Proposals for Mixed Use Regeneration

140-146 CAMDEN STREET
LONDON NW1 9PF

Planning Report

Arboricultural Impact Assessment Report

Prepared by:
Landmark Trees

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December 2014

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ARBORICULTURAL IMPACT ASSESSMENT REPORT:

140-146 Camden Street

London

NW1 9PF

REPORT PREPARED FOR:

Chassay + Last Architects

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MSc ARB MICFor FArbor A MRICS C Env

Ref: CHL/CMD/AIA/03a

Date: 8th December 2014

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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:	Chassay + Last Architects	**Case Ref:**	CHL/CMD/AIA/03a
Local Authority:	LB Camden	**Date:**	08/12/14
Site Address: 140-146 Camden Street, London NW1 9PF			
Proposal: Redevelopment of the existing property with several floors of flats above the height of the existing building, and expansion of the basement across the existing footprint.			

Report Checklist	**Y/N**		**Y/N**
Arboricultural constraints on site	Y	Trees removed	N
Tree Survey	Y	Topographical Survey	Y
BS5837 Report	Y	Conservation Area	Y
Tree Preservation Orders	N		
Tree Protection Plan:	N/a	(include In future method statement)	
Tree Constraints Plan:	Y		
Arboricultural Impact Assessment:	Y		

Site Layout				
Site Visit	Y	Date: 8/11/13	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 on plans:		N/a	On or off-site trees indirectly affected by development	Y

Trees with the potential to be affected

Street trees T1-4 may be vulnerable to demolition impacts. Impacts from proposed parking/loading areas and alterations to pavement to be undertaken manually with use of existing sub-bases and porous surfacing. Care to be taken not to disturb roots that may be lying beneath the existing sub-base. Potential minor canopy-building juxtaposition issues, but trees T1-3 (maples) are in cyclical management (pollarding) and T4 is a newly planted (Juneberry) tree

Comments

T1-3 are fairly unsightly pollards: potential to discuss replacement with LB camden

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
BS5837: 2012 'Trees in relation to construction – recommendations'

1. SUMMARY

1.1 This report comprises an arboricultural impact assessment of the revised proposals for 140-146 Camden, Street, London NW1 9PF, reviewing any conflicts between the proposals and material tree constraints identified in our survey.

1.2 There are 4 trees surveyed on or around the site, of which all 4 are 'C' category *(Moderate Quality), comprising Norway maple (T1-3) and Juneberry (T4) street trees. In theory, only moderate quality trees and above are a significant material constraint on development. However, the trees belong to the council and stand within the local conservation area. It is likely therefore, that the council will consider them a constraint on development.

1.3 There is evidence of subsidence damage to the existing property. Trial investigations have implicated the trees in the damage, but the investigations have not been thorough enough to satisfy the council requirements for removal. New proposals will hopefully provide the opportunity for the construction of more robust foundations to facilitate the peaceful coexistence of trees and buildings. We recommend exploring the possibility of replacing the trees on aesthetic grounds, but not as a requirement of planning. NB the trees have not grown at all in size since our survey in May 2011.

1.3 The principal primary impacts are from proposed parking/loading areas and alterations to the existing entrance/pavement areas. To avoid damage to any roots that may be lying below the existing sub-bases, it is important that any works within the theoretical RPA's are undertaken manually with use of existing sub-bases and porous surfacing. No other primary impacts are anticipated, given that the proposals are for redevelopment of the existing footprint. Our desktop / conventional RPA's are shown overlapping the existing build. However, it is unlikely that they do so significantly, and if they did, they would not be welcome below the existing building, given the site history. The proposal to make the building taller will have no specific impact on the trees, which are already shaded by the existing building (and do not overhang it).

1.4 No significant secondary impacts are anticipated either: the subsidence issue can presumably be resolved with suitable foundation design and although the trees stand within 2-3m of the northern elevation, they have now been pollarded to 1.5m radii and put into cyclical management. Therefore, the new proposals cannot create pressure to prune trees that are already under cyclical management. However, it would be prudent to design the layout and window position around the tree locations to avoid the most immediate obstructions.

1.5 Thus, with suitable mitigation and supervision the scheme is viable.

* British Standards Institute. 2012. Trees in Relation to Construction BS 5837: 2012 HMSO, London

2. INTRODUCTION

2.1 Terms of reference

2.1.1 LANDMARK TREES were asked by Chassay + Last Architects, to undertake an arboricultural planning survey of the site: 140-146 Camden, Street, London NW1 9PF. The report is to accompany a planning application for the revised proposals.

2.1.2 The current revisions are as follows:

- An increase in employment floorspace.
- The commercial floorspace now covers the lower ground and ground floor level and does not include a mezzanine level.
- Improvement in the quality of employment space:
- No mezzanines
- Increased floor to floor height to 3550 mm F/F from 2650 mm.
- More daylight provisions to the lower ground floor by the introduction of light wells and voids
- The number of residential units has decreased from 62 to 53.
- The affordable provision has decreased from 14 to 12 units. The affordable housing provision is now 23% of total units and proposes 59% social rented and 41% intermediate (shared ownership).
- Block C has been reduced from 9 to 8 storeys (53.35m).
- Block B remains at 5 storeys. There is a slight decrease in height by 200mm.
- Combining Block C + D into one core with the main entrance off Camden street. This Core would serve only private residential units.
- Removal of the stairs in the internal courtyard
- Introduction of large balconies onto the Canal Elevation
- Alteration of the Canal Elevation at lower ground and ground floors to reflect the new commercial spaces behind the green terracotta wall cladding retained.
- The disabled space, loading bay and electrical car space remains the same.
- The review of the number of cycle spaces.

2.1.3 This report will assess the impact of the revised proposals 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 20 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 – SC2-Existing Plans A2-TCP (1) Proposed ground floor – CSC3 - Plans - 141128 MB

2.3 Scope of survey

2.3.1	As Landmark Trees' arboricultural consultant, I surveyed the trees on site on 8th November 2013, recording relevant qualitative data in order to assess both their suitability for retention and their constraints upon the site, in accordance with British Standard 5837:2005 Trees in relation to construction – Recommendations [BS5837:2005].
2.3.2	Our survey of the trees, the soils and any other factors, is of a preliminary nature. The trees were inspected 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). I 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 4.
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 can then be overlain in turn onto the client's proposals to create an Arboricultural Impact Assessment Plan in Appendix 5. The proposals have yet to be finalised, but will essentially observe the existing footprint. General observations and discussion follow, below.

3.0 OBSERVATIONS

3.1 Site description

3.1.1	The property is a commercial premises on the corners of Bonny and Camden Street, occupied by four tenants. The building is of traditional construction with brick walls surmounted by a flat felt roof. The Grand Union Canal runs to the rear of the building.
3.1.2	The site is relatively level.
3.1.3	In terms of the Soil Survey of England and Wales, the soil lies within the unsurveyed area of Greater London where the soils are generally, highly shrinkable clay; e.g. slowly permeable seasonally waterlogged fine loam over clay. Such 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. There is evidence of subsidence damage to the existing property. Trial investigations have implicated the trees in the damage, but the investigations have not been thorough enough to satisfy the council requirements for removal.
3.1.4	A structural engineer may be able to advise further on the local geology and its implications for development.

3.2 Subject trees

3.2.1	There are 4 trees surveyed on or around the site, of which all 4 are 'C' category *(Moderate Quality), comprising Norway maple (T1-3) and Juneberry (T4) street trees. The maples variably exhibit surface wounding from vehicular traffic, but show no signs of significant decay or disease. NB the trees have not grown at all in size since our survey in May 2011

3.3 Planning Status

3.3.1	We are not aware of the existence of any Tree Preservation Orders and it is unusual to encounter them on street trees, but the street is within a Conservation Area, which will affect trees on the site. It is a criminal offence to disturb or damage 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 generally 12-x stem diameter at 1.5m above ground level, except where basal diameters are used in the case of multi-stemmed trees, and the radius is set at 10x the diameter.

4.1.2 Circular RPA's are appropriate for individual specimen trees grown freely such as these, but where there is ground disturbance, the morphology of the RPA can be modified to an alternative polygon, and where appropriate shifted 20% in the direction of undisturbed ground, as shown in the diagram below. In less fanciful terms, one needs to remember that RPA's are area-based and not linear. **No modifications have been made in this instance, though arguably they could be both removed from under the building and reduced to reflect the corresponding reduction in canopy.**

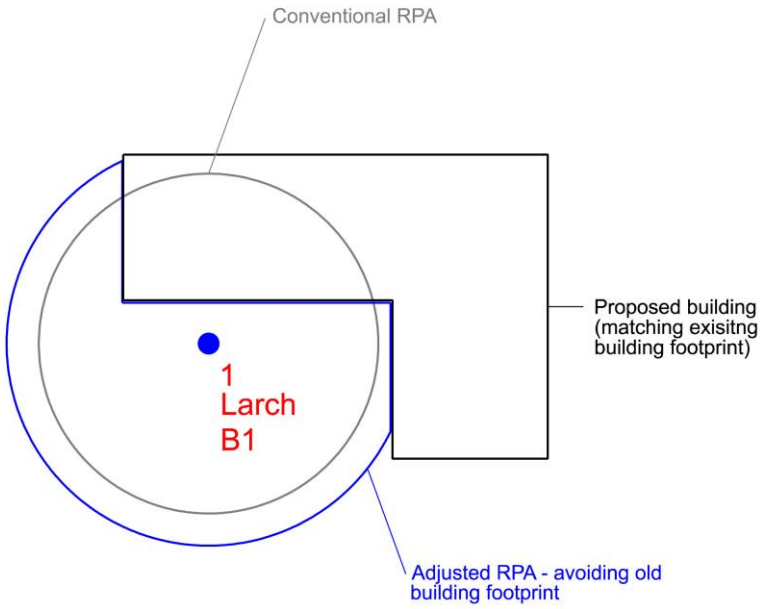

Figure 2 – Generic BS 5837 RPA Adjustments

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 the moderate quality trees are a material constraint on development. However, the trees belong to the council and stand within the local conservation area. It is likely therefore that the council will consider them a constraint on development and the proposals will have to work around them. We recommend exploring the possibility of replacing the trees on aesthetic grounds, but not as a requirement of planning. NB the trees have not grown at all in size.

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.

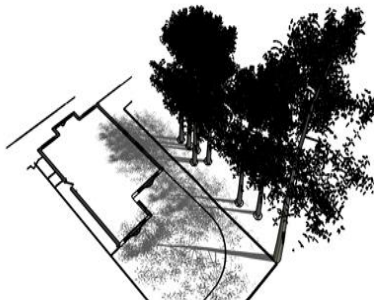

Figure 3 –
Generic Shading Constraints

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.

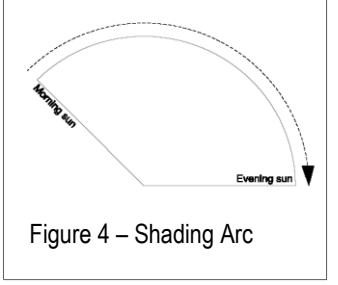

Figure 4 – Shading Arc

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 The principal secondary constraint would be the juxtaposition of the building and tree canopies. However, the pollarding and its cyclical repetition should considerably reduce nuisance to a well considered layout.

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 for Retained Trees

Hide irrelevant | Show All Trees

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

Ref: CHL/CMD/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
C	1	Maple, Norway	Building Construction within RPA New loading bay	11 m^2 17.76 %	Early Mature	Moderate	Moderate	Low	N/A	Pre-emptive root pruning No-dig construction with maintenance of existing pruning cycle
C	2	Maple, Norway	Building Construction within RPA New parking bay	1.5 m^2 4.55 %	Early Mature	Moderate	Moderate	Low	N/A	Pre-emptive root pruning No-dig construction with maintenance of existing pruning cycle
C	3	Maple, Norway	Building Construction within RPA New parking bay	14 m^2 16.73 %	Early Mature	Moderate	Moderate	Low	N/A	Pre-emptive root pruning No-dig construction with maintenance of existing pruning cycle

6.0 DISCUSSION

6.1 Rating of Primary Impacts

6.1.1 The principal primary impacts are from proposed parking/loading areas and alterations to the existing entrance/pavement areas. To avoid damage to any roots that may be lying below the existing sub-bases, it is important that any works within the theoretical RPA's are undertaken manually with use of existing sub-bases and porous surfacing. No other primary impacts are anticipated, given that the proposals are for redevelopment of the existing footprint. Our desktop / conventional RPA's are shown overlapping the existing build. However, it is unlikely that they do so significantly, and if they did, they would not be welcome below the existing building, given the site history. The proposal to make the building taller will have no specific impact on the trees, which are already shaded by the existing building (and do not overhang it)..

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*.

6.2 Rating of Secondary impacts

6.2.1 No significant secondary impacts are anticipated either: the subsidence issue will presumably be reduced with the extension of the basement with suitable foundation design and although the trees stand within 2-3m of the northern elevation, they have now been pollarded to 1.5m radii and put into cyclical management. Therefore, the new proposals cannot create pressure to prune trees that are already under cyclical management. However, it would be prudent to design the layout and window position around the tree locations to avoid the most immediate obstructions.

6.3 Mitigation of Impacts

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

6.3.2 The 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.

6.3.3 It would be prudent to undertake trial pits to determine the level of root penetration onto the site, though such penetration should not constrain development unduly. Naturally, the layout should be designed to minimise nuisance juxtaposition with the canopies between pruning.

7.0 CONCLUSION

7.1 The potential impacts of the built development are all relatively low in terms of overall RPA percentage and even then, they are largely theoretical. Those that relate to the alterations to the existing hardstandings can be mitigated with careful removal and use of the existing sub-bases. The proposals could benefit the trees by ensuring that there are porous surfaces and better soil relations. However, overall it would be preferable to replace these trees with more suitable and attractive trees (subject to agreement with the Borough Council).

7.2 The full potential of the impacts can be largely mitigated through design. 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 fair 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.

8.0 RECOMMENDATIONS

8.1 Specific Recommendations

8.1.1	Tree surgery recommendations are found in Appendix 2 to this report, with a selection of columnar tree species cultivars for constricted sites provided in Appendix 3. Any tree removals recommended within this report should only be carried out with local authority consent.
8.1.2	Demolition (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 (pull back method) and by consultant supervision as necessary (trial pits). These method statements can be provided as part of the discharge of conditions.

8.2 General Recommendations

8.2.1	Any trees which are in close proximity to buildings proposed for demolishing should be protected with a Tree Protection Barrier (TPB). This TPB should comprise individual boxed hoarding. 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 BS5837:2005 and 'The Principles of Arboricultural Practice: Note 1, Driveways Close to Trees, AAIS 1996 [APN1]'.

8.2.6 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]'.

8.2.7 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.

8.2.8 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.

8.2.9 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 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.

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BS5837 Tree Constraints Survey Schedule

Site: 140 Camden Street, London NW1 9PF

Surveyor(s): Adam Hollis

Date: 8th November 2013

Ref: CHL/CMD/AIA

Tree No.	English Name	Height	Crown Spread	Ground Clearance	Age Class	Stem Diameter	Protection Multiplier	Protection Radius	Growth Vitality	Structural Condition	Landscape Contribution	B.S. Cat	Sub Cat	Useful Life	Observations
1	Maple, Norway	9	2	6	Early Mature	370	12	4.4	Moderate	Fair	Low	C	2	20-40	Pollarded street tree Entry wound on trunk @5m abg N
2	Maple, Norway	8.5	2121	6	Early Mature	270	12	3.2	Moderate	Fair	Low	C	2	20-40	Pollarded street tree
3	Maple, Norway	11	3233	6	Early Mature	430	12	5.2	Moderate	Fair	Low	C	2	10-20	Pollarded street tree Entry wound on trunk @5m abg N & 2m abg S
4	Juneberry	5	1	1.5	Young	50	12	0.6	Normal	Good	Low	C	2	>40	A tree with insignificant defects

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.

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Recommended Tree Works

Hide irrelevant | Show All Trees

Site: 140 Camden Street, London NW1 9PF

Surveyor(s): Adam Hollis

Date: 8th November 2013

Ref: CHL/CMD/AIA

Tree No.	English Name	Height	Stem Diameter	Crown Spread	Recommended Works	Comments/ Reasons
1	Maple, Norway	9	370	2	POL Maintain regular pruning cycle (subject to site investigations)	Pollarded street tree Entry wound on trunk @5m abg N Advisable for good arboricultural practice
2	Maple, Norway	8.5	270	2121	POL Maintain regular pruning cycle (subject to site investigations)	Pollarded street tree Advisable for good arboricultural practice
3	Maple, Norway	11	430	3233	POL Maintain regular pruning cycle (subject to site investigations)	Pollarded street tree Entry wound on trunk @5m abg N & 2m abg S Advisable for good arboricultural practice

APPENDIX 3: TREE SELECTION FOR CONSTRICTED SITES

Table: A3.1 Rosaceous Tree Species for Constricted Planting Sites

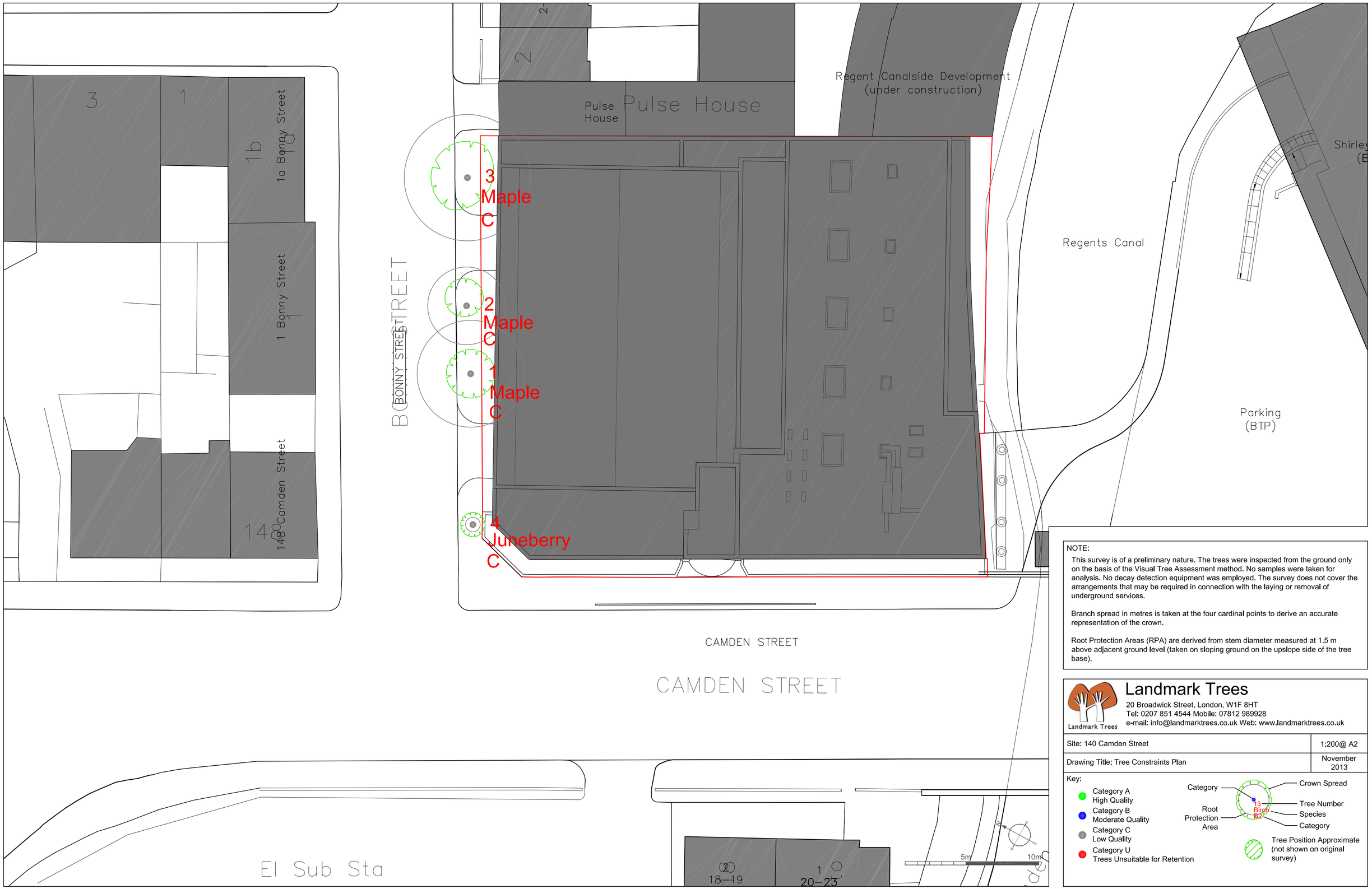
Common Name	Species	Selected Form
Hawthorn	Crataegus monogyna	Stricta
Cockspur	Crataegus prunifolia	Splendens
Cherry	Prunus x hillieri	Spire
Bird cherry	Prunus padus	Albertii
Rowan / Mountain ash	Sorbus aucuparia	Cardinal Royal
Rowan / Mountain ash	Sorbus aucuparia	Rossica Major
Rowan / Mountain ash	Sorbus aucuparia	Sheerwater Seedling
Swedish whitebeam	Sorbus intermedia	Brouwers
Bastard whitebeam	Sorbus x thuringiaca	Fastigiata

Table: A3.2 Specimen Tree Species for Constricted Planting Sites

Common Name	Species	Selected Form
Chinese red bark birch	Betula albosinensis	Fascination
Swedish birch	Betula pendula	Dalecarlica
Hornbeam	Carpinus betulus	Fastigiata Frans Fountaine
Turkish Hazel	Corylus colurna	
Maidenhair tree	Gingko biloba	
Pride of India	Koelreuteria paniculata	Fastigiata
European larch	Larix decidua	Sheerwater Seedling
Tulip tree	Liriodendron tulipfera	Fastigiata

APPENDIX 4

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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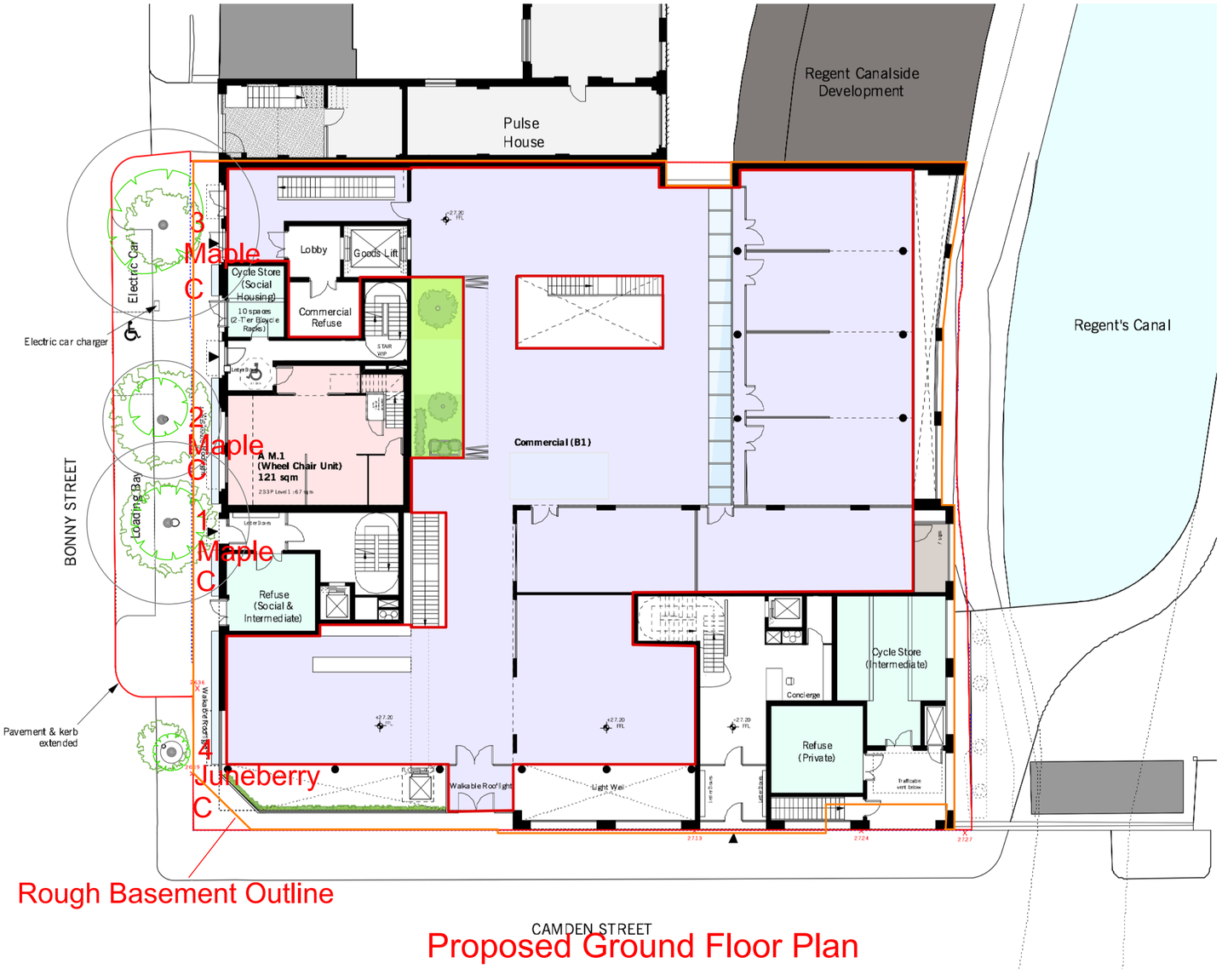
Site: 140 Camden Street	1:200@ A2
Drawing Title: Tree Constraints Plan	November 2013

Key:

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

APPENDIX 5

ARBORICULTURAL IMPACT ASSESSMENT PLAN



Proposed Ground Floor Plan

5m 10m

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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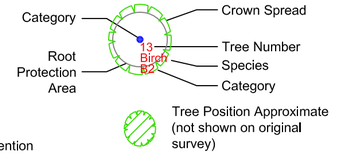
Site: 140 Camden Street	1:200@ A2
Drawing Title: Arboricultural Impact Assessment Plan	December 2014

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)