken with care, ensuring that the off-site trees are protected. With suitable demolition techniques, particularly the careful removal of the existing hard surfaces/foundation slabs, there will be potential future benefits to T5 from the removal of the existing building from within 0.6m of the stem. The new surfaces separating the proposed building from the row of off-site trees T5 – T9 and the new landscaping around T4 should be no-dig and porous, thus providing potential benefits to all of these trees.

1.6 There will be secondary impacts of honeydew / litter deposition and partial shade on this site. However, the off-site trees T5 and T7 are pollarded and currently require husbandry works to remove overhanging epicormic shoots, which will reduce the secondary impacts associated with these trees. The secondary impacts from T9 can be mitigated by design, although it is important to note that the over-hanging epicormic shoots also require pruning on the grounds of sound husbandry. Subject to the proposed mitigation and husbandry works, the secondary impacts of development are minimal.

1.7 The site has potential for development without impacting significantly on the wider tree population or local landscape. Thus, with suitable mitigation and supervision the revised scheme is recommended to planning.

*British Standards Institute: Trees in relation to design, demolition and construction BS 5837: 2012 HMSO, London

2. INTRODUCTION

2.1 Terms of reference

2.1.1 LANDMARK TREES were asked by Mr Zolf of Abbey properties, % Archetype, to provide a survey and an arboricultural impact assessment of proposals for the site: 36 Redington Road, London, NW3 7RT. The report is to accompany a planning application.

2.1.2 The proposals are for house reconstruction including a new basement level. 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.

2.1.3 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 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: Existing Site Plan*

Proposals: Proposed drawings -1048 (10) 02, 1048 (10), 03 1048 (10) 09

*In the absence of a full topographical survey, tree positions may be approximate only.

2.3 Scope of survey

2.3.1	As Landmark Trees' (LT) arboricultural consultant, I surveyed the trees on site on 17th April 2014, 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.
2.4.2	A site plan identifying the surveyed trees, based on the client's drawings / topographical survey is provided in Appendix 6.
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 client's proposals to create an Arboricultural Impact Assessment Plan in Appendix 7. General observations and discussion follow, below.

3.0 OBSERVATIONS

3.1 Site description

Photograph 1: View of the Site from Redington Road

3.1.1	The site currently contains a residential property comprising a 3 bed two storey semi-detached house. There are gardens to the front and rear of the property.
3.1.2	The site is relatively flat.
3.1.3	In terms of the British Geological Survey, the site overlies the Claygate Member / Beds (see dark area on plan extract overleaf). As the youngest part of the London Clay, they form a transition between the clay and the sandier Bagshot Beds above (shown in yellow). Unlike the Bagshot Beds, more typical of Hampstead Heath, 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.
3.1.4	The actual limits of soil series are not as clearly defined on the ground as on plan and there may be anomalies between them. Further advice from the relevant experts on the specific soil properties can be sought as necessary.
3.1.5	Clay soils are prone to compaction during development. Damage to soil structure can have a serious impact on tree health. Design of foundations near problematic tree species will also need to take into consideration subsidence risk.

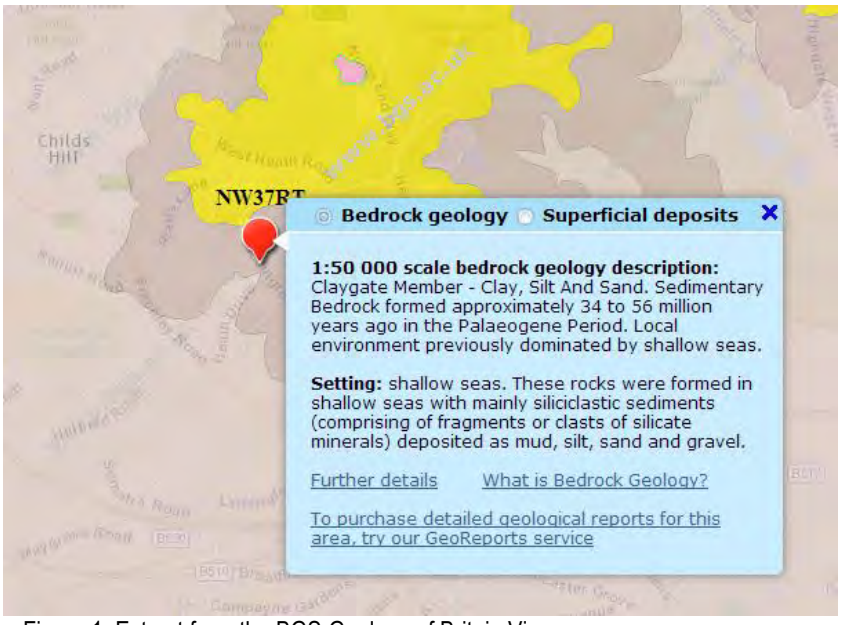

Figure 1: Extract from the BGS Geology of Britain Viewer

3.2 Subject trees

3.2.1	Of the 10 surveyed trees 1 is category A (High Quality). There are 3 B category (Moderate Quality), 5 C category (Low Quality) trees and 1 C category group of mix broadleaves. 3.2.2 The tree species found on site comprise pear, whitebeam, apple, rowan, lime, cherry and mixed broadleaves.
3.2.3	In terms of age demographics pear, whitebeam, apple and one of the lime trees are early mature. Rowan and cherry are semi mature trees with a young lime tree and young group of mixed broadleaves and one mature lime tree on site.

3.2.4	Full details of the surveyed trees can be found in Appendix 1 of this report.
3.2.5	There are some arboricultural works required within the existing tree population. 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 Redington Frognal 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.

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. **No modifications have been made in this instance (please see overleaf), though further investigations indicate the assumptions made below at 4.1.11 are correct.**

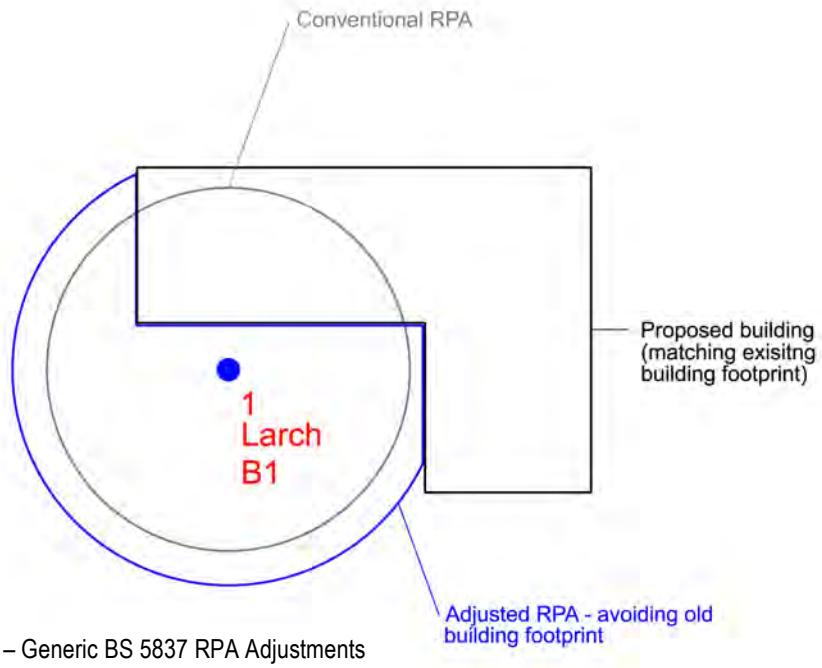

Figure 2 – Generic BS 5837 RPA Adjustments

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. Not infrequently, LT are requested by LPA Tree Officers to modify the RPA's to reflect their assumptions that e.g. a road will have drastically limited root growth.

4.1.4 Such assumptions cannot be proved without prior site investigations / trial pits. Where it is not always possible to conduct site investigations (e.g. below busy roads), we can always look to the published science. There seems little support for the popular myth that roads and services will curb root growth: research for the International Society of Arboriculture by Kopinga J (ISA 1994), found that "a constant high moisture content of the soil directly underneath the pavement surface can be considered as a major soil factor in attracting the trees' roots to develop there." By contrast, grass in lawns may actively antagonise tree roots with natural pathogens. Similarly, Professor F Miller (ISA 1994) found that service trenches at > 3m distances from trees had minimal impact on growth or crown shape.

4.1.5 A key misunderstanding, even among professionals, is that we conflate the RPA with the actual root system: RPA's are *prima facie* a notion / convention / treaty and almost entirely theoretical, but readily calculable. Conversely roots are a "known unknown," spatial entity that we predict at our folly. Yet, many are quick to do so.

4.1.6 LT favour the neutrality of a circular RPA, because in a difference of opinion, the tree officer will always have the prerogative to dictate the final modification of shape. With the best will in the world, the free allowance of modifications will tend to lead to inequitable outcomes, prejudicing the applicant and the practice is in our view, best avoided. The neutral circle dispenses with this inequity.

4.1.7 Ultimately, the point of the circular RPA is to illustrate areas of concern. The purpose of this report is to consider areas of concern (not to modify them to suit our argument or findings). Therefore, no modifications are made here to the RPA's, regardless of roads etc.

4.1.8 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.

4.1.9 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."

4.1.10 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.

4.1.11 The potentially significant constraints upon development comprise the off-site category A tree T9, in addition to the off-site category B trees T5 and T7. Their boundary location and the presence of hard standing on site, suggest that rooting will be asymmetrical, preferring off-site conditions. Rooting patterns on site were investigated by trial pits in July 2014; the results at Appendix 5 support the assumption of asymmetrical rooting. Thus, the theoretical RPA shown in our plans overstate the constraints. Although the RPA need not be coextensive with the root system, it also needs to be able to support root growth. The conventional RPA will still be treated as precautionary areas while working on site, but their status as constraints should be viewed with limited weighting.

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.

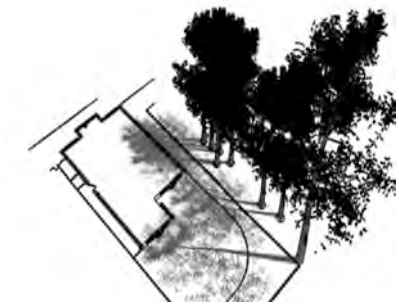

Figure 3 –
Generic Shading Constraints

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.

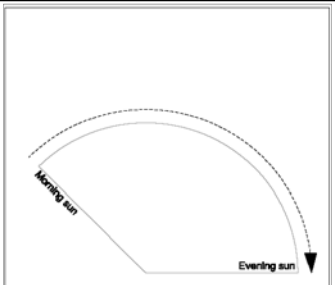

Figure 4 – Shading Arc

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-site trees will ensure that shading constraints are minimal, with leaf deposition and honey-dew likely to be as it is today. However, the orientation and location of the off-site trees on the southern/south eastern boundary will potentially provide a variety of secondary impacts, including shading, organic deposition and the need to maintain crown clearance in the future. The significance of these constraints will vary depending on the location and proximity to the proposed re-development.

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: ARC/36RDR/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	5	Lime, Common	Basement Construction within RPA - trial pits determined minimal impact GF Gonstruction within RPA/Canopy (9.1m2/8%)	20.6 m^2 18.21 %	Mature	Normal	Moderate /good	Low	N/A	Manual excavation of basement line through RPA Remedial tree surgery as per good husbandry rec.
B	7	Lime, Common	Basement Construction within RPA - trial pits determined minimal impact Building Construction within RPA/Canopy	22.47 m^2 24.53 %	Early Mature	Normal	Moderate/ good	Low	N/A	Manual excavation of basement line through RPA Remedial tree surgery as per good husbandry rec.
A	9	Lime, Common	Basement Construction within RPA - trial pits determined minimal impact Building Construction within RPA/Canopy	54.83 m^2 21.54 %	Mature	Normal	Moderate/ good	Low	N/A	Manual excavation of basement line through RPA Remedial tree surgery as per good husbandry rec.
C	10	Cherry, Japanese	Felled to Facilitate Development	m^2 N/A %	Semi-mature	Moderate	N/A	N/A	Low	New planting / landscaping

6.0 DISCUSSION

6.1 Rating of Primary Impacts

6.1.1 The primary impacts of development have been reduced from the original scheme, with the current proposals requiring the felling of the category C tree T10 only. Other primary impacts remain as before, the medium/high theoretical encroachment from the proposed lower ground floor (LGF) to the off-site trees T5 (18.2% RPA), T7 (22.5% RPA) and T9 (21.5% RPA). Trial pits have determined that the actual root colonisation by the off-site trees within the majority of proposed development site has been limited by barriers such as the boundary wall, in addition to the existing buildings and driveway. Where significant roots were found (e.g. the north-eastern end of Trial Pit 1 as shown in Appendix 5), the LGF line remains as previously amended to ensure the impact is low. The conventional RPA will still be treated as precautionary areas, by the contractor, but their status as constraints should be viewed with limited weighting.

6.1.2 The felling of the category C tree is rated as a low impact, with no significant effect on visual character of Redington Frognal Conservation Area. The replanting scheme will offer considerable enhancement with replacement trees having the advantage of being specifically selected for the proposed site, healthy and fit-for-purpose. Design can provide for a diverse range of native and ornamental species that will compliment rather than conflict with the proposals, so providing a more sustainable long-term resource for the future.

6.1.3 The demolition of the existing building will need to be undertaken with care, ensuring that the off-site trees are protected. With suitable demolition techniques, particularly the careful removal of the existing hard surfaces/foundation slabs, there will be potential future benefits to T5 from the removal of the existing building from within 0.6m of the stem. The new surfaces separating the proposed building from the row of off-site trees T5 – T9 and the landscaping around T4 should be no-dig and porous, thus providing potential benefits to all of these trees.

6.1.4 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.

6.1.5 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).

6.1.6 The trees in question are healthy specimens of species with a good resistance to development impacts, and quite capable of tolerating these low impacts.

6.1.7 "**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.*

6.2 Rating of Secondary impacts

6.2.1 There will be secondary impacts of honeydew / litter deposition and partial shade on this site. However, the off-site trees T5 and T7 are pollarded and currently require husbandry works to remove overhanging epicormic shoots, which will reduce the secondary impacts associated with these trees. The secondary impacts from T9 can be mitigated by design, although it is important to note that the over-hanging epicormic shoots also require pruning on the grounds of sound husbandry. Subject to the proposed mitigation and husbandry works, 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 trees. Care must be taken to avoid disturbing the soil beneath the existing foundations/sub-base, to ensure that any roots that are just below the surface are protected.

6.3.3 The path of the basement foundations through RPAs will need to 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. Where the ground floor encroachment exceeds the basement line within the RPA of T5, there are existing building foundations and the line of the new elevation falls behind these. It is recommended that low invasive foundations techniques should be used; the foundation pits will need to be trial excavated, with and significant roots trimmed as above.

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. 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.

6.3.5 Nuisance deposition can be mitigated with regular crown cleaning and filtration traps on the guttering (see Figure 5 below). Alternatively, elements of green roof construction might be considered, where applicable.

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.

6.3.7 The landscape impact of tree losses can be offset by the landscape proposals, ideally involving new planting of ornamental varieties of native species, and where appropriate with columnar or compact form. A selection of columnar tree species cultivars for constricted sites is provided in Appendix 4.

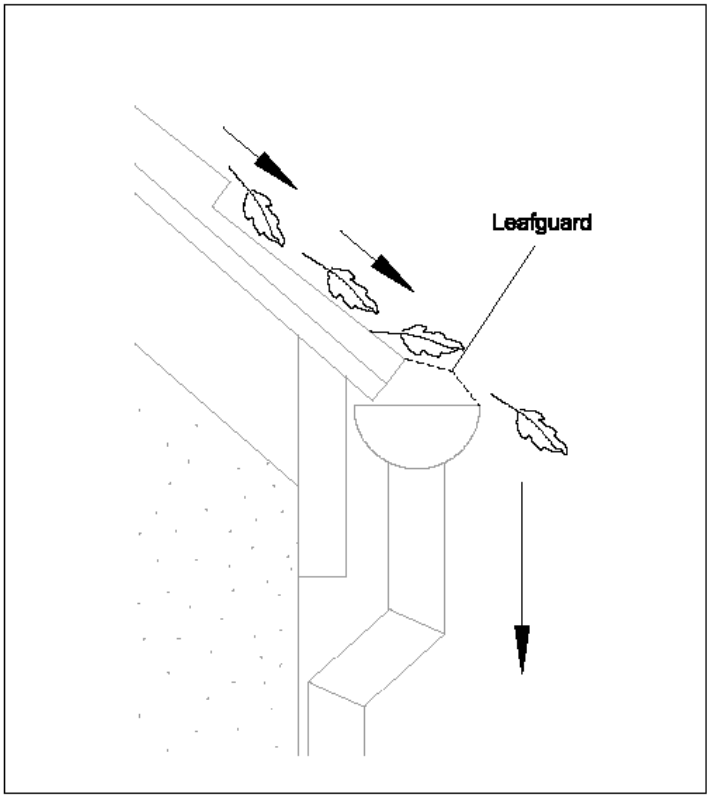

Figure 5: Filtration traps, as shown above, could be fitted on the gutters which can easily be maintained at 2-3m above ground.

7.0 CONCLUSION

7.1	The potential impacts of development are all relatively low in terms of the quality of the tree removed. Trial pits have informed the development proposals, allowing modifications to be made to the design so that the potential impacts are low.
7.2	The full potential of the impacts can be mitigated through design and precautionary measures. These measures can be elaborated in Method Statements in the discharge of planning conditions.
7.3	The tree that is recommended for felling is of little individual significance, such that its loss will not affect the visual character of the area.
7.4	Therefore, the proposals will not have any significant impact on either the retained trees or wider landscape. Thus, with suitable mitigation and supervision the scheme is recommended to planning.

8.0 RECOMMENDATIONS

8.1 Specific Recommendations

8.1.1 Current tree works recommendations are found in Appendix 2 to this report, with works to facilitate development in Appendix 3 and a selection of columnar tree species cultivars for constricted sites provided in Appendix 4. Any tree removals recommended within this report should only be carried out with local authority consent.

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.

8.1.3 Replace felled trees with native ornamental nursery stock under current best practice; i.e. conforming to and planted in accordance with the following:

- BS 3936:1980 Nursery Stock;
- BS 4043:1966 Transplanting Semi-Mature Trees; and
- BS 5236:1975 Cultivation and Planting of Trees in the Advanced Nursery Stock Category.
- All replacement stock should be planted and maintained as detailed in BS 4428:1989 (Section 7): Recommendations for General Landscape Operations.

8.2 General Recommendations

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 lay out 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 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

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APPENDIX 1

TREE SCHEDULE

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 asan 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: 36 Reddington Road

Date: 17 April 2014

Appendix 1

BS5837 Tree Constraints Survey Schedule

Landmark Trees Ltd

020 7851 4544

Surveyor(s): Adam Hollis

Ref: ARC/36RDR/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	Pear, Willow-leaved	4	3	1.5	200	Early Mature	2.4	Moderate	Good	C	2	>40	Garden ornamental A sparser than normal canopy
2	Whitebeam	8	4	4.0	430	Early Mature	5.2	Normal	Good	B	2	>40	Pollarded at 6m Included bark in main stem unions
3	Rowan	7	1323	4.0	233	Semi-mature	2.8	Moderate	Fair	C	2	10+	Ivy smothered Suppressed by nearby tree Remote survey only
4	Apple, Cultivated	8	4	3.0	300	Early Mature	3.6	Normal	Fair	C	2	>40	Pollarded at 5m
5	Lime, Common	17	4443	5.5	500	Mature	6.0	Normal	Fair	B	2	20+	Pollarded @ 12m Included bark in main stem unions Multistem from 3m Remote survey only
6	Lime, Common	8	2322	3.5	100	Young	1.2	Normal	Fair	C	2	>40	Basal cavity Remote survey only
7	Lime, Common	17	2423	3.0	450	Early Mature	5.4	Normal	Fair	B	2	20+	Pollarded @ 12m Included bark in branch unions Sprouting along lower stem Remote survey only

Landmark Trees

Site: 36 Reddington Road

Date: 17 April 2014

Appendix 1

BS5837 Tree Constraints Survey Schedule

Landmark Trees Ltd

020 7851 4544

Surveyor(s): Adam Hollis

Ref: ARC/36RDR/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
G8	Mixed Broadleaves	6	2	3.0	100	Young	1.2	Normal	Fair	C	2	>40	
9	Lime, Common	17	5767	5.0	750	Mature	9.0	Normal	Fair	A	2	>40	Multistem from 5m Included bark in branch unions Ivy clad Remote survey only
10	Cherry, Japanese	3	3122	1.5	150	Semi-mature	1.8	Moderate	Fair	C	2	>40	Garden ornamental Canker (early stage): shot holes

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 / ClrBs - Sever ivy / clear base and re-inspect base / stem for concealed defects.

Landmark Trees

Site: 36 Reddington Road
Date: 17 April 2014

Surveyor(s): Adam Hollis
Ref: ARC/36RDR/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
5	Lime, Common	B	17	5.5	4443	CL 8m I.e remove epicormic shoots overhanging property	Pollarded @ 12m Included bark in main stem unions Multistem from 3m Remote survey only Recommended husbandry 2
7	Lime, Common	B	17	3.0	2423	CL 8m I.e remove epicormic shoots overhanging property	Pollarded @ 12m Included bark in branch unions Sprouting along lower stem Remote survey only Recommended husbandry 2
G8	Mixed Broadleaves	C	6	3.0	2	CL 6m I.e remove side shoots overhanging property	Recommended husbandry 2
9	Lime, Common	A	17	5.0	5767	CL 6m I.e remove epicormic shoots overhanging property	Multistem from 5m Included bark in branch unions Ivy clad Remote survey only Recommended husbandry 2

APPENDIX 3

RECOMMENDED TREE WORKS TO FACILITATE DEVELOPMENT (See Table 1)

Notes for Guidance:

RP - Pre-emptive root pruning of foundation encroachments under arboricultural supervision.
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 / ClrBs - Sever ivy / clear base and re-inspect base / stem for concealed defects.

Landmark Trees

Site: 36 Redington Road
Date: 26th May 2015

Surveyor(s): Adam Hollis
Ref: ARC/36RDR/AIA

Appendix 3

Recommended Tree Works To Facilitate Development

Hide irrelevant
Show All Trees

Tree No.	English Name	B.S. Cat	Height	Ground Clearance	Crown Spread	Recommended Works	Comments/ Reasons
5	Lime, Common	B	17	5.5	4443	CL As per recommended husbandry works	Pollarded @ 12m Included bark in main stem unions Multistem from 3m Remote survey only To facilitate development/recommended husbandry
7	Lime, Common	B	17	3.0	2423	CL As per recommended husbandry works	Pollarded @ 12m Included bark in branch unions Sprouting along lower stem Remote survey only To facilitate development/recommended husbandry
9	Lime, Common	A	17	5.0	5767	CL As per recommended husbandry works	Multistem from 5m Included bark in branch unions Ivy clad Remote survey only To facilitate development/recommended husbandry
10	Cherry, Japanese	C	3	1.5	3122	Fell	Garden ornamental Canker (early stage): shot holes To facilitate development

APPENDIX 4: TREE SELECTION FOR CONSTRICTED LOCATIONS

Table 4a: Rosaceous Tree Species for Constricted Planting Locations

Common Name	Species	Selected Form
Hawthorn	Crataegusmonogyna	Stricta
Cockspur	Crataegusprunifolia	Splendens
Cherry	Prunus x hillieri	Spire
Bird cherry	Prunuspadus	Albertii
Rowan / Mountain ash	Sorbusaucuparia	Cardinal Royal
Rowan / Mountain ash	Sorbusaucuparia	Rossica Major
Rowan / Mountain ash	Sorbusaucuparia	Sheerwater Seedling
Swedish whitebeam	Sorbusintermedia	Brouwers
B.whitebeam	Sorbus x thuringiaca	Fastigiata

Table 4b: Specimen Tree Species for Constricted Planting Locations

Common Name	Species	Selected Form
Chinese red bark birch	Betulaalbosinensis	Fascination
Swedish birch	Betulapendula	Dalecarlica
Hornbeam	Carpinusbetulus	FastigiataFransFountaine
Turkish Hazel	Coryluscolurna	
Maidenhair tree	Gingko biloba	
Pride of India	Koelreuteriapaniculata	Fastigiata
European larch	Larix decidua	Sheerwater Seedling
Tulip tree	Liriodendron tulipfera	Fastigiata

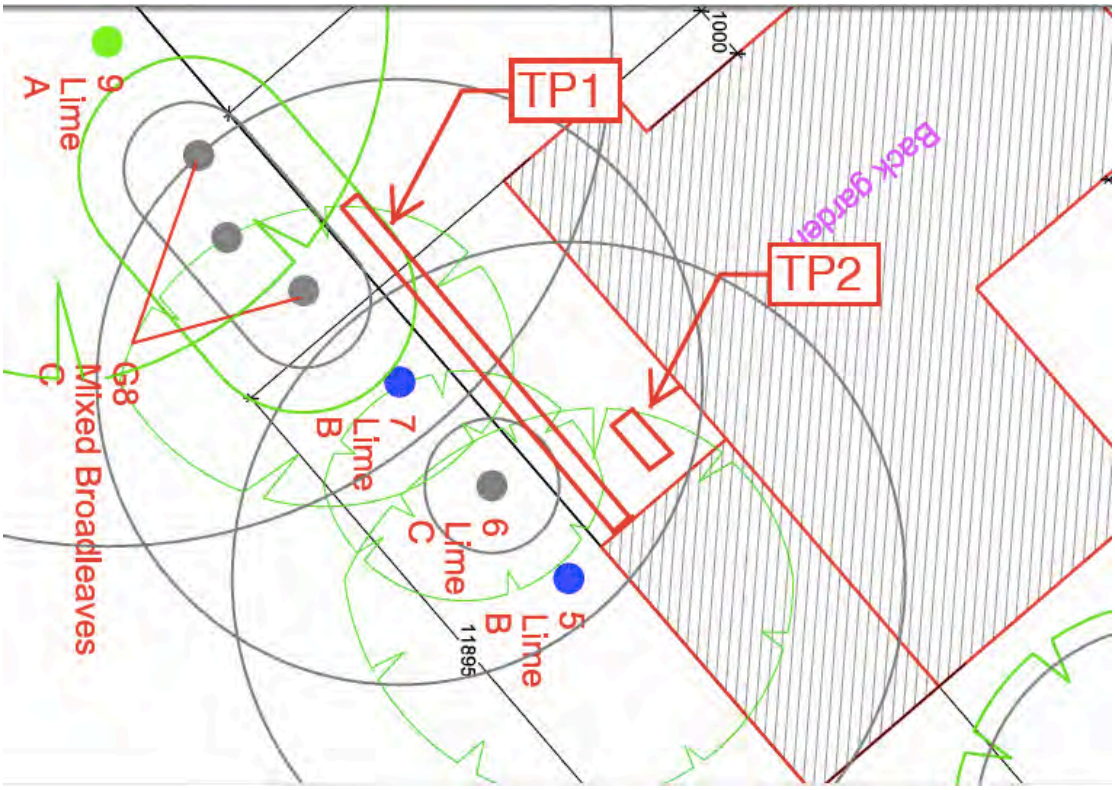
APPENDIX 5

TRIAL PIT RESULTS

A5.0 TRIAL PIT RESULTS

A5.1 Trial Pit Method Statement

A5.1.1	The method statement for the excavations of the main trench is provided at the end of this appendix. An extract from the location plan is provided below:



Extract A5.1 Location of the Trial Pit 1

A5.2 Trial Pit Results

A5.2.1	The trial pit results are shown in table A5.2 below and illustrated in the photographs. Where significant roots were found, the basement outline has been amended.

TABLE A5.2 Trial Pit Results

Trial Pit	Results
TP1	Roots over 50mm encountered towards the north-eastern end of the trial pit. Basement outline amended accordingly.
TP2	Two remaining significant roots encountered; both below 50mm.

Photographs A5.1 and A5.2 illustrating results of Trial Pit 1 and amendment to basement line in red

Photograph A5.3: Results from Trial Pit 2

36 Reddington Road Method Statement:

Trial pits excavation within RPA

i. It is recommended the LPA be notified of intended works in view of Conservation Area /TPO designation. A formal 6-week application should not be required, just notification of intent and ideally an email (consensual) response from the council. Note: any excavations should be carried out with the health of the trees in mind, due to their protected status.

ii. Location of trenches to correspond with LT plan (as emailed 28/5/14): to be excavated within the existing building footprint.

iii. Trial trenches to be of minimum 1.5m length, 1m depth and minimal width for ease of dig. Neither roots >25mm in diameter or thick mats of finer roots should be damaged in these operations. Where there is any uncertainty, the contractor should liaise with Landmark Trees (LT), ideally through use of mobile phone photographs and site visits as necessary.

iv. Paving / flooring and sub-base can be removed by manual (power) tools only. Soil to be loosened by airspade, and / or carefully removed by hand spade, and through careful working by operatives briefed on this statement, with clear understanding of English, the brief and requisite precautions. Contractor or supervising agent must have access to mobile phone with photo-relay facility. Plant and operatives to keep off soft landscape / keep to paving or boarded ground protection (in case of e.g. flowerbed).

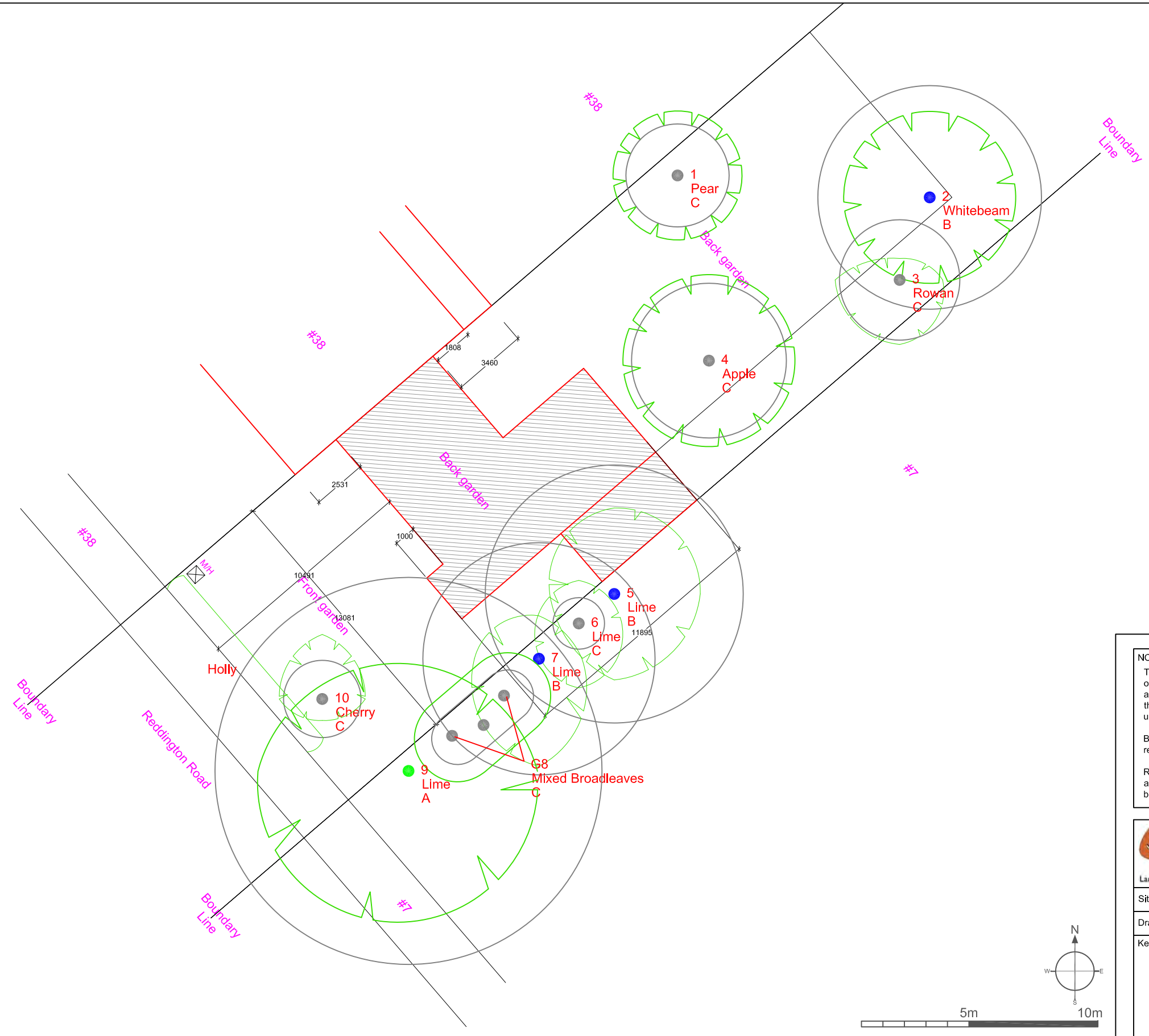
v. Trench to be left open for LPA inspection (as necessary), following photographing (and consultant inspection of any potentially significant roots). Roots exposed by such operations larger than 25mm diameter should be wrapped in damp, clean hessian sacking to prevent desiccation and exposure to extreme temperature fluctuations.

vi. Before backfilling (after LPA inspection), any hessian wrapping should be removed and any preserved roots, surrounded with loose granular fill, before the remaining fill is added. The material should be free from contaminants injurious to plant health.

Adam Hollis
Landmark Trees
23/6/14

APPENDIX 6

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).

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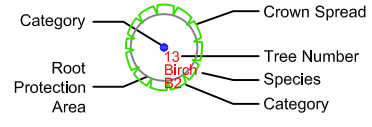
Site: 36 Reddington Road	1-200@A3
Drawing Title: Tree Constraints Plan	April 2014

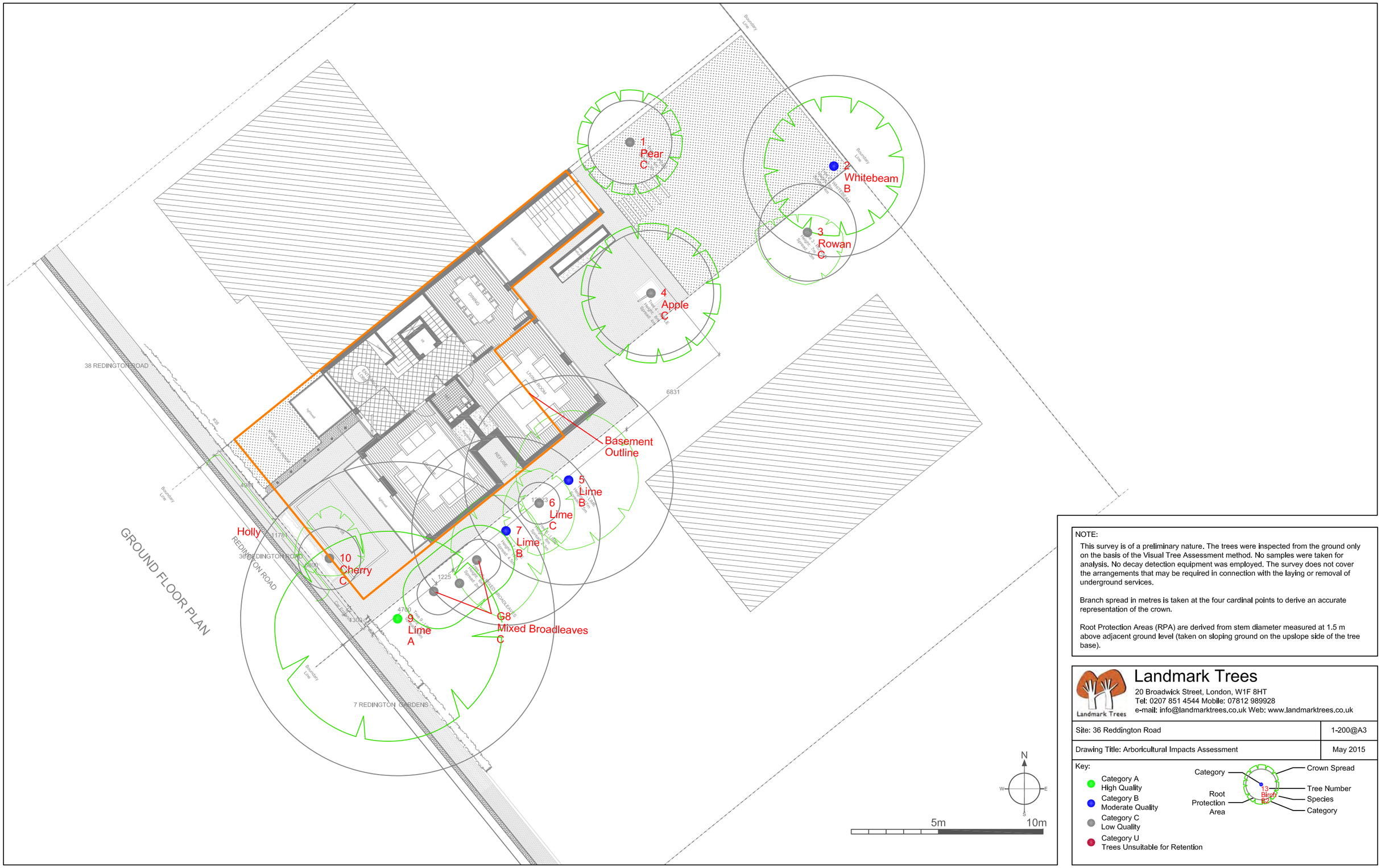
Key:

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



APPENDIX 6

ARBORICULTURAL IMPACT ASSESSMENT 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.

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Site: 36 Reddington Road	1-200@A3
Drawing Title: Arboricultural Impacts Assessment	May 2015

Key:

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