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14 Endsleigh Street

Arboricultural Impact Assessment Report

Overbury

Project number: XXXXX

August 2020

Quality information

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Revision History

Revision	Revision date	Details	Authorized	Name	Position
1	27.08.2020	Updated to address review comments	AK	Adam King	Associate Director

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1. Introduction

1.1 Background

AECOM has been instructed by Overbury (the Client) to carry out a Tree Survey to BS5837:2012 Trees in relation to design, demolition and construction – Recommendations (BS5837) and an Arboricultural Impact Assessment to identify the likely direct and indirect impacts of the Proposed Development on trees and vice versa in support of a planning application to renovate the property and courtyard garden.

1.2 Trees and the Planning Process

The National Planning Policy Framework (NPPF) seeks to ensure that new development is sustainable and underlines the importance of Green Infrastructure, of which trees form an integral part. This encompasses a recognition of the importance of trees in relation to the management of air, soil and water quality along with other associated ecosystem services and climate change adaption. The NPPF also seeks to achieve the protection and enhancement of landscapes and a net gain in biodiversity. Finally it specifically identifies veteran and ancient trees and woodland as a highly valuable and irreplaceable habitat.

Local Planning Authorities (LPA) in the UK have a statutory duty to consider both the protection and planting of trees when considering planning applications. The potential impact of development on all trees (including those not protected by a Tree Preservation Order or other statutory designation) is therefore a material consideration.

'*BS5837:2012 Trees in relation to design demolition and construction – Recommendations (BS5837)*' provides a framework which sets out how trees should be considered in this context and also explicitly applies to development where planning consent is not required.

BS5837 recommends that a tree survey is undertaken to identify the quality and benefits of trees and the spatial constraints associated with them. This is then used to produce a Tree Constraints Plan showing the above and below ground constraints associated with trees. This drawing is used to inform the design process and to allow the retention of good quality trees where appropriate.

An Arboricultural Impact Assessment is then developed to identify the likely direct and indirect impacts of the Proposed Development, and a Tree Protection Plan is prepared to identify trees to be removed or retained and to illustrate how retained trees are to be protected. An Arboricultural Method Statement is often required as a condition of planning consent to detail how sensitive operations are to be achieved in close proximity to retained trees. These elements are the minimum normally required for a planning application and are intended to ensure both a sustainable and harmonious relationship between trees and new development.

1.2.1 Local Policy Context

The London Plan[1] (The Spatial Development Strategy for London Consolidated with Alterations Since 2011) (March 2016), Policy 7.2.1 recognises the value of trees and woodlands and recommends that in relation to planning decisions 'existing trees of value should be retained and any loss as the result of development should be replaced following the principle of 'right place, right tree'. Wherever appropriate, the planting of additional trees should be included in new developments, particularly large-canopied species'.

'**The draft New London Plan** ('NLP') was published on 27 November 2017. Consultation took place on the draft document up until 02 March 2018. The Mayor's Minor Suggested Changes to the London Plan were published on 13 August 2018. The Plan then went through an Examination in Public (EiP), with Consolidated Suggested Changes published in July 2019. The draft NLP has been issued to the Secretary of State and adoption is anticipated in 2020.

Policy G7 Trees and Woodlands, recognises the importance of protecting trees and woodland and the importance of planting trees in appropriate locations. It also identifies that new Development Proposals should retain trees of quality (Category A and B) and that removal of trees of this quality must be essential to the development. Where trees of quality are to be removed there must be adequate replacement based on the

[1] https://www.london.gov.uk/sites/default/files/the_london_plan_2016_jan_2017_fix.pdf

existing value of the benefits of the trees removed which could be determined by a CAVAT or i-tree evaluation (or other suitable methods). Regardless of tree removals the planting of additional trees is generally expected with new developments, particularly larger canopied trees due to providing more benefits.

The **London Borough of Camden (LB Camden) Local Plan**[2] includes a specific policy on biodiversity with reference to trees and vegetation. It states:

Policy A3: Trees and vegetation

The Council will protect, and seek to secure additional, trees and vegetation.

We will:

j. resist the loss of trees and vegetation of significant amenity, historic, cultural or ecological value including proposals which may threaten the continued wellbeing of such trees and vegetation;

k. require trees and vegetation which are to be retained to be satisfactorily protected during the demolition and construction phase of development in line with BS5837:2012 'Trees in relation to Design, Demolition and Construction' and positively integrated as part of the site layout;

l. expect replacement trees or vegetation to be provided where the loss of significant trees or vegetation or harm to the wellbeing of these trees and vegetation has been justified in the context of the proposed development;

m. expect developments to incorporate additional trees and vegetation wherever possible.

LB Camden have also published **Camden Planning Guidance - Trees** (March 2019)[3] which sets out how the council expects trees to be considered during the development process.

The following extract sets out the key points of the document and some important points in relation to tree quality and value and how this should be taken into account during the design process.

- *Camden's trees and canopy cover have valuable amenity and are an integral*

asset to the borough's green environment and quality of life.

- *Using our planning powers and British Standard BS5837:2012 the Council will*

aim to preserve existing tree and canopy coverage where possible as well as

increase and improve tree coverage in the design of new developments and

through planning contributions.

With all proposals, we will expect:

- *A survey of existing trees (and woody vegetation) to be undertaken prior to the developer deciding on a design of a scheme;*
- *Retention and integration of existing significant trees in the design of a scheme.*
- *New trees to sustain or increase canopy coverage and visual amenity, applying a "right place, right tree" approach;*
- *Other planting to be provided to contribute to Camden's green infrastructure, where appropriate.*

2.32 The design of the scheme should seek to retain Category A and B trees and Category C trees should be considered for retention where they would not impose a significant restraint on development. For full definitions of these categories, please refer to BS 5837.

2.33 There is often a misconception that Category C trees, being those of lower quality and value, are dispensable. However, in certain situations the Council may expect certain Category C trees to be retained until new planting has become established.

[2] https://www.camden.gov.uk/documents/20142/3912524/Local+Plan+Low+Res.pdf/54bd0f8c-c737-b10d-b140-756e8beeae95
[3] https://www.camden.gov.uk/documents/20142/4823269/Trees+CPG+March+2019.pdf/985e3c70-d9a5-6ded-a5a3-3c84616f254d

2.34 Normally, the retention of existing mature trees and vegetation can make an important contribution to the sustainability of a project. For example by reducing the impacts and energy demand associated with the provision of new planting, such as in their transportation and the irrigation required. We will also seek the retention of landscape features and habitats which are important to the character of the site or local townscape.

2.35 Inclusion of trees on neighbouring land should be guided by whether they would influence the development site itself and whether the trees are an important part of the local landscape character. It will always include trees where the crown or RPA (root protection area) encroach upon the application site.

2.36 Existing trees within a development site should be assessed using the Capital Asset Value for Amenity Trees (CAVAT).

The resulting value calculated for each tree should accompany the Tree Survey.

1.3 Methodology

The tree survey has been based on ordnance survey base mapping and all tree features have been plotted indicatively with reference to Site features, off set measurements provided by the client and publicly available aerial photography. As such all positions for these trees must be considered to be indicative only and the relative distances of features must be measured out on Site as required.

The survey was otherwise conducted in accordance with the requirements of *BS5837.*

The initial fieldwork was undertaken on 18th August 2020**,** during which dimensional data and observational information were collected. A diameter tape measure was used to measure stem diameters where feasible.

The fieldwork informing this report has comprised a preliminary, non-intrusive, visual survey undertaken from ground level with the specific intention of evaluating the quality and benefits of trees on Site.

Where further inspection is deemed appropriate to ascertain the condition of the tree or other arboreal features, this has been identified within the preliminary management recommendations. Average dimensions or dimensional ranges have occasionally been used, where appropriate, to best describe features.

The Root Protection Area (RPA) is the notional extent of what is considered to be the key rooting area for tree health and function. This is generally depicted as a circle but can be amended to a polygon with an equivalent area in accordance with Section 4.6.2 of BS5837 where the RPA is likely to have developed asymmetrically. The RPA of all surveyed trees is depicted as a circle and no RPAs have been amended.

A Tree Constraints Plan showing the position of trees and the spatial constraints associated with them is included as Appendix A of this report, which corresponds with the Tree Survey Schedule presented in Appendix B.

The tree categorisation process recommended by BS5837:2012 is summarised in the table below and corresponds with the tree canopy outline shown on the Tree Constraints Plan (Appendix A) and the information in the Tree Survey Schedule (Appendix B).

Table 1: BS5837:2012 Tree Categorisation process

Category	Definition
A	High quality, minimum of 40+ years remaining contribution
B	Moderate quality, minimum of 20+ years remaining contribution
C	Low quality, minimum of 10+ years remaining contribution
U	Unsuitable for retention, <10 years remaining contribution
1	Arboricultural value
2	Landscape value
3	Conservation or cultural value

2. General Arboricultural Principles

2.1 General Principles

Trees are dynamic living organisms which provide essential benefits to society and the wider environment. Any Proposed Development with the potential to impact on trees must take into consideration the value of trees on site; the impact of any proposed activity along with any potential future conflicts on the site. Suitable measures to safeguard retained trees or mitigate the loss of trees (to be removed) will need to be fully considered and may be subject to a condition of planning consent.

Tree branches and roots frequently grow across site boundaries and off site trees can pose a significant constraint, and should be carefully considered when assessing the developable space within a site.

2.2 Below Ground Constraints

Below ground tree roots and the soil environment in which they grow need to be protected if the tree is to be retained. Trees grow in association with fungi and other soil organisms which are of key importance to tree health. Roots are essential for anchorage, the uptake of water and nutrients, and the storage of energy (carbohydrates) for the future growth and function of the tree.

Roots can be damaged by physical severance or wounding (e.g. following excavation of the soil) which can lead to the development of decay and a decline in vitality and/or instability. Raising the soil level can bury tree roots at a depth where suitable conditions for growth are less available. Toxic materials discharged into the soil (such as cement based aggregates, fuel and chemicals) can lead to root death and dysfunction. Soils can be compacted to levels inhospitable to tree growth with even a single pass of machinery, regular pedestrian traffic or the storage of plant and materials. Relieving compaction can be problematic and may require costly remedial works. Changes in drainage/water levels can also have significant long-term impacts for tree health.

The effects of these incursions may take many years to manifest, with a resulting decline in amenity value and potentially the death or failure of the tree. It should be noted that older trees are particularly sensitive to damage and changes in conditions.

The Root Protection Area (RPA) is a notional area considered to be the minimum zone that must be protected to avoid any adverse impacts on retained trees. This area is deemed to be particularly important for tree stability, growth, function and health. However, roots may extend far greater distances, with the distribution of the root system relating directly to the availability of suitable conditions for growth (namely oxygen, water and nutrients). It is generally accepted that tree roots are predominantly located in the upper 1000mm of soil; however, roots may develop at deeper levels where conditions allow.

RPAs are calculated as per BS5837: 2012 Annexe C, D and Section 4.6 in the BS 5837 2012 Document.

The RPA of the existing tree stock is an important material consideration when considering site constraints and planning development activities. The RPA of significant trees on site is shown on the Tree Constraints Plan (Appendix A).

The default position must be that all development, including any associated services will occur outside the RPAs of retained trees. Where this is unavoidable, it may be appropriate to use special measures to install structures, services or surfacing within RPAs which allow the protection of roots and soil structure which are essential for tree growth and keep any incursion to a minimum.

Further steps to improve or increase the useable rooting area available to the tree may also be required.

2.3 Soils

On shrinkable clay soil, tree growth can lead to the differential movement of structures as moisture is removed from the soil during the growing season. Soils must be carefully assessed, and any foundations must be installed following the recommendations of National House Building Council (NHBC) Standards Chapter *4.2: Building Near Trees (2020)* to avoid potential future damage. Where trees which predate existing structures are to be removed, this can result in heave as the soils are re-wet. Prior to any tree removal the risk of heave should be considered by a suitably qualified engineer.

The advice of a suitably qualified engineer must be obtained to inform any potential issue of heave. Specific advice in relation to this issue is beyond the scope of this report.

2.4 Above Ground Constraints

Tree stems and branches can restrict available space on site. Damage or wounding (including excessive pruning) can significantly reduce the amenity contribution of the tree and may lead to the development of dysfunction and decay, with significant long term implications for tree health. The future impact of existing trees should be carefully considered, including individual species characteristics (such as potential future size, fruit fall, shade etc.) and how the tree will interact with any proposed development and future land use. Annual tree growth can lead to direct damage if stems/branches (or roots) come into physical contact with structures and this must also be taken into consideration.

2.5 Trees and Risk in the Context of Development

Tree owners/managers have a legal duty to prevent foreseeable harm. It is generally accepted that this duty can be fulfilled by undertaking proactive inspections of significant trees to identify obvious defects and by taking appropriate remedial action or gaining further advice as appropriate.

Further guidance is available from the National Tree Safety Group[4].

The tree survey carried out as the basis of this report is primarily for planning purposes, focusing on the quality and benefits of the trees and is not specifically designed to assess the safety of trees on site. However, when obvious issues have been identified recommendations have been included in the Tree Survey Schedule.

The Construction (Design and Management) Regulations (2015) states that developers and contractors have responsibilities for health and safety as a result of their actions. Should trees be left in an unstable or hazardous condition the Health and Safety Executive (HSE) could seek to prosecute those responsible along with the potential for further Civil claims for damages.

2.6 Trees and Wildlife

Full consideration must be given to the presence of species protected under the Wildlife and Countryside Act (1981 - as amended), the Countryside Rights of Way Act (2000) and the Conservation of Habitats and Species Regulations (2017), in particular the presence of bats and nesting birds. It is recommended that wherever possible, significant tree/hedge works take place outside of the typical bird nesting season of March to September. The advice of a suitably qualified Ecologist is recommended in relation to any potential impacts on protected species.

2.7 Tree Works

Any tree surgery recommendations contained within this report are to be undertaken in accordance with BS3998: 2010 Tree work – Recommendations (BS3998) by suitably qualified and insured contractors. Significant pruning works are best undertaken when trees are dormant or outside periods of high functional activity to reduce the overall impact on energy available to the tree for growth and processes. In general the optimum period for works is between November to February and July to August (subject to the presence of protected species) when the tree is less active and better placed to respond to wounding and a reduction in leaf area.

3. Field Work Observations

3.1 The Site

The Site boundary is shown on the Site Location Plan included within Appendix C of this report.

[4] National Tree Safety Group (NTSG),2011. Common sense risk management of trees. Forestry Commission.

The Site is formed of the curtilage of 14 Endsleigh Street in Bloomsbury in the London Borough of Camden, north London. The Site is a Grade II listed building and forms part of the University College London (UCL) complex.

It is located as part of a row of terraced town houses with back to back rear gardens. Passfield House is to the south, Endsleigh Street is to the east, Endsleigh Gardens to the north, Endsleigh Place to the south and Taviton Street to the west. Tavistock Gardens is to the south west and the Site is otherwise generally bordered by residential or commercial premises.

The Site will undergo refurbish works subject to planning and listed building consent..

3.2 The Trees

Nine features were included within the tree survey.

The trees on or immediately adjacent to the Site range from young to mature. The most significant trees within the site boundary are two early mature to mature common lime (*Tilia x europaea*) to the rear of the small courtyard garden, the eastern tree of the two has been supressed by its neighbour and leans north. The westernmost of the two trees has a more upright and balanced form. Tree of heaven (*Ailanthus altissima*) which are likely to be self-sown are positioned to the east and west of the garden just beyond the boundary wall and in proximity to the adjacent residential structures. Two semi mature cherry laurel (*Prunus laurocarasus*) are located to the north and east of the courtyard. These shrubs have developed into small trees and are considered to be of low quality. A small cypress (*Chamaecyparis sp*) is located in the north eastern corner of the garden close to the boundary wall. Finally two high quality large mature London plane (*Platanus x acerifolia*) are located well back from the property boundary in the gardens of adjacent properties. These trees form the dominant arboricultural features in the immediate area.

The masonry boundary wall around the courtyard ranges from circa 1.4m to over 2m in height, is cracked and bulging in many places particularly close to the larger trees on and immediately adjacent to the Site and it is likely that the trees are causing direct damage via contact between the stem and roots and the wall or its footings. A flagstone courtyard is lifted and uneven in places and this could be due to surface roots in the bedding layer however no flags were lifted for inspection at the time of the site visit. All of the trees in and immediately surrounding the courtyard are closer than the recommended planting distances set out in BS 5837 Table A.1 for new trees close to masonry boundary walls (1-2m dependent on the ultimate size of the tree).

Site photography can be found at Appendix D located to the rear of this report.

3.3 Statutory and Non Statutory Designations

3.3.1 Statutory Designations:

AECOM checked the London Borough of Camden online mapping[5] The Site is located within the Bloomsbury Conservation Area as such all trees with a stem diameter greater than 75mm (measured at a height of 1.5m) within this area are subject to statutory protection, equivalent to that of a Tree Preservation Order.

Overbury (the client) have informed AECOM that there are no Tree Preservation Orders affecting trees within or immediately adjacent to the Site boundary.

A felling licence will not be required in advance of any tree removals as the trees are located in gardens which form an exception.

Full planning consent is an exemption from the need to apply for consent for works to trees protected by a Tree Preservation Order or the need to give notice of the intention to undertake works within a Conservation Area. Prior to any tree works the status of trees to be removed or pruned must be verified with LB Camden.

[5] https://ssa.camden.gov.uk/connect/analyst/mobile/#/main?mapcfg=CamdenConservation&lang=en-gb

3.3.2 Non Statutory Designations

Following a review of Magic Map[6] there are no non statutory designations relating to trees within or immediately adjacent to the Site and there are no recorded ancient or veteran trees shown on the Woodland Trusts Ancient Tree Inventory[7] (and no trees of this nature were identified during the survey).

3.4 Tree Valuation

Trees are highly valued features which provide a broad range of essential benefits to both rural and urban landscapes including managing flood water, improving air quality, buffering extremes in temperature, capturing carbon and improving both physical and psychological wellbeing.

There are a range of tree valuation methodologies available. The asset value of the individual trees included within the detailed tree survey has been calculated in monetary terms using the Capital Asset Value for Amenity Trees (CAVAT) system (Full Method). Many local authorities in the UK use this system to inform decision making and compensation valuations in relation to publicly owned trees and the method is specifically suggested in the draft New London Plan as an appropriate approach to determine tree value in relation to development.

The following describes how the CAVAT value is derived:

'CAVAT works by calculating a unit value for each square centimetre of tree stem, by extrapolation from the average cost of a range of newly planted trees. In the Full Method this basic value is adjusted to reflect the degree of benefit that the tree provides to the local population. The adjustment is designed to allow the final value to reflect realistically the contribution of the tree to public welfare through tangible and intangible benefits'. (Chris Neilan. 2010 http://ltoa.org.uk/component/docman/cat_view/98-capital-asset-value-for-amenity-trees-cavat).

The CAVAT value for the trees considered within this report which are most likely to be affected by any work associated with the Proposed Development have been included as the final column in the Tree Survey Schedule which is included as Appendix B. The surveyed trees have a total combined CAVAT value of £180,936.

4. Tree Related Constraints and Opportunities

The Tree Constraints Plan (Appendix A) shows the area of constraints associated with the trees on Site. As identified within the drawing key, the green shaded area shows the extent of tree canopies, the canopy outline colour indicates the quality category of the tree and the dashed black line is indicative of the RPA, which is the nominal area of tree roots which are generally considered essential to tree health and function. Roots are likely to extend outside of this point but beyond the RPA extent tree roots are not considered a significant constraint.

The default position is generally that all new features and associated works be located outside of areas where trees are to be retained.

4.1 Tree Categorisations as per BS5837:2012

The trees on Site have been assigned to a quality category as per BS5837:2012, which relates to their arboricultural, landscape and cultural/conservation value.

Category C trees are shown by a grey canopy outline on the Tree Constraints Plan (Appendix A). This means they are of relatively low quality and would not normally be considered a significant constraint to future development. However these trees may still provide some useful value and should be considered for retention where they do not pose a significant constraint to the Proposed Development.

Category B trees (blue canopy outline) are described as being of moderate quality and it is generally desirable to retain trees of this standard and incorporate them within the Proposed Development where ever feasible.

[6] https://magic.defra.gov.uk/magicmap.aspx
[7] https://ati.woodlandtrust.org.uk/tree-search/?v=1746242&ml=map&z=18&nwLat=51.53789661265637&nwLng=-0.13603968909684072&seLat=51.53519384493015&seLng=-0.12574000647965322

Category A trees (green canopy outline) are classified as being of high quality and trees of this nature should be retained and incorporated into the design of the Proposed Development due to the high level of benefits they provide.

Category U trees (red canopy outline) are trees with less than ten years of reasonable useful life expectancy or those in such poor condition that they should be removed, regardless of any development activity. Trees of this nature represent no constraint to development.

The table below summarises the number of trees in each category recorded within or adjacent to the Site.

Table 2 Summary of trees in each quality category.

Quality Category	A	B	C	U
Number of trees	2	1	5	1

5. The Proposed Development

The Proposed Development is detailed on the Proposed Landscape Layout Plan included as Appendix C (ref: SK-001.01 and includes the renovation of the existing property and courtyard garden.

6. Arboricultural Impact Assessment

6.1 Purpose

This impact assessment sets out the likely principal direct and indirect impacts of the Proposed Development on the trees on or immediately adjacent to the Site and suitable mitigation measures to allow for the successful retention of significant trees or to compensate for trees to be removed, where appropriate.

A brief summary of trees to be removed, tree works and incursions related to the Proposed Development are detailed within the table below.

Table 3: Summary of Removals, Incursions and Pruning to Facilitate the Proposed Development

Impact	Category A	Category B	Category C	Category U
Trees to be removed to facilitate the Proposed Development	0	T6	T2, T3, T4, T5, T7	T1
Total	**0**	**1**	**5**	**1**
Trees which may require some incursion into their construction exclusion zone to allow the Proposed Development.	0	0	0	0
Total	**0**	**0**	**0**	**0**
Trees to be pruned to facilitate the Proposed Development	0	0	0	0
Total	**0**	**0**	**0**	**0**

6.2 Trees to be Removed

Seven individual trees are to be removed to facilitate the Proposed Development; this includes one tree classed as moderate quality (Category B), five trees classified as low quality (Category C) and one tree which is unsuitable for retention (Category U).

The majority of the trees to be removed are within the red line application boundary with the exception of trees T1 and T7 which are located immediately outside of the site boundary in adjacent gardens. These trees are understood to be the responsibility of UCL. Prior to any works the ownership of these trees must be established and the consent of the tree owner obtained in writing.

The loss of these trees is necessary to achieve the landscaping proposals for the Site, to avoid inappropriate retention of large stature trees in proximity to residential structures and to prevent ongoing damage to boundary walls and hard landscaping

Tree removals will be mitigated with a high quality scheme of new tree planting and associated landscaping works on UCL land (outside of the Site boundary). This is likely to provide a greater level of amenity value as it will be more publicly accessible and visible to a wider number of people. Newly planted trees will also be viable for the long term, securing canopy cover into the future and will represent an opportunity to enhance the quality, benefits and resilience of trees in the local area.

The CAVAT value of trees removed to facilitate the development is detailed in Table 3 below. Future values to account for increasing growth over time have also been estimated for years 10, 20 and 40. We have assumed an annual increase in stem diameter of 0.6cm and a 6cm increase in diameter every 10 years (as described further in Section 6.7).

The future useful life expectancy of the trees has been reduced over time to reflect their proximity to adjacent structures and a decrease in life expectancy as they age. Structural value has been reduced over time to account for the impact of likely pruning, suppression and shading which will reduce the size of the crown in proportion to the diameter of the stem.

Table 4: CAVAT Valuation for Trees to be Removed and Future Potential Value

Tree Number	Stem Diameter (cm)	CAVAT Valuation (£)	Stem Diameter Yr 10 (cm)	CAVAT Value Yr 10 (£)	Stem Diameter Yr 20 (cm)	CAVAT Value Yr 20 (£)	Stem Diameter Yr 40 (cm)	CAVAT Value Yr 40 (£)
T1	26	£911	32	£460	38	£648	50	£842
T2	12	£406	18	£364	24	£180	36	£323
T3	12	£445	18	£546	24	£323	36	£647
T4	7	£84	13	£126	19	£90	31	£180
T5	38	£5,349	44	£3,912	50	£1,684	62	£2,157
T6	45	£12,729	51	£16,350	57	£14,041	69	£17,636
T7	31	£2,966	37	£2,305	43	£830	55	£1,019
Total		**22,890**		**£24,062**		**£17,796**		**£22,803**

Tree removals will be mitigated with a high quality scheme of new tree planting on UCL land in the local area. This represents an opportunity to enhance the quality, benefits and resilience of trees on Site. Mitigation planting and its associated value is considered in Section 6.7.

All of the remaining recorded trees which are set well back from the Site boundary can be retained and protected.

6.3 Tree Works

Tree removals to facilitate the Proposed Development are detailed in the Tree Survey Schedule included as Appendix B.

No additional works to retained trees are likely to be required. All tree work is to follow the principles of *BS3998: 2010 Treework – Recommendations* and must be carried out by suitably qualified and insured contractors. The

Arboricultural Association provides a list of contractors who meet these requirements which can be found at www.trees.org.uk.

6.4 The Future Impact of Retained Trees

The retained trees are located outside of the Site boundary and are a significant distance from the Site and will therefore not have any significant impact on its future use. A degree of shading may be provided by T8 and T9 although these trees will not directly overhang the garden or house and will only lead to shading for limited periods each day, in the morning (T9) and a very small level of potential shading in late afternoon (T8).

Leaf fall from these two trees (which will occur each autumn) is unlikely to have any significant impact on the house or outside space due to their distance from the site boundary.

6.5 Tree Protection

Retained trees are vulnerable to damage from construction activities which can include physical damage to stems and branches following impacts with plant. Root severance following trenching, root death or dysfunction following damage to soil structure (caused by the movement of people or machinery on unsurfaced ground) or via the spillage of materials toxic to tree health. The default position is that the RPA and Canopy spread of trees to be retained will form an effective Construction Exclusion Zone, secured with robust fencing where no access will be permitted. Where access is necessary within this area special measures such as the use of ground protection and arboricultural supervision are generally required.

All works will be contained within the footprint of the existing garden. Any access outside of the boundary (e.g. to repair or replace masonry boundary walls) will take place outside of the RPA of any adjacent trees and this area will be fenced off as an exclusion zone at the outset.

Outline tree protection measures are considered in Appendix F of this report. An Arboricultural Method Statement (AMS) is often required as a condition of planning consent to set out the phasing of site operations, the finalised tree protection measures for the site and to provide detail on how sensitive elements of work are to be achieved in proximity to retained trees. In the context of this Site where all trees within and close to the site boundary are being removed an AMS is not required.

6.6 Site Organisation, Storage and Use of Materials, Plant and Machinery.

All construction site facilities including site huts, staff and contractor parking and areas for storage will be located outside of the RPA or crown spread of retained trees, including those not specifically covered in this report. Space is likely to be constrained on Site and will need to be carefully considered. The Construction Exclusion Zones identified on the Tree Protection Plan must be fully respected and their location and significance is to be highlighted to all site staff and contractors during the formal site briefing.

The use, mixing and washing of materials can lead to run off or inadvertent spillage into tree root zones. Many substances often used on construction sites can be toxic to tree roots (such as concrete, fuels, salts, builders sand and herbicides) and can result in the death of tree roots and beneficial soil organisms and can have a significant impact on the future health and appearance of the tree.

The storage of materials and arising's can result in an effective raised soil level. This buries tree roots at depths where air and water are less available and can lead to the decline or death of the tree.

For these reasons the storage of materials and any washing, mixing or refuelling will take place in agreed allocated areas at least 5m from the edge of the RPA of retained trees.

Any slope effect must be taken into account and where there is a potential for run off, heavy duty polythene sheeting and sandbags must be in place as bunding to prevent toxic materials reaching RPAs.

Particular care is required where high sided vehicles, long reach machinery and plant with jibs, booms and counterweights are to operate with in proximity to retained trees. A banksman will be used where the movement of plant or long reach machinery occurs within 5m of any part of a retained tree to ensure no damage is sustained.

6.7 Tree Planting

A mitigatory tree planting scheme will be delivered on land managed by UCL at Frances Gardner House and Calthorpe Estate, this will be delivered as part of the *Green Biodiversity Strategy and Action Plan Championing biodiversity across an urban estate* which recognises the benefits of tree planting to support biodiversity and provide a range of ecosystem services.
Suggested species and stock sizes are set out in Table 4 below. A minimum of four replacement trees will be planted and a maximum of eight.

Where new trees are to be planted, the minimum planting distances detailed in Annexe A, Table A.1 of BS5837:2012 must be adhered to, to prevent direct damage to services and structures from future tree growth. New tree planting should be implemented in accordance with the guidance set out in BS8545: 2014 Trees: from nursery to establishment in the landscape – Recommendations.

The estimated CAVAT value of proposed new tree planting to mitigate tree removals is detailed in Table 4 below. Tree values are shown at the time of planting, after 10 years, 20 years and 40 years. AECOM has estimated tree growth over time to determine future CAVAT values (based on stem diameter). This is based on the likely radial increase in stem diameter which has been determined with reference to guidance from Mitchell (1979) and White (1998) which indicate an estimated 0.24cm - 0.35cm increase in stem radius each year (Rogers et al (2014). On this basis we have assumed an average radial increase of 0.3cm per year and an annual increase in diameter of 0.6cm and a 6cm increase every 10 years. Other practitioners have adopted an annual increase in diameter of 0.94cm and therefore the approach is likely to be fairly conservative. We have assumed that tree canopies (and resulting structural CAVAT Value) will be unimpeded until circa 20 years where we have assumed a reduced structural value of 90%, reducing to 80% by year 40 to account for potential natural shading or limited pruning for access.

Table 5: Estimated CAVAT Value for New Tree Planting

Tree Species	DBH at planting (cm)	CAVAT Value (£)	DBH after 10 yrs (cm)	CAVAT Value (£)	DBH after 20 yrs (cm)	CAVAT Value (£)	DBH after 40 yrs (cm)	CAVAT Value (£)
Liquidamber styraciflua 20-25cm girth	7	1,222	13	4,216	19	8,104	31	19,177
Quercus palustris 20-25cm girth	7	1,222	13	4,216	19	8,104	31	19,177
Betula nigra 20-25cm girth	7	1,222	13	4,216	19	8,104	31	19,177
Gleditsia triacanthos 20-25cm girth	7	1,222	13	4,216	19	8,104	31	19,177
Total Value of New Tree Planting (£)		**£4,888**		**£16,864**		**£32,416**		**£76,708**
Total Value of Trees to be Removed (£)	**-**	**£22,890**		**£24,062**		**£17,796**		**£22,803**

The overall CAVAT value of trees to be removed is £22,890. Replacement planting will provide equivalent asset value benefits in 10 to 20 years. The estimate of the potential future value of removed trees (if they were to be retained) illustrates that the value of new planting would balance out with the value of the trees highlighted for removal after between 10 and 20 years and would be between three and four times that of existing trees by year 40. This is because the new planting would be allowed to grow relatively unhindered due to greater space and

existing trees (if retained at all) would require regular pruning or pollarding to maintain a clearance from adjacent structures and to allow the reasonable use of outside space and would have reduced crown growth due to shade from adjacent trees.

If more than four new trees are planted (up to eight trees are proposed) then the time taken to mitigate the lost trees would be reduced commensurately.

The new planting scheme also provides an opportunity to increase the diversity of age and tree species to increase resilience and the range of ecosystem services and amenity benefits provided.

6.8 Services

No information in relation to services has been made available at this stage however as no trees are to be retained within or adjacent to the property and its garden, no trees will be impacted by any utility installation or diversion associated with the Proposed Development.

7. Conclusions

Seven individual trees are to be removed to facilitate the Proposed Development; this includes one tree classed as moderate quality (Category B), five trees classified as low quality (Category C) and one tree which is unsuitable for retention (Category U).

The majority of the trees to be removed are within the red line application boundary with the exception of trees T1 and T7 which are located immediately outside of the Site boundary in adjacent gardens. These trees are understood to be the responsibility of UCL. Prior to any works the ownership of these trees must be established and the consent of the tree owner obtained in writing. All of the trees are within the Bloomsbury Conservation Area, if in advance of full planning consent any tree works are proposed, at least six weeks' notice must be given to LB Camden. Full planning consent supersedes this requirement.

The loss of these trees is necessary to achieve the landscaping proposals for the Site, to avoid inappropriate retention of large stature trees in proximity to residential structures and to prevent ongoing damage to boundary walls and hard landscaping

Tree removals will be mitigated with a high-quality scheme of new tree planting and associated landscaping works on UCL land (outside of the Site boundary) at Frances Gardner House and Calthorpe Estate. Where new trees are planted in publicly visible areas this will result in a greater level of amenity compared to the existing trees which are screened by adjacent properties and aren't significantly publicly visible.

A minimum of four replacement trees (of species which will be provided with appropriate soil volumes and aftercare to reach a significant ultimate size) will exceed the asset value (CAVAT) of existing trees in between 10 and 20 years after planting and will continue to increase in value whereas the existing trees value reduces over time in real terms due to shading and the likely ongoing requirement for heavy pruning. If more replacement trees are planted (a maximum of eight new trees are proposed) the time taken to mitigate tree loss will be reduced accordingly.

References

British Standards Institution (BSI), BS5837:2012. Trees in relation to design, demolition and construction – Recommendations. BSI

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Appendix A Tree Constraints Plan

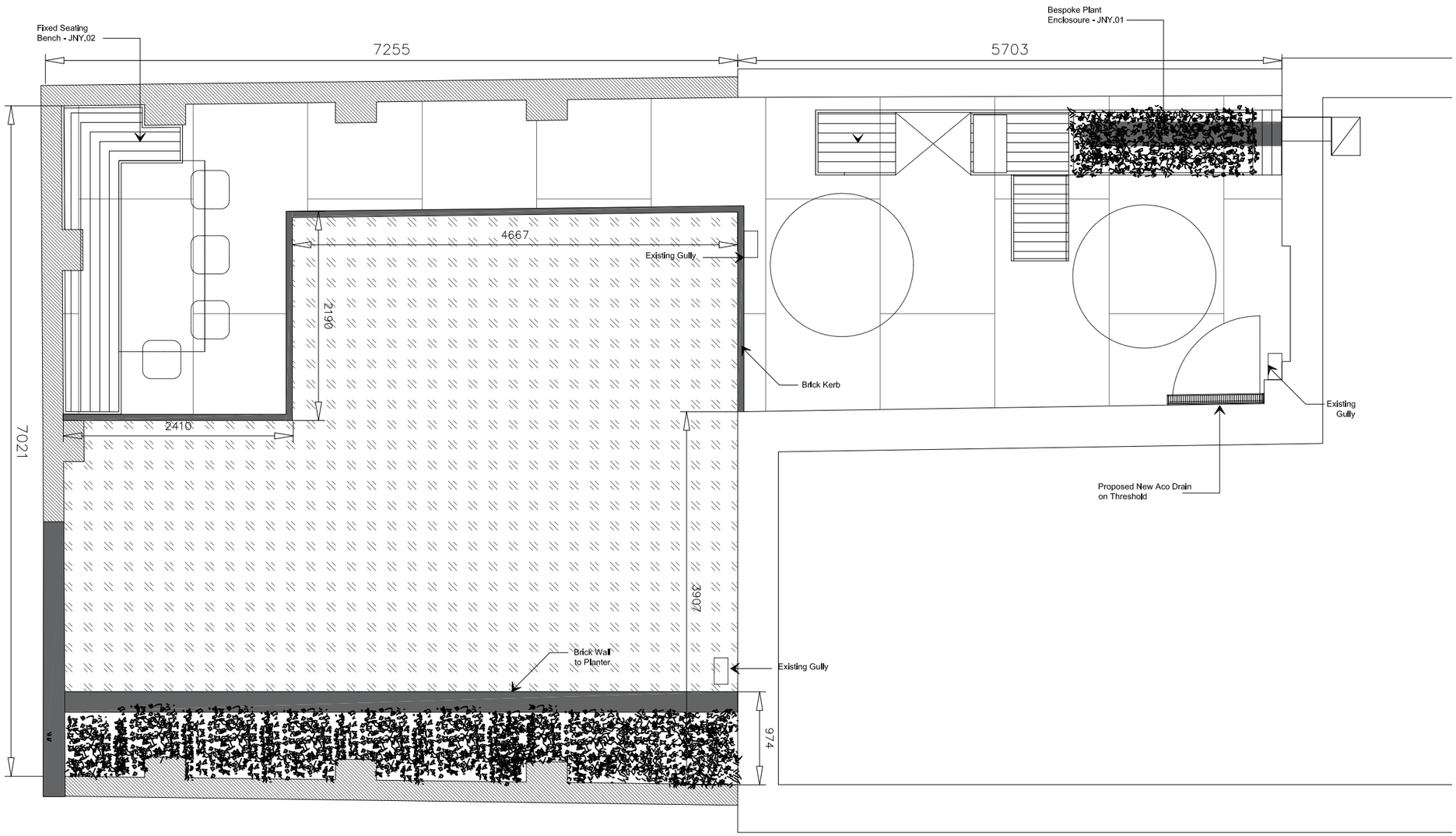
Appendix B Tree Survey Schedule

Tree ID	Species	Estimated Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Tree Works to Facilitate Development	Estimated Remaining Contribution	Category	CAVAT Value (£)
T1	Tree of Heaven (Ailanthus altissima)	12	260	3.5	4	4.5	3.5	7	7	Good	SM	Fair	Base less than 10cm from 1.4m boundary wall with bulge and cracking adjacent to the tree. Touching adjacent structure. Large growing species inappropriate so close to structure.	Fell and poison stump to prevent further damage to wall and a tree unsuitable so close to structure	Fell	<10	U	£911
T2	Cherry Laurel (Prunus laurocerasus)	4.5	130	3	3	4	1.5	0.3	1.5	Good	SM	Fair	Base is 10cm from 1.4m boundary wall with cracking.		Fell	10+	C2	£406
T3	Cypress (Chamaecyparis sp)	5.5	120	1.5	1	1.5	1	1.3	1.8	Good	SM	Good	Base is 40cm from 1m boundary wall with cracking to north (more likely associated with lime to west). Likely future damage as tree matures.		Fell	10+	C2	£445
T4	Cherry Laurel (Prunus laurocerasus)	4	70	1.5	2	3	0.5	2	1	Good	Y	Fair	Corrected lean to south west resulting in right angled stem form.		Fell	10+	C2	£84
T5	Lime (Tilia sp)	18	380	5	4	2.5	5.5	3	2.5	Good	EM	Fair	Lean to north, likely due to suppression from T6. Stem base 15cm from 1.4m wall, stem touches wall at 1m, cracking to east and north. Wall appears to lean to north.	Fell and poison stump to prevent further damage to boundary wall.	Fell	10+	C1,2	£5,349
T6	Lime (Tilia sp)	20	450	4	5	5	5	6	4	Good	M	Good	Ivy on stem and scaffold branches, base is 20cm from 2m+ boundary wall, stem is less than 10cm from wall at 1.5m. Wall bulging and cracking to north west and east. Lifted flags to south.	Sever ivy Consider removal as inappropriate for long term retention and likely causing damage to wall.	Fell	20+	B1,2	£12,729
T7	Tree of Heaven (Ailanthus altissima)	12	310#	3.5	4.5	4.5	7	4	2	Good	EM	Fair	No access stem likely 1m from wall. 2.5m-3m from corner of building. 2m+ wall with cracking adjacent to the tree to the east. Large growing species, inappropriate so close to structure.	Consider removal as inappropriate for long term retention and likely causing damage to wall.	Fell	10+	C1,2	£2,966
T8	London plane (Platanus x acerifolia)	25	800#	8	8	8	8	7	n/a	Good	M	Good	Inaccessible and barely visible tree in adjacent property.		n/a	40+	A1,2	£79,023
T9	London plane (Platanus x acerifolia)	25	800#	8	8	8	8	n/a	n/a	Good	M	Good	Inaccessible and barely visible tree in adjacent property. Pollard.		n/a	40+	A1,2	£79,023

Key to Abbreviations Used in the Survey

Ref No	Specific identification number given to each tree or group. T=Tree/H=Hedge/G=Group.	
Species	Common name followed by botanical name shown in *italics*	
RPA	Root Protection Area (As defined by BS5837)	
Stem diameter	Diameter of main stem, measured in millimetres at 1.5 m above ground level. (MS = Multi-stem tree measured in accordance with BS5837 Annexe C)	Av / Average: indicates an average representative measured dimension for the group or feature
Spread	The width and breadth of the crown. Estimated on the four compass points in metres.	
Crown clearance	The estimated height (in metres) above ground level of the lowest significant branch attachments.	
#	Estimated dimensions	
*	Indicates estimated position of tree (not indicated on topographical survey).	
Category	Categorisation of the quality and benefits of trees on Site as per Table 1 and 2 of BS5837:2012. 1=Arboricultural quality/value 2=Landscape quality/value 3=Cultural quality/value (including conservation)	
	A=High quality/value 40yrs+ (light green). B=Moderate quality/value 20yrs+ (mid blue) C=Low quality/value min 10yrs/stem diameter less than 150mm (grey). U=Unsuitable for retention (dark red).	
Life stage	**Young (Y):** Newly planted tree 0-10 years. **Semi-Mature (SM):** Tree in the first third of its normal life expectancy for the species (significant potential for future growth in size). **Early Mature (EM):** Tree in the second third of its normal life expectancy for the species (some potential for future growth in size) **Mature (M):** Tree in the final third of its normal life expectancy for the species (having typically reached its approximate ultimate size). **Over Mature (OM):** Tree beyond the normal life expectancy for the species. **Veteran (V):** Tree which is of interest biologically, aesthetically or culturally because of its condition, size or age.	
Structural condition	**Good:** No significant structural defects **Fair:** Structural defects which can be resolved via remedial works. **Poor:** Structural defects which cannot be resolved via remedial works. **Dead:** Dead.	
Physiological condition	**Good:** Normal vitality including leaf size, bud growth, density of crown and wound wood development. **Fair:** Lower than normal vitality, reduced bud development, reduced crown density, reduced response to wounds. **Poor:** Low vitality, low development and distribution of buds, discoloured leaves, low crown density, little extension growth for the species. **Dead:** Dead **Fair/Good** = Indicates an intermediate condition **Fair – Good** = Indicates a range of conditions (e.g. within a group)	
Preliminary management recommendations	Works identified during the tree survey as part of sound arboricultural management, based on the current context of the Site (where relevant reference has been made to tree management based on the potential future context of the site).	

Appendix C Proposed Development



Materials Key:

Hard Paving (30sqm): Marshells SYMPHONY® Tumbled 800 x 400 x 20mm or similar to be approved.

Brick Kerb (11300m): Reclaimed brick from demolished walls reused or to match.

Brick Wall to planter (7100m): Reclaimed brick from demolished walls reused or to match, 4 courses high.

Astroturf (30 sqm): Specification TBC

Aco Drain - Galvanised (100mm x 100mm, 150mm deep channel) at level threshold.

BBQ TBC. Joinery to be designed to fit.

Notes:

Existing heritage pavement to be carefully removed and stored.
Levels of ground underneath modified to create level threshold. Garden to be leveled and compacted generally, enough excavation to allow the existing stones to be relaid at a lower level and to take new pavement on top which extends to the garden.
Paving to fall away from building towards existing gully at end.

Level threshold between all surfaces for DDA access.

Aco Drain connected to existing corner gully.

All other existing raised beds and paving to be removed.

Sub-base details and design to be confirmed by Landscaper.

All levels tbc by Civil Engineer.

Planting tbc.

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Project Name:
14 Endsleigh St

Drawing Title:
Proposed Landscape Layout
SK-001.01

Scale:
1:50 @ A3

Revision:
Tender/Planning

Date:
19/08/20

Note: These drawings are for planning purposes only.

Appendix D Site Photography

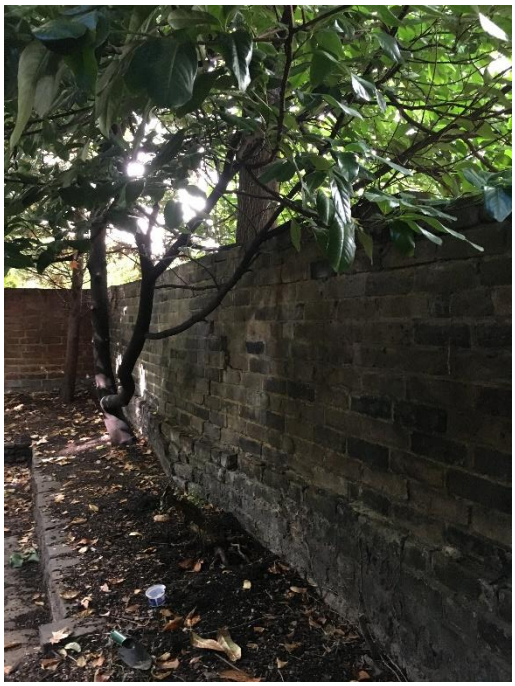


Figure 1: T1 and bulging boundary wall.

Figure 2: T3 Cypress close to boundary wall with cracking.

Figure 3: T4 Lime leaning on rear boundary wall.

Figure 4: T5 Lime close to boundary wall with stepped cracking.

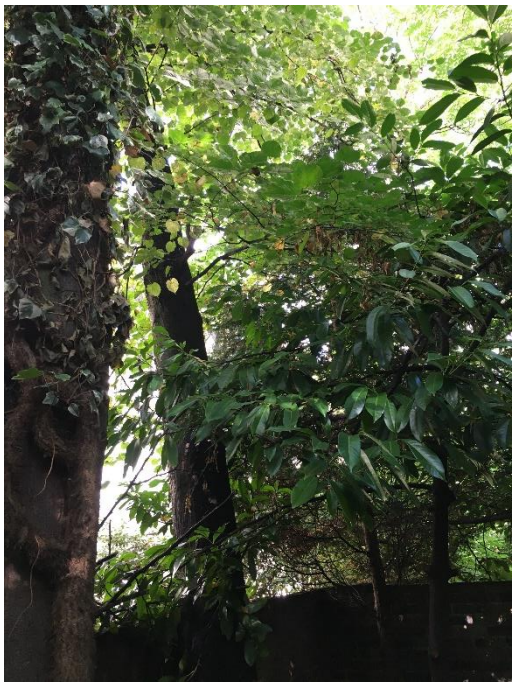


Figure 5: T4 illustrating lean to north.

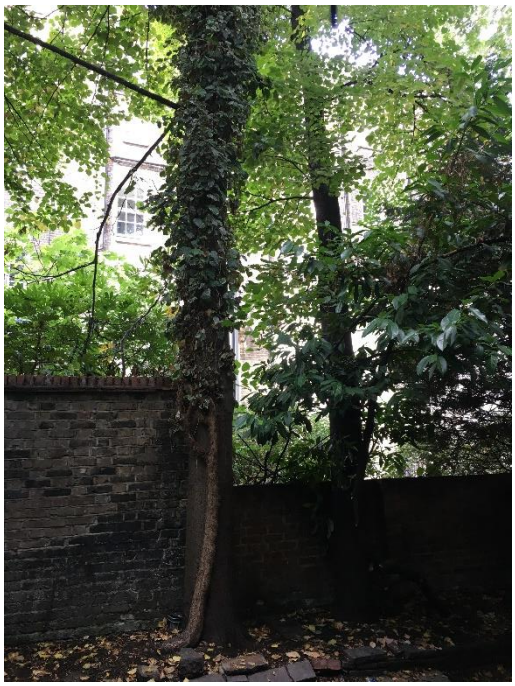


Figure 6: T4 and T5 showing wider context to the rear of the garden.

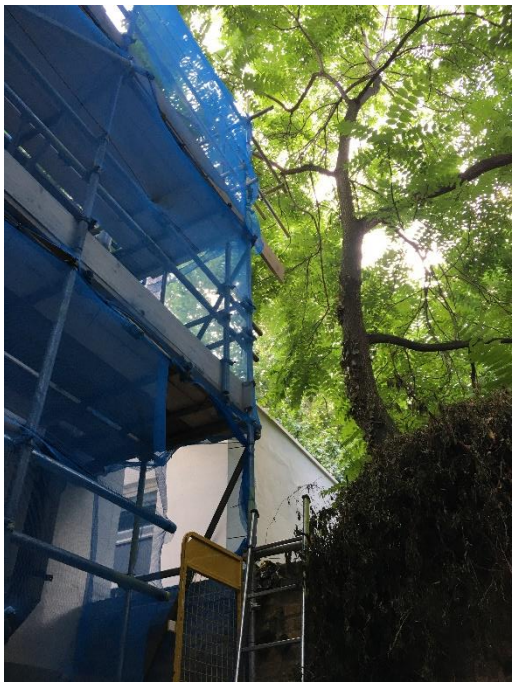


Figure 7: T7 Tree of heaven beyond the western boundary wall.

Figure 8: Illustrating cracked and bulging wall adjacent to T7.

Appendix E Tree Protection Plan

Appendix F Outline Tree Protection Measures

A.1 Outline Tree Protection Measures

The default position as set out by BS 5837:2012 is that retained trees must be protected from construction operations and this is generally achieved with the erection of robust protective fencing positioned on the outer edge of the RPA or crown spread (whichever is greatest).

In the context of this Site, where retained trees are located on private land outside of the Site boundary, no formal tree protection measures are required. However if the existing boundary walls are to be rebuilt all work should be completed from within the property garden.

If access is unavoidable beyond the garden boundary Tree Protection Fencing must be installed around the outer RPA of adjacent off-site trees including the two London plane T8 and T9 and any other trees must be protected with a buffer zone with a radius equivalent to 12 x the diameter of their stem (measured at a height of 1.5m). The final position of any fencing should be approved by an Arboriculturist. Any damage to off-site trees would constitute an offence due to the Conservation Area designation, with fines of up to £20,000 per tree or unlimited fines in a crown court.

All site operations will be restricted to the area outside of tree protection fencing and this area will form a Construction Exclusion Zone (CEZ) unless agreed otherwise.

The area inside the fence and any additional tree protection measures will be sacrosanct and must not be removed or altered without the prior approval of the LPA Tree Officer. Any damage to tree protection measures must be reported immediately.

Fencing shall be constructed with robust vertical and horizontal scaffold framework with weldmesh panels firmly attached as per BS 5837:2012 Figure 7 (included below). Vertical support poles and bracing poles must be located with care to avoid underground utility services and will be sited to avoid the structural roots of retained trees.

Alternative equivalent robust and immovable fencing specification including site hoarding will also be appropriate.

Suitable all weather signage will be fixed to fencing to notify site staff and visitors of the construction exclusion zone and its purpose.

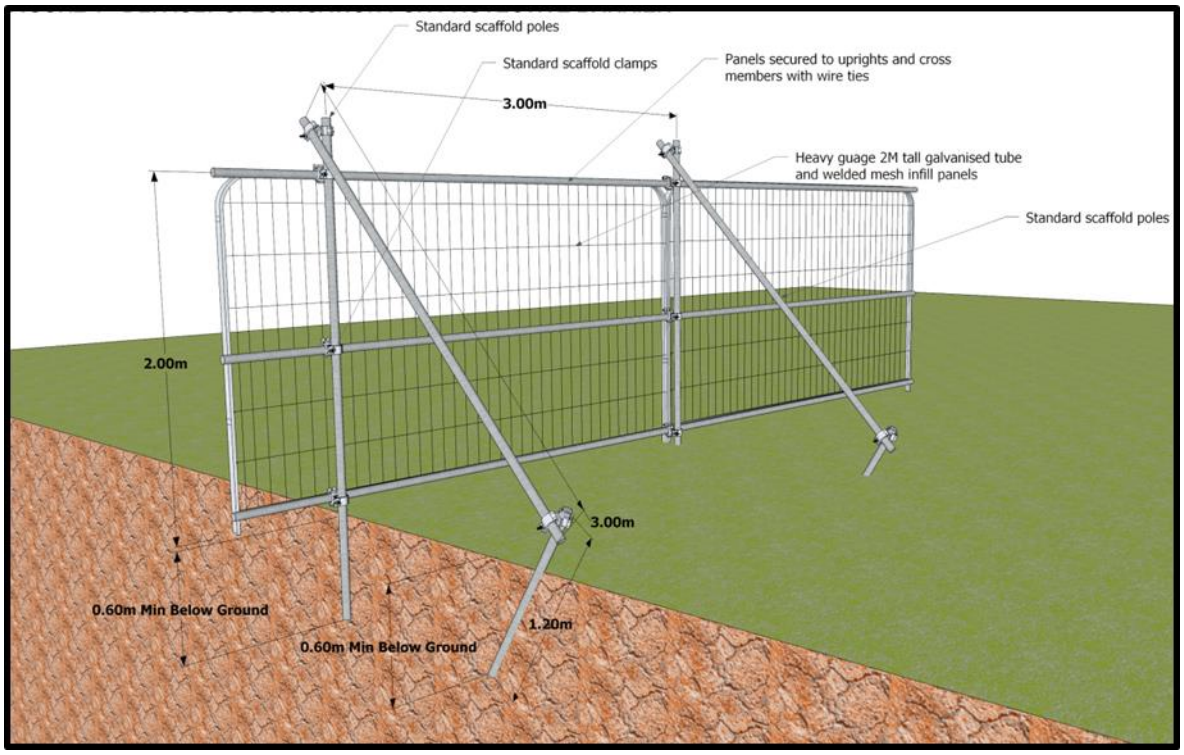


Figure 1 Default specification for protective barrier

A.2 Ground Protection

Should access be unavoidable within the RPA of a retained tree, fit for purpose ground protection must be in place which is sufficient to protect the structure of the soil from damage based on the heaviest anticipated load.

As set out in section 6.2.3.3 of BS5837:2012 the following ground protection measures will be appropriate:

- Suitable ground protection for pedestrian only access will comprise a single thickness of scaffold boards set on a compressible layer of 100mm of woodchip on a geotextile separation layer.
- Pedestrian operated plant up to two tonnes in weight would require the use of a proprietary ground protection system (such as Ground Guards or Eve Trakway or equivalent) set on a minimum depth of 150mm woodchip or sharp sand.
- Heavier loads will require ground protection to an engineering specification in conjunction with arboricultural advice.

As a guide the threshold beyond which root development is significantly affected is a bulk density ranging from 1.4g per cm^3 for clay soils, to 1.75g per cm^3 for sandy soils.

Tree protective measures shall stay in place until all construction operations are completed and removal is agreed with the Site arboriculturist and/or the Local Authority Tree Officer as appropriate.

A.3 General guidance for the management of exposed roots

Excavation must only take place within the RPA of a retained tree with the prior agreement of an arboriculturist and the Local Authority Tree Officer. All excavation must be undertaken using hand tools or compressed air (such as an air spade).

The following general principles will apply:

- Individual or small groups of roots less than 25mm in diameter will be retained where possible but can be severed with a sharp tool such as secateurs or pruning saws to leave a clean cut end (ideally 100mm back from the face of the excavation to account for future regrowth) where they pose an obstruction.

- Where roots are encountered which are larger than 25mm in diameter or where significant groups of smaller roots are found, the advice of an arboriculturist must be sought to decide an appropriate course of action (following consultation with the Local Authority Tree Officer where appropriate).
- Roots must only be exposed for the minimum period possible. In the interim period any exposed roots must be completely covered with dampened hessian sacking (which may require ongoing re wetting) to avoid drying out and exposure to light (which can result in the death of roots). Backfill for excavations should utilise the parent material and must not be significantly compacted.

A.4 Storage, use and mixing of materials

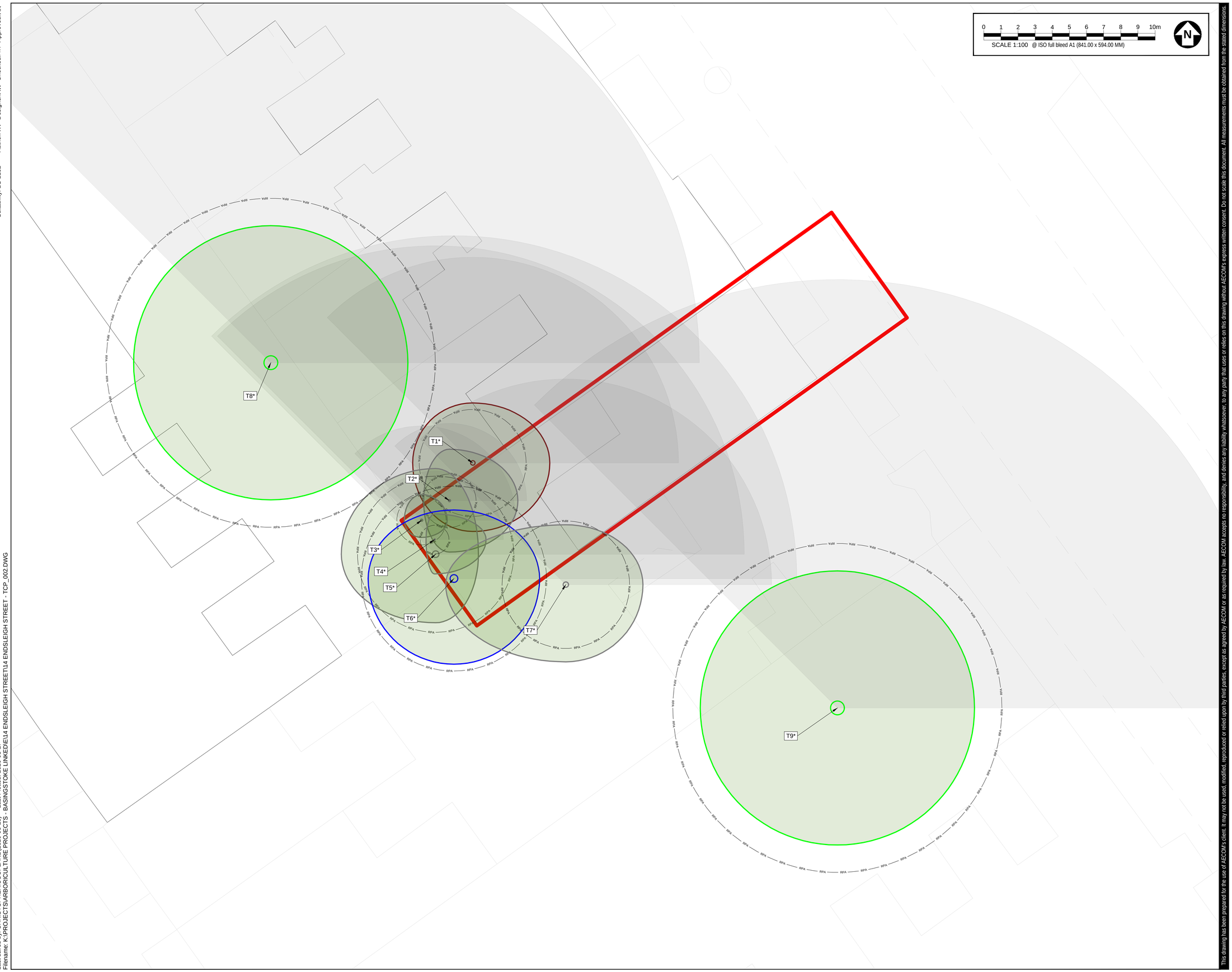
The use, mixing and washing of materials can lead to run off or inadvertent spillage into tree root zones. Many substances often used on construction sites can be toxic to tree roots (such as concrete, fuels, salts, builders sand and herbicides), can result in the death of tree roots and beneficial soil organisms; and have a significant impact on the future health and appearance of trees.

The storage of materials can result in an effective raised soil level. This buries tree roots at depths where air and water are less available and can lead to the decline or death of the tree.

For these reasons the storage of materials and any washing, mixing or refuelling must take place in agreed allocated areas at least 10m from the edge of the RPA of retained trees.

Any slope effect must be taken into account and where there is a potential for run off, heavy duty polythene sheeting and sandbags must be in place as bunding to prevent toxic materials reaching RPAs.

Suitability: BS 1192 Author:TR Designer:AW Checked:AW Approved:AK



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AECOM

PROJECT

14 ENDSLEIGH STREET

CLIENT

OVERBURY

CONSULTANT

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GENERAL NOTES

1. TREE CATEGORIES AS DEFINED BY BS 5837:2012
2. TREE LOCATIONS ARE BASED ON THE TOPOGRAPHICAL SURVEY AND GPS CO-ORDINATES FROM ON SITE WALKOVER.
3. * INDICATES A TREE / GROUP WHOSE POSITION IS APPROXIMATE AS BASED UPON AERIAL PHOTOGRAPHY AND ON SITE OBSERVATIONS.
4. PLANS SHOULD BE READ IN CONJUNCTION WITH THE AECOM ARBORICULTURAL REPORT.
5. THE ORIGINAL OF THIS DRAWING WAS PRODUCED IN COLOUR - A MONOCHROME COPY SHOULD NOT BE RELIED UPON.
6. DRAWING REFERNCES:
   1802-SBA-XX-B0-DR-A-503 (P1) Site Plan.dwg
   1802-SBA-XX-XX-DR-A-501 (P1) Location Plan.dwg

KEY PLAN

KEY

- **SITE BOUNDARY**
- **A - CATEGORY TREES, GROUPS, HEDGES, OR WOODLAND** *(HIGH QUALITY & VALUE)*
- **B - CATEGORY TREES, GROUPS, HEDGES, OR WOODLAND** *(MODERATE QUALITY & VALUE)*
- **C - CATEGORY TREES, GROUPS, HEDGES, OR WOODLAND** *(LOW QUALITY & VALUE)*
- **U - CATEGORY TREES, GROUPS, HEDGES, OR WOODLAND** *(UNSUITABLE FOR RETENTION)*
- **ROOT PROTECTION AREAS (RPA)** *(AS DEFINED BY BS 5837:2012)*
- **APPROXIMATE SHADING ARC** *(AS DEFINED BY BS 5837:2012)*

ISSUE/REVISION

I/R	DATE	DESCRIPTION
P01	21.08.20	FIRST ISSUE

DRAWING STATUS

PLANNING

PROJECT NUMBER

XXXXXXXX

SHEET TITLE

TREE CONSTRAINTS PLAN (SHEET 01)

SHEET NUMBER ACM-XXXXXXXX-AB-TCP-001

REV. P01

Suitability: BS 1192 Author:TR Designer:AW Checked:AW Approved:AK

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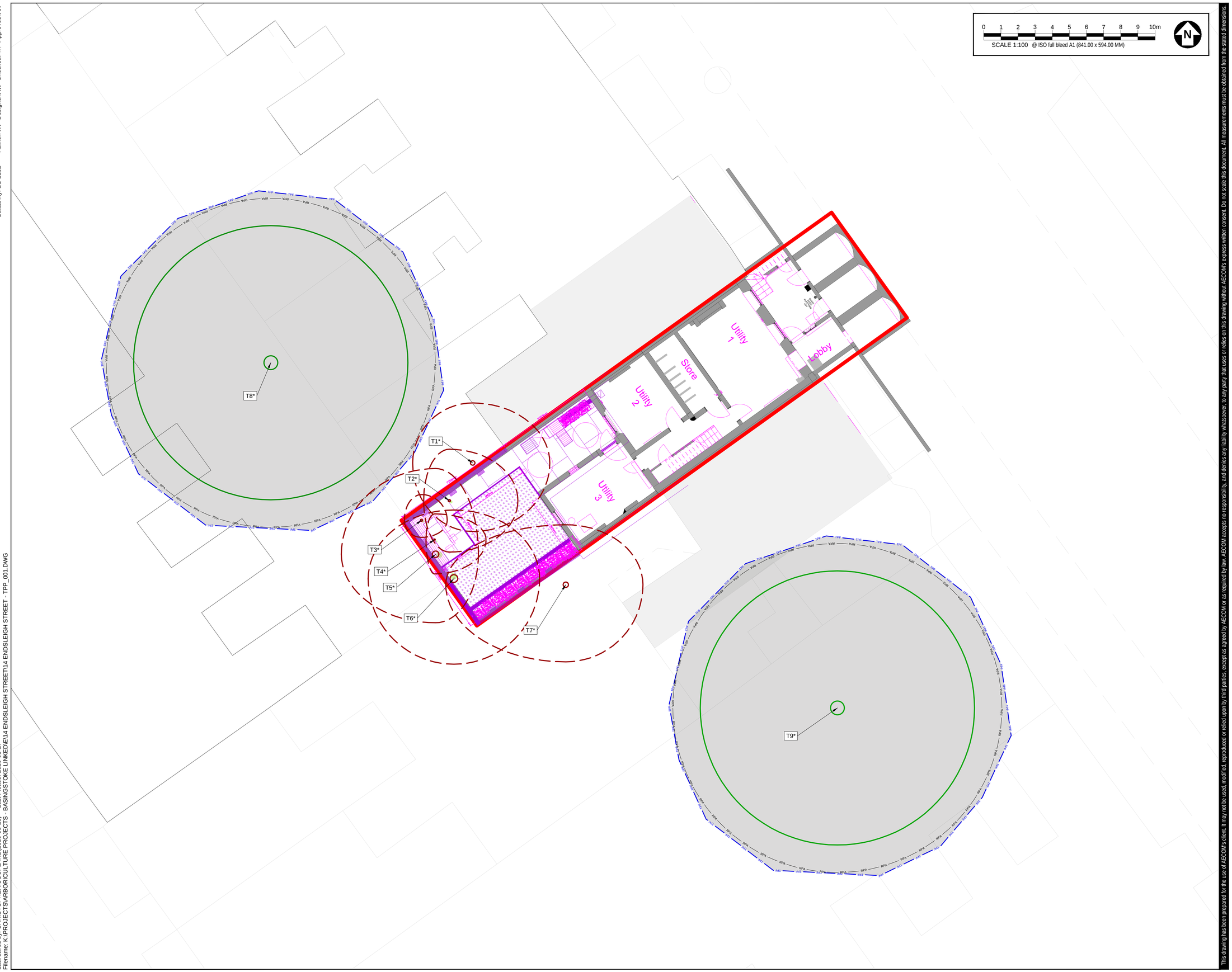

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5. THE ORIGINAL OF THIS DRAWING WAS PRODUCED IN COLOUR - A MONOCHROME COPY SHOULD NOT BE RELIED UPON.
6. DRAWING REFERNCES:
   1802-SBA-XX-B0-DR-A-503 (P1) Site Plan.dwg
   1802-SBA-XX-XX-DR-A-501 (P1) Location Plan.dwg
   OVB - SK.01 - Landscape Design.dwg

KEY PLAN

KEY

- SITE BOUNDARY
- EXISTING TREE, GROUP, WOODLAND, OR HEDGE TO BE RETAINED
- EXISTING TREE, GROUP, WOODLAND, OR HEDGE TO BE REMOVED
- ROOT PROTECTION AREA OF RETAINED TREES *(AS DEFINED BY BS 5837:2012)*
- TREE PROTECTION FENCING
- CONSTRUCTION EXCLUSION ZONE *(TRACKING OF PLANT, MATERIALS STORAGE, EXCAVATION AND ALL OTHER CONSTRUCTION ACTIVITIES ARE EXCLUDED WITHIN THESE AREAS FOR THE PURPOSES OF PROTECTING TREE HEALTH)*
- PROPOSED DEVELOPMENT LAYOUT *(BASED UPON DRAWING REFERENCES LISTED IN THE GENERAL NOTES SECTION)*

ISSUE/REVISION

P01	17.08.20	FIRST ISSUE
I/R	DATE	DESCRIPTION

DRAWING STATUS

PLANNING

PROJECT NUMBER

#pnum#

SHEET TITLE

TREE PROTECTION PLAN (SHEET 01)

SHEET NUMBER ACM-XXXXXXXX-AB-TCP-001

REV. P01

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