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Site Details: Vine House, Hampstead Square, London, NW3 1 AB

Prepared for: Mrs. J. Gosman

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Title: GOS_VHHS_AIA_001

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Report Index

1.0 – Summary of Instruction

An Arboricultural Impact Assessment (AIA) in accordance with *BS 5837:2012 Trees in relation to design, demolition and construction - Recommendations* was commissioned by our client, Mrs. J. Gosman to be undertaken at Vine House, Hampstead Square, London, NW3 1AB.

The AIA is required to support an application for planning consent.

I have been instructed to provide an Arboricultural Impact Assessment (AIA) & a preliminary tree protection strategy for the proposed development scheme at the above property.

The development scheme relates to the proposed:

- Renovation of the existing single storey, boiler house and green house structure to a habitable garden room, including an extension to create a wider footprint to the south;
- New bin store area cut in from the north side driveway.

Instructions were to:

- Carry out a tree survey in accordance with the British Standard *BS 5837:2012 Trees in relation to design, demolition and construction - Recommendations* to:
    - Undertake an Arboricultural Impact Assessment (AIA) to evaluate the potential direct and indirect effects of the proposed scheme and associated construction activity on nearby significant trees;
    - Assess and categorise the trees at and adjacent to the site to ascertain their suitability for retention;
    - Provide all relevant tree data including species identification, dimensions, life stage, condition assessments and make Preliminary/General Management Recommendations where necessary;
    - Identify the above and below ground tree constraints to the development to assist with scheme feasibility, conception and design;
    - Highlight the arboricultural implications that the development process may have on the retained trees and provide a method statement to show the necessary controls required to mitigate identified implications;
    - Make recommendations for measures to be taken to protect the retained trees above and below ground level during the development process, to safeguard their short and long term health and condition;
    - Produce findings of the AIA survey in a written report including an Arboricultural Method Statement (AMS) for submission to the Local Planning Authority for approval.

The British Standard Institute publication *BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations* is referred to throughout this report. This is a nationally recognised standard typically used by Local Planning Authorities to assess planning applications. It is frequently referred to in planning conditions to enforce protection or control of works that may be harmful to trees both on and off the site.

This report has been produced in accordance with *BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations* for the sole use of our client (as detailed on the Title Page). Information provided by third parties including supplied plans/drawings used in the preparation of this report is assumed to be correct.

2.0 – Report Limitations

- *Assessments of all trees have been conducted using Stage 1 of the Visual Tree Assessment (VTA) method of inspection. (See Section 2.4).*
- *All observations of tree condition were undertaken from ground level, a visual assessment of external features only, assisted as required by the use of binoculars, a metal probe and a rubber mallet (used for audible resonance testing) where necessary. Below ground tree roots and buried parts were not inspected.*
- *The provided 'Topographical Survey with Proposed Extension' drawing from Hertford Planning Service (Drawing No. 13441-P006-B) has been used to create the Tree Constraints Plan (TCP) and Tree Protection Plan in the AIA report.*
- *Two additional trees which were not recorded on the Topographical Survey have been added to the TCP and TPP based on measurements recorded at the time of the tree survey, as site conditions allowed (T2 & T3).*
- *All measurements of tree heights, crown spreads and crown clearance from ground level are recorded to the nearest half metre for dimensions up to 10m and to the nearest metre for dimensions over 10m.*
- *Stem diameters are measured to the nearest 10mm, or where inaccessible, estimated based on the visible features and characteristics of the tree in question.*
- *Stem diameter measurements were recorded in accordance with methods detailed in Annex C (fig.C.1a-C.1f) as applicable for each individual tree and adjusted in accordance with Table D.1 of Annex D in BS 5837:2012 as required.*
- *Detailed background information is not known concerning the past history of the site, the soil type, geology or hydrology of the environs. No inspection material has been acquired by Tree Sense Arboricultural Consultants for assessment by a laboratory.*
- *Assessing the potential influence of trees upon load-bearing soils beneath existing and proposed structures, resulting from water abstraction by trees on shrinkable soils, was not included in the contract brief and is not, therefore, considered in any detail in this report. Tree Sense Arboricultural Consultants cannot be held responsible for damage arising from soil shrinkage or heave issues related to the retention or removal of trees on site.*
- *The author of the AIA report does not have formal qualifications in the areas of structural engineering or law. However, making comment on such matters from an arboricultural perspective is both within the normal scope of our instructions and also within the range of the author's experience. Notwithstanding this, specialist professional advice should be sought to clarify/confirm any observations on engineering or legal matters that this report may contain.*
- *The recommendations made in this report relate to the assessment of the trees and their surroundings at the time of inspection.*
- *Treatment recommendations assume that the client understands that tree management is a continuing process, requiring regular attention and that as part of this process the condition of the trees should be thoroughly reassessed at regular, timely intervals, with hazard checks after periods of likely tree stress, e.g. after periods of severe weather.*
- *Weather conditions were dry and bright on the day of the tree survey 23rd May 2019).*
- *Where a tree is subject to a Tree Preservation Order (TPO) and/or stands within a designated Conservation Area, it will be necessary for the tree owner or his/her appointed agent to ensure appropriate compliance with planning requirements, before any recommended, non-urgent treatments can be undertaken. (See Section 12.0).*
- *The AIA report is provided to detail impartially the potential tree constraints posed to the development proposal as identified at the site and detail the tree protection measures and methodologies to be employed, in the interest of safeguarding the short and long term health of significant nearby trees.*
- *The AIA does not provide any guarantees that the associated Local Planning Authority (LPA) will agree with the opinion of the Consulting Arboriculturist, or grant planning consent based on the content and findings of the AIA report.*
- *This report is compiled into a single PDF file designed for electronic release. If printing this document, please note that the plan drawings may be a different size or orientation to the standard A4 / portrait of the rest of the report. Some PDF reader software may also automatically adjust the size of drawings included in this report.*
- *The Tree Constraints Plan (TCP) and Tree Protection Plan (TPP) are drawn to the scale indicated in Sections 8.1 and 9.1.1 respectively and feature a scale bar for cross reference purposes.*

2.1 – Time Limits

It should be understood that trees are not static objects, but growing, living organisms; and their condition, size and relationship to buildings and other trees can change significantly and sometimes unpredictably over a period of time. Therefore this report has a validity period of 12 months from the date of publication and is subject to any suggested management recommendations being undertaken within the correct time frames.

2.2 – Severe Weather Limitations

Impacts of severe drought, storm, inundation, land slip or subsidence are not covered by this report.

2.3 – Tree Safety Matters / Tree Risk Assessment

The Arboricultural Impact Assessment (AIA) in accordance with *BS 5837:2012 (Trees in relation to design, demolition and construction - Recommendations)* is carried out in sufficient detail to gather data for and to inform the current project.

Our appraisal of the structural integrity of trees on and adjacent (if applicable) to the site is of a preliminary nature and sufficient only to inform the current development proposal. The tree assessment is carried out from ground level as is appropriate for this type of survey, without invasive investigation.

The disclosure of hidden tree defects cannot therefore be expected. Whilst the survey is not specifically commissioned to report on matters of tree safety, we report obvious visual defects that are significant in relation to the existing and proposed land use. As such, General Management Recommendations (GMR) or Preliminary Management Recommendations (PMR) may be made regarding the assessed trees, in respect of good urban tree management.

2.4 – Visual Tree Assessment (VTA)

The Visual Tree Assessment (VTA) method of inspection is an internationally recognised tree hazard assessment method developed by Prof. Claus Mattheck: *Body Language of Trees – a handbook for failure analysis (HMSO, 1994).*

The basis of VTA is the identification of (external) symptoms which a tree produces in reaction to a weak spot or area of mechanical stress. These can then be interpreted in terms of potential direct impact hazard features within a tree.

The VTA method of inspection does not allow for opinions to be made concerning the risk of a trees potential to cause indirect impact on nearby structures. Indirect impact refers to potential problems caused by changes in soil moisture content in shrinkable soils (i.e. those soils with a high clay content); to which trees can be a contributing factor.

The tree inspection survey undertaken at the above site was conducted in accordance with Stage 1 of the VTA process.

3.0 – Process

The development proposal at Vine House is currently in the feasibility, planning and design stage. The Arboricultural Impact Assessment (AIA) in accordance with *BS 5837:2012 Trees in relation to design, demolition and construction - Recommendations* was commissioned to be undertaken as part of the feasibility study at the planning stage of the process.

The elements of the AIA at this stage in the process were to undertake the tree survey, categorise the trees and identify the tree constraints to the development, with a view to assisting with the conceptual design and feasibility of the proposal.

The identified tree constraints should inform and assist with the scheme design, including advising on any necessary engineering solutions and demolition/construction methods which will need to be explored to minimise potential damage to retained trees in the short and long term, both above and below ground level. Additionally, the identified constraints will also later determine the specification and positioning of tree protection measures to be employed at the site, to safeguard the trees above and below ground throughout the development process to completion.

Following the identification of tree constraints, the AIA evaluates the identified direct and indirect effects of the proposed design in relation to nearby trees. The assessment will consider the effect of any tree loss or damaging activities proposed in the vicinity of retained trees. Activities such as:

- *Removal of existing structures or hard surfacing;*
- *Installation of new hard surfacing;*
- *The location and dimensions of all proposed excavations or alterations in ground levels;*
- *Construction of any new structures above ground level.*

In addition to the permanent works, account should be taken to the buildability of the scheme in terms of access, plant machinery use, adequate operational space and provision for the storage of materials including topsoil, without inflicting damage to the retained trees. Post development pressure on nearby trees must also be closely considered and assessed.

As well as an evaluation of the extent of the impact on existing trees, the AIA includes and details within this document:

a) The tree survey data;

b) Trees selected for retention, clearly identified (e.g. by number) and marked on a plan with a continuous outline;

c) Trees to be removed, also clearly identified (e.g. by number) and marked on a plan with a dashed outline or similar;

d) Trees to be pruned, including any access facilitation pruning, also clearly identified and labelled or detailed as appropriate;

e) Areas designated for structural landscaping that need to be protected from construction operations in order to prevent the soil structure being damaged;

f) Evaluation of impact of proposed tree losses (if applicable);

g) Evaluation of tree constraints and production of a draft tree protection plan including details of tree protection measures;

h) Issues to be addressed by an arboricultural method statement where necessary in conjunction with input from other specialists associated with the project.

4.0 – General Site Observations

The property at Vine House features a large detached dwelling, with private gardens to the east and west of the main house. An existing boiler house/green house structure features off of the east side elevation.

A driveway and detached single storey garage feature to the north of the site, which are accessed via a gated entrance and crossover from Holford Road. The topography of the driveway slopes downwards west to east towards the crossover onto Holford Road, in relation to the approximate ground floor level of the house and gardens. The property is also accessible via a pedestrian entrance gate from Hampstead Square, where once inside the boundary, the east and west side gardens can be accessed via internal gated access points, which lead directly into each of the garden areas. Paved patio surfaces feature off of both the east and west elevations of the house and all boundaries of the site feature established brick walls which surround and enclose the property.

Both gardens are well maintained, predominantly lawn surfaced and feature a number of significant trees, in addition to numerous ornamental shrubs and under storey planting.

Notably, a mature *Magnolia grandiflora* tree is growing in very close proximity to the area of proposed development *(boiler house/ green house).* The tree appears to have been originally planted within a low raised planting bed of brick construction, which it has long since outgrown. Major roots have caused significant structural damage to the retaining wall, which has cracked and separated in a number of places. Two large fractures are present in the south facing retaining wall, with major roots breaking the surface of the soil within the planting bed. The stem, buttressing and major roots of the tree are also directly impacting on the southern elevation of the boiler house. A large longitudinal crack is visible on the external south elevation of the boiler house wall behind the tree and is mirrored internally also, with further horizontal cracking observed along the brickwork. Additionally, a number of paving slabs which form the nearby patio area have also lifted and distorted in places, which can be attributed to the presence of shallow, major roots belonging to the tree exerting forces against the underside of the paving slabs, as they have extended over time into the preferable soil environment of the soft landscaped garden. *(See Appendix C – Supporting Photographs).*

The property is a Grade 2 listed building and is located within The Hampstead Conservation Area.

For the purposes of the Arboricultural Impact Assessment (AIA), eleven on site trees were recorded; six in the east garden and five in the west garden.

Details of the individual tree surveyed for inclusion in the AIA can be found in the Individual Tree Data Table in Section 5.0 below, with additional tree data notes provided in Section 5.2.

5.0 – Individual Tree Data

Tree No.	Species	Height (m)	Stem Diameter (mm)	Branch Spread (m)	First Significant Branch Height and Direction of Growth (m)	Canopy Height (m)	Life Stage	General Comments Inc. Physiological and Structural Condition	Preliminary / General Management Recommendations	Estimated Remaining Contribution (Years)	Category
1	*Magnolia (Magnolia grandiflora)*	10	1 – 250 2 – 150 SE – 275	N – 3 E - 4 S – 3 W – 4	1 – S	2	M	Physiological Condition – Good Structural Condition – Fair Originally planted within a low retaining bed of brick construction in close proximity to the south elevation of the boiler house. Direct impact from the stem, buttressing and major roots have caused structural damage to the walls of the retaining bed and the boiler house as the tree has incrementally increased in size over its lifetime. Major roots beneath the nearby paved patio surface have also caused slabs to lift and become distorted. (See Appendix C – Supporting Photographs) (SEE TREE CONSTRAINTS ASSESSMENT SECTION 8.2)	***Remove tree;*** ***Remove stump using a stump grinder;*** ***Remove and dispose of all arisings accordingly.*** (SEE TREE CONSTRAINTS ASSESSMENT SECTION 8.2)	<10	C 1
2	*Silver Birch (Betula pendula)*	8	75	N – 2 E - 2 S – 2 W – 2	2.5 – W	4	Y	Physiological Condition – Good Structural Condition – Good Young tree, balanced crown.	–	10+	C 1
3	*Ceanothus.sp (Ceanothus)*	4	150	N – 1 E - 1 S – 2 W – 1	1.5 – S	1	M	Physiological Condition – Fair Structural Condition – Fair Some low crown dieback.	–	<10	C 2
4	*Maidenhair (Ginkgo biloba)*	11	6 @ avg. 120 SE – 300	N – 4 E - 4 S – 2 W – 3	3 – E	3	SM	Physiological Condition – Good Structural Condition – Fair Some minor sized deadwood visible in the crown. Included bark in places where co-dominant stems have become fused.	–	20+	B 1
5	*Hawthorn (Crataegus monogyna)*	10	350	N – 3 E - 4 S – 2 W – 4	2 – N	3	M	Physiological Condition – Good Structural Condition – Fair Dense Ivy growth on the main stem and into the crown framework, restricting close structural assessment.	***Remove Ivy from the crown and stem.***	10+	C 1

Tree No.	Species	Height (m)	Stem Diameter (mm)	Branch Spread (m)	First Significant Branch Height and Direction of Growth (m)	Canopy Height (m)	Life Stage	General Comments Inc. Physiological and Structural Condition	Preliminary / General Management Recommendations	Estimated Remaining Contribution (Years)	Category
6	*Acer* *(Acer japonica)*	9	8 @ avg. 120 SE – 350	N – 5 E - 5 S – 5 W – 5	1 – NW	2	M	Physiological Condition – Good Structural Condition – Good Well balance crown, some minor sized deadwood visible. Good foliage cover, good vitality.	_	20+	B 1
7	*Magnolia* *(Magnolia grandiflora)*	8	1 – 150 2 – 150 3 – 150 4 – 150 5 – 100 SE – 325	N – 1 E - 6 S – 5 W – 3	1 – E	2	SM	Physiological Condition – Good Structural Condition – Fair Located in the planting bed on the north side of the garden. Growth bias to the south and east. Some crossing framework branches. South and east spreading branches in close contact with the north side elevation of the house and the western elevation of the garage.	***Prune to reduce the south and east spreading branches by 2m, to clear away from structures and balance the crown.***	10+	C 1, 2
8	*Magnolia* *(Magnolia grandiflora)*	8	1 – 150 2 – 125 SE - 200	N – 1 E - 3 S – 5 W – 2	2 – SE	2	SM	Physiological Condition – Good Structural Condition – Fair Located in the planting bed on the north side of the garden. Similar south east growth bias to T7, but not in contact with any structures.	_	10+	C 1, 2
9	*Tulip* *(Liriodendron tulipifera)*	15	500	N – 5 E - 5 S – 6 W – 5	3 – E	4	SM	Physiological Condition – Good Structural Condition – Good Dominant tree in the west side garden, centrally located. Single tapering stem with a balanced crown framework Major and minor sized deadwood is visible in the crown.	***Crown clean to remove all hazardous deadwood.***	20+	B 1
10	*Wild Cherry* *(Prunus avium)*	9	275	N – 2 E - 5 S – 4 W – 4	2 – E	2	M	Physiological Condition – Poor Structural Condition – Poor Located in a raised bed at the western end of the garden. |Significant crown dieback, major and minor sized deadwood in the crown. Fruiting body of *Ganoderma.sp* fungus on the east side of the stem base. *Ganoderma* is a parasitic disease which causes white heart rot to the base of the stem and roots of broadleaved trees and invariably leads to stem failure. Considering where T10 is located within the garden, the condition of the tree and presence of *Ganoderma* fungus, retention of the tree exceeds the risk tolerance level. (See Appendix C – Supporting Photographs)	***Remove tree;*** ***Remove stump using a stump grinder;*** ***Remove and dispose of all arisings accordingly.***	_	U

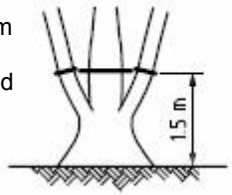
Tree No.	Species	Height (m)	Stem Diameter (mm)	Branch Spread (m)	First Significant Branch Height and Direction of Growth (m)	Canopy Height (m)	Life Stage	General Comments Inc. Physiological and Structural Condition	Preliminary / General Management Recommendations	Estimated Remaining Contribution (Years)	Category
11	*Wild Cherry (Prunus avium)*	9	275	N – 3 E - 4 S – 4 W – 3	3 – NE	3	M	Physiological Condition – Poor Structural Condition – Poor Located in a raised bed at the western end of the garden. |Significant crown dieback, major and minor sized deadwood in the crown. Numerous fruiting bodies of *Ganoderma.sp* fungus on the northwest side of the stem base. *Ganoderma* is a parasitic disease which causes white heart rot to the base of the stem and roots of broadleaved trees and invariably leads to stem failure. Bark delamination and probe testing the area suggests heartwood decay is onset. Considering where T11 is located within the garden, the condition of the tree and presence of *Ganoderma* fungus, retention of the tree exceeds the risk tolerance level. (See Appendix C – Supporting Photographs)	***Remove tree;*** ***Remove stump using a stump grinder;*** ***Remove and dispose of all arisings accordingly.***	_	U

5.1 - Key to Table 5.0

1) Height describes the height of the tree from ground level in metres.
2) Stem Diameter is the diameter of the trunk in millimetres, measured at 1.5m from ground level. For multi stemmed trees*, a single stem diameter equivalent (SE) is calculated and indicated beneath the measurements of each separate stem. (Est.) indicates the stem diameter was estimated due to the tree being obscured and/or inaccessible to measure.
3) Branch Spread is the average length of branch spread from the centre of the tree in the direction of each cardinal point in metres.
4) First Significant Branch Height and Direction of Growth – Clearance height from the ground of the first major structural branch of the trees' crown and its direction of growth.
5) Canopy Height is the distance between the lowest visible canopy branches and ground level in metres.
6) Life Stage is represented as: Y= young (*in first third of life expectancy*), SM = Semi Mature (*in second third of life expectancy*), M= Mature (*final one third of life expectancy*). Trees considered to be beyond their likely life expectancy are normally classed as OM = Over Mature or V = Veteran.
7) Physiological Condition relates to the vitality of the tree, Structural Condition relates to the presence of structural defects. *(i.e. dead branches, cavities, splits, included bark etc.)*
8) Estimated Remaining Contribution is an indication of the minimum useful contribution the tree will provide.
9) Preliminary Management Recommendations detail any additional arboricultural practices to be undertaken before construction activity begins. General Management Recommendations (GMR) may also be indicated and relate to tree surgery management works which are recommended in respect of good tree management and are not made in the context of a potential development project. (See Section 5.2).
10) Category grading is based on tree categorization guidelines provided within The British Standard 5837:2012 Trees In relation to design, demolition and construction - Recommendations (See 6.0 below)

*= Stem diameter measurements:

T1, T4, T6, T7 and T8 feature more than one stem at 1.5m above ground level. As such, a single stem equivalent has been calculated and recorded for these trees, based on the measuring method shown in *Fig. C.1f in Annex C of BS 5837:2012*, as required.



f) Measurement of a tree with more than one stem at 1.5 m above ground level

- Major deadwood = over 25m diameter, Minor deadwood = under 25mm diameter.

PMR = Preliminary Management Recommendation - i.e. VTA Stage 2/3, semi invasive tree condition investigations (Tomography/Resistograph testing etc.) or climbed tree inspection.

GMR = General Management Recommendation – i.e. Tree surgery management works (pruning, felling etc, including Access Facilitation Pruning). ***For on site trees which are under the management control of the applicant.***

GMR ADVISORY = General Management Recommendation – i.e. Tree surgery management works (pruning, felling etc, including Access Facilitation Pruning). ***For off site trees which are NOT under the management control of the applicant.***

5.2 – Tree Data Notes

The trees detailed individually in Section 5.0 above are those which were considered in the Arboricultural Impact Assessment (AIA).

*General Management Recommendations – (GM*R) for tree surgery works may have been made in the interest of good tree management and are not necessarily required in relation to the proposed development project.

Preliminary Management Recommendations – (PMR) may have been made where *further investigation into tree health and condition is required before a decision can be made concerning the safe retention of a tree.

**Further investigation normally refers to (but is not restricted to):*

- *Stage 2/3 of the Visual Tree Assessment (VTA) process, which involves semi invasive testing with Tomography, Resistograph and Fractometer equipment on areas of the tree where a significant internal structural defect is suspected following the Stage 1 VTA.*
  Stage 2/3 VTA can determine in much greater detail the extent and severity of suspected internal wood decay and/or structural defects and also determine the strength of supporting wood tissue.

- *Recommendations for a climbed inspection to be undertaken, to assess the upper sections of the tree stem or crown, where a significant structural defect is suspected but could not be quantified during the Stage 1 VTA undertaken from ground level.*

Any tree surgery work recommended must be undertaken following the correct procedures relating to trees protected by Tree Preservation Orders (TPO), or which are growing within a designated Conservation Area, where applicable to both on site and off site trees. (See Section 12.0)

Any works recommended to be undertaken to off site trees which are outside of the management responsibility of the applicant, must also be permissible by the tree owners, except in situations where Common Law allows. (The Statutory Protection process as above still applies where relevant).

Any *General Management Recommendation (GMR)* which may have been made to remove hazardous trees, deadwood from crowns, or removal of invasive climbing vegetation (such as Ivy) from TPO or Conservation Area trees does not require permission from the Local Authority before actioning. However, it is considered good practice to inform the Local Authority of any intended emergency tree removals and/or deadwood and Ivy removal works. In the case of complete tree removal emergencies, taking before and after photographs is strongly recommended.

Advisory GMRs are made in the interests of good tree management and should be brought to the attention of those who own or have the responsibility to manage the trees concerned.

All recommended tree work must be undertaken in accordance with guidelines set out in *BS 3998:2010 Tree work – Recommendations (As updated). (See Section 10.3).*

The following sections provide information regarding the categorisation of the surveyed trees and the tree constraints which have been identified at the site.

6.0 – Tree Categorisation

The purpose of Tree Categorisation as detailed in *BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations*, is to identify the quality and value of existing tree stock, allowing informed decisions to be made concerning which tree(s) should be retained or removed should development occur. This process is the starting point of the tree survey, following a land survey and should ideally, be undertaken before any site design or layout is proposed.

Trees are given a category grading based on individual tree assessment, in line with the categorisation methodology as detailed in Table 1 of *BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations.* Table 1 is reproduced as an informative below:

Table 1 **Cascade chart for tree quality assessment**

Category and definition	Criteria (including subcategories where appropriate)			Identification on plan
Trees unsuitable for retention (see Note)				
Category U Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years	• Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees (e.g. where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning) • Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline • Trees infected with pathogens of significance to the health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality *NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve; see 4.5.7.*			See Table 2
	1 Mainly arboricultural qualities	**2 Mainly landscape qualities**	**3 Mainly cultural values, including conservation**	
Trees to be considered for retention				
Category A **Trees of high quality** with an estimated remaining life expectancy of at least 40 years	Trees that are particularly good examples of their species, especially if rare or unusual; or those that are essential components of groups or formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue)	Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture)	See Table 2
Category B **Trees of moderate quality** with an estimated remaining life expectancy of at least 20 years	Trees that might be included in category A, but are downgraded because of impaired condition (e.g. presence of significant though remediable defects, including unsympathetic past management and storm damage), such that they are unlikely to be suitable for retention for beyond 40 years; or trees lacking the special quality necessary to merit the category A designation	Trees present in numbers, usually growing as groups or woodlands, such that they attract a higher collective rating than they might as individuals; or trees occurring as collectives but situated so as to make little visual contribution to the wider locality	Trees with material conservation or other cultural value	See Table 2
Category C **Trees of low quality** with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150 mm	Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories	Trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value; and/or trees offering low or only temporary/transient landscape benefits	Trees with no material conservation or other cultural value	See Table 2

To easily identify the category grading for each tree assessed for inclusion in the AIA, all tree identification numbers on the Tree Constraints Plan(s) and Tree Protection Plan(s) are shown in a colour which represents the tree's category grading. Table 2 below, again reproduced from *BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations*, details the identification colours to be used for each category grade:

Table 2 **Identification of tree categories**

Category (from Table 1)	Colour [A)]	RGB code [A)]
U	Dark red	127-000-000
A	Light green	000-255-000
B	Mid blue	000-000-255
C	Grey	091-091-091

[A)] Colours verified against http://safecolours.rigdenage.com/palettefiles.html#files [viewed 2012-03-26].

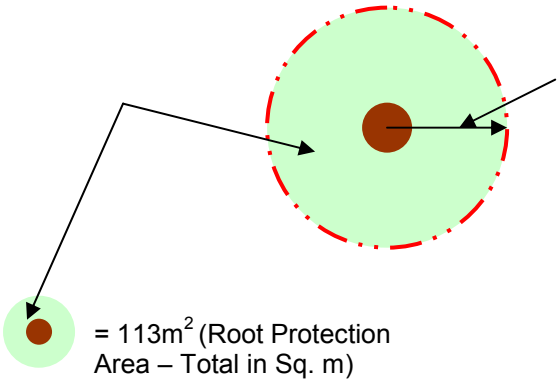
Once it has been established which trees can and are suitable to remain and are worthy of retention, necessary measures to protect them throughout the course of the development project must be undertaken.

7.0 - Tree Constraints

The tree constraints are the influences the trees will have below and above ground level in relation to the development proposal. The below ground constraints are represented by the trees Root Protection Area (RPA), the above ground constraints are represented by the trees size and position, including shading patterns caused by crown density and spread which may affect light into newly developed buildings.

7.1 - RPA (Root Protection Area) – (Below Ground Constraints)

The nominal RPA radius is taken from the centre of the tree stem, encircling the tree to give the RPA Area (example based on T9 shown below) **:



** Tree root systems do not necessarily show the symmetry indicated in the above example, the development of all roots is influenced by the availability of water, nutrients, oxygen and soil penetrability. As far as these conditions allow, the root system tends to develop sufficient volume and area to provide physical stability.

The following table indicates the calculated Root Protection Areas (RPA) for the trees which were assessed as part of the Arboricultural Impact Assessment (AIA).
The RPAs have been calculated using stem diameter measurements (taken at 1.5m above ground level) collected at the time of the tree survey and are detailed in Table 5.0.
RPA calculations are made using formulae detailed in *BS 5837:2012 Trees in relation to design, demolition and construction - Recommendations* – Section 4.6 and Table D.1.

Tree No.	RPA Radius (m)	RPA Area (m^2)
1	3.3	34
2	0.9	3
3	1.8	10
4	3.6	41
5	4.2	55
6	4.2	55
7	3.9	48
8	2.4	18
9	6	113
10	3.3	34
11	3.3	34

Green = Tree to be retained

Red = Tree to be removed

7.2 – Above Ground Constraints

The above ground constraints caused by tree heights and the spread of branches can pose constraints to the development project in respect of demolition work, new building design, position and operational space requirements.

For example, if the lateral branch spread of a tree extends into areas where development activity is likely, there is a risk of potential direct impact from site machinery and construction activity on the tree crowns which may cause damage to limbs and branches. Tree stems and exposed buttress roots are also above ground constraints which need to be considered in respect of possible impact damage to them. Post development pressure is also of material consideration in respect of future tree pruning requirements and frequency following completion of the development.

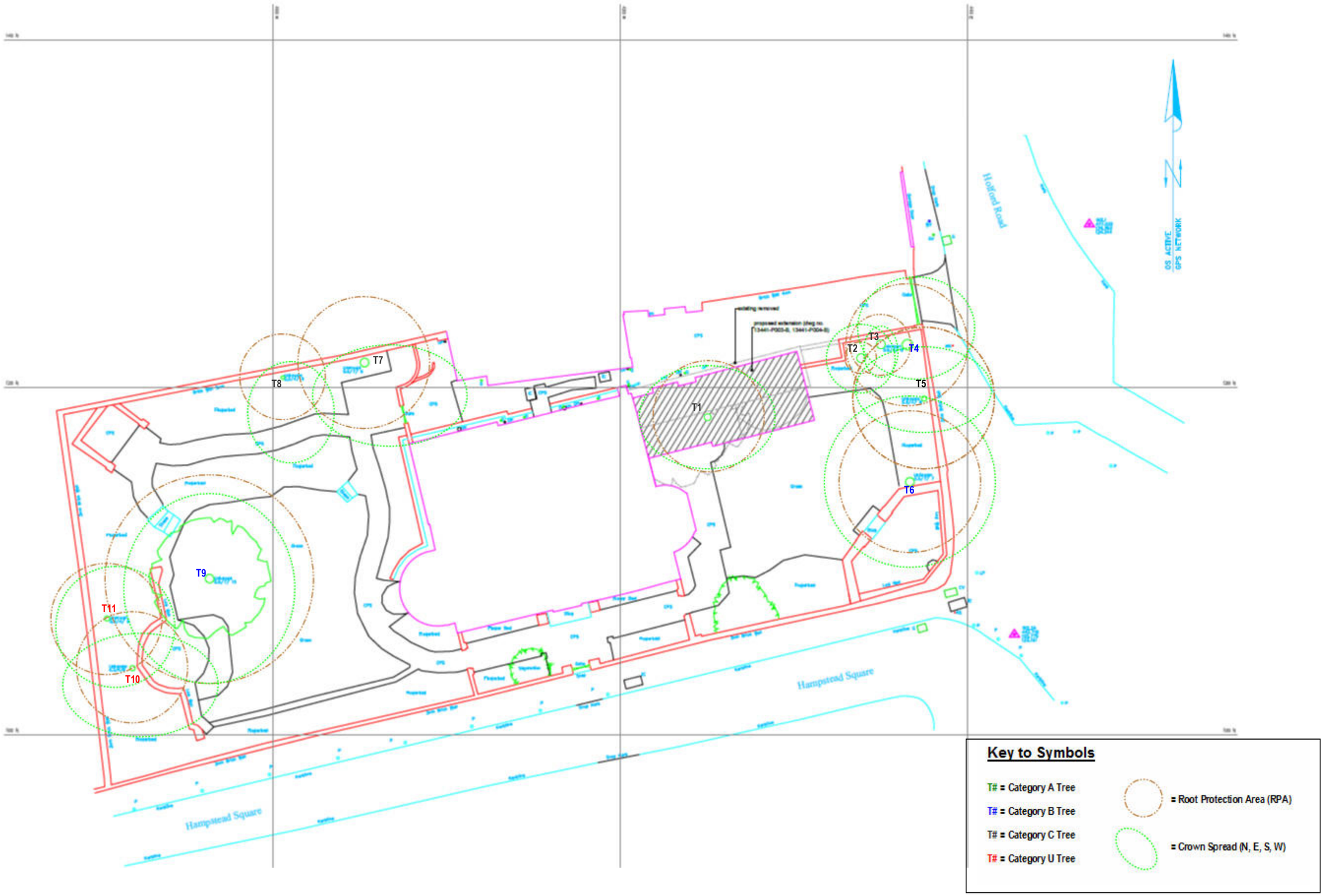
Shading issues should also be considered in respect of tree size, form and position in relation to the proposed new structure.

Species characteristics such as density of foliage, and whether trees are deciduous or evergreen are important factors to consider in respect of shading issues, which may affect light levels into buildings.

Any proposals for above ground service installations such as telecommunication cables should also be considered with close reference to the above ground constraints posed by the trees at the development site, their location and their crown spreads.

The Tree Constraints Plan (TCP) in Section 8.0 below indicates the above and below ground constraints of all relevant trees at and adjacent to the site, with comments relating to the identified constraints in Sections 8.1 and 8.2. Canopy heights (ground clearance) and crown spread measurements are recorded in the Individual Tree Data Table in Section 5.0.

8.0 – Tree Constraints Plan (TCP)



Key to Symbols

T# = Category A Tree

T# = Category B Tree

T# = Category C Tree

T# = Category U Tree

= Root Protection Area (RPA)

= Crown Spread (N, E, S, W)

8.1 - Tree Constraints Plan (TCP) Notes:

The Tree Constraints Plan (TCP) in Section 8.0 is shown to approximate 1:200 scale based on the 'Topographical Survey with Proposed Extension' drawing (Drawing No. 13441-P006-B*)* provided.

The TCP is provided only to indicate the position, category and numbering of the surveyed trees and provide an indication of the tree constraints by showing a graphic of the calculated nominal Root Protection Areas (RPA) and tree crown spreads.

RPA measurements can be found in the RPA table in section 7.1, crown spread measurements can be found in table 5.0 above.

Only the RPA measurements detailed in section 7.1 are to be used to measure out and determine the positioning and installation of the Construction Exclusion Zone (CEZ) fencing and ground protection at the site, unless otherwise detailed or advised in Sections 9.0-10.1.

As described in section 7.1 above, tree root systems do not necessarily show the symmetry indicated on the above Tree Constraints Plan, the development of all roots is influenced by the availability of water, nutrients, oxygen and soil penetrability. As far as these conditions allow, the root system tends to develop sufficient volume and area to provide physical stability.

Using the formula described in *BS 5837:2012 Trees in relation to design, demolition and construction - Recommendations* (Section 4.6 of the standard), the calculated RPA should be shown as a nominal circle on the Tree Constraints Plan with a radius based on 12 times the stem diameter for a single stem tree.

The symmetry of the calculated nominal RPAs shown for all of the assessed trees bar T9, is not an accurate depiction of the likely root distribution for these trees.

T3 – T6 in the east side garden are growing at a ground level which is raised in relation to the adjacent street (Holford Road), with a high brick wall dictating the boundary line. Therefore, where the nominal RPAs are shown to extend beyond the eastern boundary, this is not a true reflection of the trees' root morphology and distribution. Due to the restrictive nature of the boundary wall and the ground level differences, roots being adventitious are most likely to divert and concentrate within the soft landscaped area of the garden.

Similarly, T7 and T8 in the west side garden are growing close to the north boundary wall with the neighbouring building in close proximity beyond the boundary. As such, the likely root morphology for these trees is assumed to follow the same distribution strategy within the soft landscaped areas of the garden.

T9 is growing within the central portion of the west side garden lawn and as such, the nominal RPA shown is a much more accurate representation of its root morphology. The presence of a retaining wall which creates a raised bed to the west of T9 may present some restriction of root distribution westwards, but not significantly.

In all cases, the above site observations and factors are taken into account and additional precautionary tree protection measures are to be employed in the form of temporary ground protection over lawns and soft landscaped areas in both gardens. Extending the fencing to create larger Construction Exclusion Zones (CEZ) would not be practicable due to the restriction this would cause in terms of site access, operations and reduce areas selected for material storage/preparation.
(See tree Protection Plan (TPP) in Section 9.1)

8.2 – Tree Constraints Assessment

The identified constraints shown on the Tree Constraints Plan (TCP) in Section 8.0 were established following the tree survey, using data collected at that time.
The tree constraints are to be used to assist with the final design and feasibility of the proposal and to later determine the layout of tree protection measures to create the Construction Exclusion Zones (CEZ) at the site.

Below is an assessment of the identified tree constraints in relation to the development proposal, following the tree survey undertaken on the 23rd May 2019:

Below Ground – Root Protection Area (RPA) Incursion - (New single storey extension)

- **Trees Affected:**
  - None.
- **Comments:**
  - *T1 is causing structural damage through direct impact from the stem and major roots to the existing boiler house structure and regardless of the proposed new extension, the tree will need to be removed. (See Appendix A – Supporting Photographs).*
  - *The damage to the building has also been assessed by a Structural Engineer, who has reached the same conclusion concerning the necessary removal of T1.*
  - Following the removal of T1, the proposed single storey extension footprint does not incur on the calculated RPA for the retained trees, as shown on the Tree Constraints Plan (TCP) and Tree Protection Plan (TPP) in Sections 8.0 and 9.1 respectively.

The RPAs shown for retained trees are indicated on the Tree Constraints Plan (TCP) by a nominal circle around each tree. The circle is based on the RPA radius, as calculated using the stem diameter measurement for each tree, taken at 1.5m above ground level. RPA calculations for all assessed trees can be found in Section 7.1 above.

- **Arboricultural Impacts:**
  - None.
- **Controls:**
  - N/A.

Below Ground – Root Protection Area (RPA) Incursion - (New underground services)

- **Trees Affected:**
  - None.
- **Comments:**
  - No new trenches for underground services are proposed to be excavated inside any of the calculated RPAs for the retained trees.
- **Arboricultural Impacts:**
  - N/A.
- **Controls:**
  - N/A.

8.2 – Tree Constraints Assessment – Cont'd

Below Ground – Root Protection Area (RPA) Incursion - (New outside hard surfacing)

- **Trees Affected:**
  - None.
- **Comments:**
  - No new hard surfacing is proposed in the context of the new extension proposal. Sections of the existing patio may be repaired following the removal of T1 without any tree related constraints.
  - A new bin store area is to be created by cutting in from the existing driveway, which will involve some ground level lowering of the east side garden to achieve.
- **Arboricultural Impacts:**
  - No RPAs are shown to be affected; however, there is some potential for root loss through severance during ground lowering works.
- **Controls:**
  - Where the new bin store is proposed to be cut in to the east side garden from the driveway, all excavation works must be undertaken using hand tools only to create the space for the new bin store.
  - Any tree roots exposed during excavation works which measure over 25mm in diameter must not be severed and the project Arboriculturist consulted.

Below Ground – Root Protection Area (RPA) Incursion in areas of unmade ground - (Site access & operations)

- **Trees Affected:**
  - T2, T3, T4, T5, T6, T7, T8, T9.
  - T10 and T11 are to be removed due to their 'Category U' status – *(See Individual Tree Data Table in Section 5.0 and Appendix C – Supporting Photographs).*
- **Comments:**
  - The retained trees T2 – T9 all exhibit RPA sectors within the curtilage of the site boundaries and are therefore at risk of adverse impact from site related activity if not safeguarded.
- **Arboricultural Impacts:**
  - Soil compaction of unmade ground inside RPAs – by plant machinery (if required) and/or pedestrian movements and operations over the existing unmade ground.
  - Soil compaction inside RPAs by storing bulk building materials on unmade ground.
  - Soil contamination inside RPAs – contaminate waste storage, spilt contaminates (fuels, cement etc.)
- **Controls:**
  - *(Refer also to the Tree Protection Plan (TPP) in Section 9.1).*
  - Barrier fencing to create a Construction Exclusion Zone (CEZ) in the east side garden is to be installed as shown on the Tree Protection Plan (TPP) in Section 9.1, to allow sufficient access and operational space around the area where the new extension and renovation works are proposed.
  - Additional temporary ground protection measures are also to be installed over the remaining lawn area as an additional precautionary measure, to further ensure tree roots are not subjected to soil compaction or contamination throughout the development works. *(With consideration paid to the likely offset of the calculated nominal RPAs shown).*
  - Material storage areas are proposed to be set up in the west side garden.
  - Barrier fencing to create Construction Exclusion Zones (CEZ) is to be installed in the west side garden as shown on the Tree Protection plan (TPP) in Section 9.1.
  - The CEZ fencing will exclude all site related access into soft landscaped areas where RPAs for T7, T8 and T9 have been calculated.
  - Again, additional temporary ground protection measures are also to be installed over the remaining lawn area outside the CEZ fencing as an additional precautionary measure where building materials are proposed to be stored.

8.2 – Tree Constraints Assessment – Cont'd

- The temporary ground protection specification must be fit for purpose and it is understood that no wheeled or tracked plant machinery will be in operation at the site, only pedestrian access/operations.
- Suggested areas designated for material storage and preparation are indicated on the Tree Protection Plan (TPP) in Section 9.1. NO SITE ACCESS, STORAGE/PREPARATION OF MATERIALS OR WASTE IS PERMITTED INSIDE THE CEZ FENCING.
- No waste materials, fuels or other construction related waste is permissible inside the Construction Exclusion Zones (CEZ) at any time.
- All Construction Exclusion Zone (CEZ) fencing and temporary ground protection measures must be fully installed at the start of the project prior to commencement of any development works and remain undisturbed and in position throughout all development phases until completion.
- CEZ fencing and temporary ground protection measures must be the first apparatus installed during site set up and the last apparatus to be removed from the site on completion of the development works.

Above Ground – Crown heights / Crown Spread - (New structures above ground level)

- **Trees Affected:**
  - None.
- **Comments:**
  - The crown heights/crown spreads of all assessed trees do not pose an above ground constraint to the construction of the proposed single storey extension.
- **Arboricultural Impacts:**
  - None.
- **Controls:**
  - N/A.

Above Ground – Crown heights / Crown Spread - (The use of cranes, booms/jibs, skip lorries)

- **Trees Affected:**
  - None.

- **Comments:**
  - No cranes are proposed to be in use at the site during the development phases.
  - The only on site location for skips to be located is on the north side driveway and If required, skips must not be positioned in close proximity to any trees on or off site, to allow for delivery and collection by skip lorries without impacting on tree crowns.
- **Arboricultural Impacts:**
  - Potential for direct impact on tree crowns/branches.

- **Controls:**
  - Skips are to be positioned away from all on site /off site trees to allow skip lorry lifting gear to operate without impact on tree branches. (I.e. on the driveway towards the garage).

8.2 – Tree Constraints Assessment – Cont'd

Above Ground – on/off site tree stems and buttressing - (All site activity)

- **Trees Affected:**
  - T2, T3, T4, T5, T6, T7, T8, T9

- **Comments:**
  - T1, T10 and T11 are to be removed prior to commencement of the development works.
  - All of the retained trees above are on site and will be excluded above ground level by the CEZ fencing installed as shown on the Tree Protection Plan (TPP) in Section 9.1.

- **Arboricultural Impacts:**
  - Direct impact damage to tree stems, buttressing and low hanging crown branches.

- **Controls:**
  - The stems and buttressing of T2 – T9 which are all on site trees will be wholly excluded behind the installed CEZ fencing in the east and west side gardens, as shown on the Tree Protection Plan (TPP) in Section 9.1.

  - All Construction Exclusion Zone (CEZ) fencing, hoarding and temporary ground protection apparatus must be installed at the start of the project and remain in position and undisturbed until completion of the development project.

The above assessment summarises the above and below ground level tree constraints identified at the site in relation to the development proposal, with a summary of tree protection control measures also provided. In terms of the associated construction works and site activity, all retained trees will need to be safeguarded by the installation of tree protection measures to prevent damage to them throughout the development phases. (See Tree Protection Sections 9.0 – 10.1 below).

The Arboricultural Method Statement (AMS) in Section 10.1 provides details of the tree protection and control measures to be employed at the site, to ensure the trees are safeguarded above and below ground level throughout the course of the development project and in the long term.

8.3 – Project Phasing

The following phasing of the development project is proposed:

- **Pre-development Phase 1** – Undertaking off all General Management Recommendations (GMR) tree surgery works.
- **Pre-development Phase 2** - Installation of all required tree protection measures (i.e. barrier fencing to create the on site Construction Exclusion Zones (CEZ) and all temporary ground protection measures as required).

- **Development Phase 1** – Construction of the new single storey extension and new bin store area.

- **Post-development Phase 1** – Remove all construction tools, machinery, scaffolding, waste, materials, skips, temporary units (site huts etc.) and any other construction related apparatus.
- **Post-development Phase 2** – Dismantle and remove the Construction Exclusion Zone (CEZ) fencing and temporary ground protection measures.

All tree surgery works recommended must be undertaken prior to commencement of the development phases and prior to the installation of the Construction Exclusion Zone (CEZ) fencing and temporary ground protection.

8.3.1 – Tree Surgery Works

The following section summarises the recommended tree surgery works which should be undertaken prior to commencement of the development phases.

- *Tree Removals:*
  - *T1, T10 and T11*
    - *Trees to be sectionally dismantled to ground level and stumps removed using a stump grinder;*
    - *All arisings to be removed from site and disposed of accordingly.*

- *Tree Pruning:*
  - *T9*
    - *Crown clean to remove all hazardous, major sized deadwood.*
  - *T7*
    - *Prune to reduce the south and east spreading branches by 2m, to clear away from structures and balance the crown.*

- *Ivy removal:*
  - *T5*
    - *Remove all Ivy growth form the stem and crown framework.*

9.0 – Construction Exclusion Zone (CEZ) – (General)

Retained trees on and/or in close proximity to the site must be protected by barriers and/or suitable ground protection before any materials or machinery are brought onto the site, and before any demolition or construction work commences.

Where all activity can be excluded from the tree's Root Protection Area (RPA), vertical barriers are to be erected to create a Construction Exclusion Zone (CEZ). Where, due to site constraints construction activity cannot be fully or permanently excluded in this manner from all or part of a trees' RPA in unmade ground, suitable temporary ground protection is to be installed over exposed RPA sectors.

The RPA measurements of the surveyed trees (as shown in section 7.1 above) are used to help determine the Construction Exclusion Zone (CEZ) around the trees, protecting them during the construction phases to eliminate the possibility of damage above or below ground level.

The CEZ is created by fencing off the area and/or installing suitable ground protection that is fit for purpose, using the calculated distance of the trees' RPA Radius as shown in the table in section 7.1 above.

The CEZ is required so that the calculated RPAs of trees remain undisturbed during the development process by excluding all activity from the area, or by protecting any exposed RPA sectors from pedestrian and vehicular traffic with suitable ground protection, if exposed outside of the barrier fencing. The CEZ should also be positioned to protect tree stems, buttress roots and any low tree branches which may travel beyond the calculated RPA. In these cases, barrier fences should be extended to incorporate low hanging crown branches behind them if possible.

The storage of building materials also must not occur within the CEZ. An area for storage of materials, fuels, spoil and the mixing of cement and concrete will be determined during the planning phase to ensure the RPAs of the trees are not affected. (See Arboricultural Method Statement (AMS) 10.1 below).

Materials which can be considered as contaminates such as cement, concrete mixings, spoil and fuels, whose accidental spillage would cause damage to a tree, should be stored and handled well away from the outer edge of any tree RPA. This also includes vehicle washings and care must be taken to ensure that sloping ground will not allow for contaminates to travel into the CEZ.

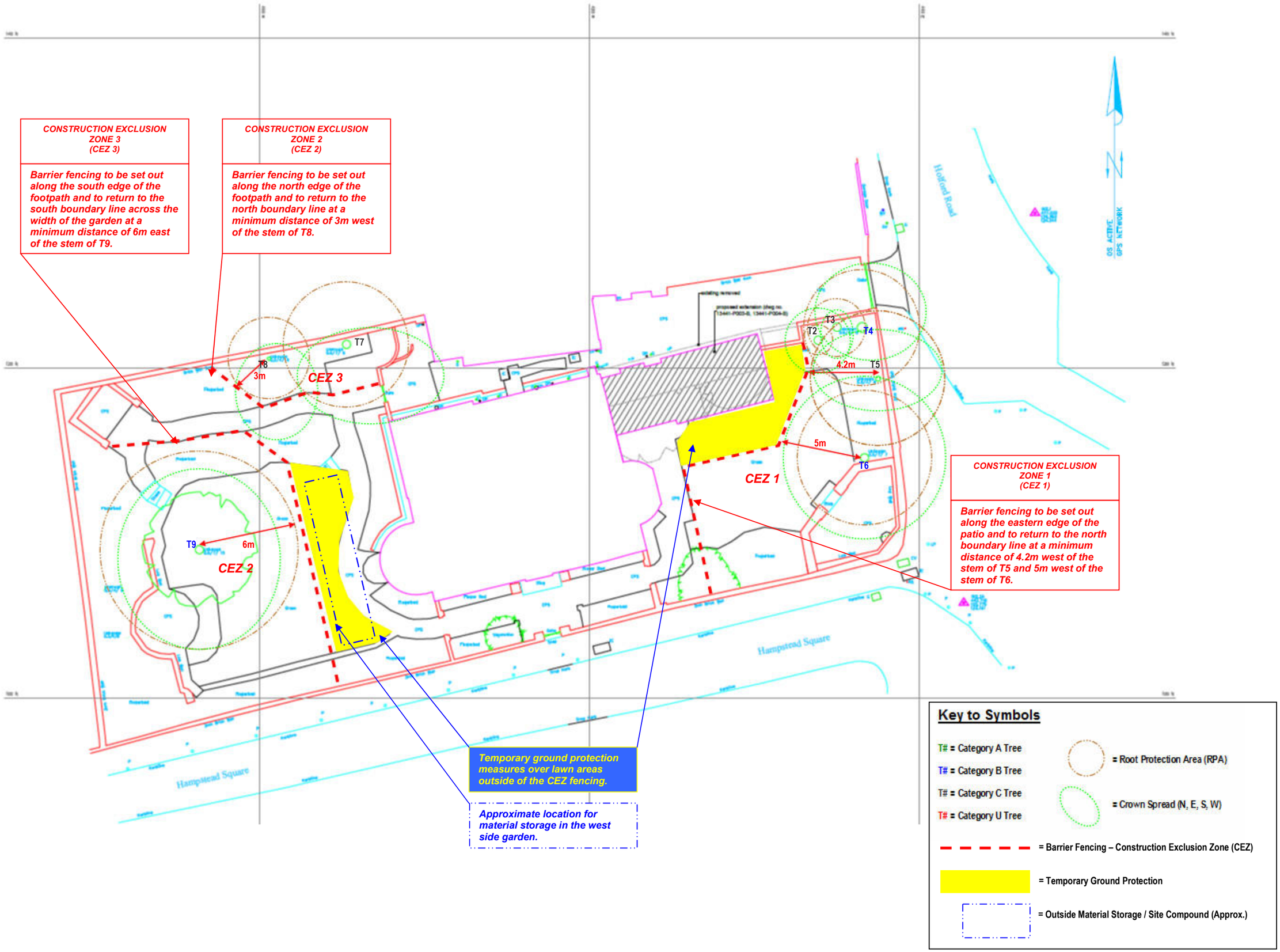
Fires on site should be avoided if possible. Where they cannot be avoided, they should not be lit where heat could affect foliage or branches. The potential size of the fire and wind direction should be taken into account when determining the fires location and it should be attended at all times until safe enough to leave. Notice boards, cables or other services must not be attached to the tree stems.

The CEZ must be considered as sacrosanct and not removed or altered without prior consultation with a Tree Sense Arboriculturist. The fencing should also display a sign with words to the effect of "Construction Exclusion Zone – Keep Out".

Care must also be taken to ensure that any site activity involving any cranes or vehicles with booms, jibs and counterweights can operate without coming into contact with the protected tree(s). CEZ fencing should be extended to encapsulate low spreading branches if they travel beyond the calculated RPA.

Direct impact from vehicles with tree crowns and stems can cause irreparable damage and may make their safe retention impossible. Consequently, any transit or traverse of plant in proximity to trees should be conducted under the supervision of a banksman, to ensure that adequate clearance from trees is always maintained

9.1 – Tree Protection Plan (TPP)



9.1.1 – Tree Protection Plan (TPP) Notes

The Tree Protection Plan (TPP) in Section 9.1 is shown to approximate 1:200 scale based on the 'Topographical Survey with Proposed Extension' drawing (Drawing No. 13441-P006-B*)* provided.

The TPP is provided only to indicate the position, category and numbering of the surveyed trees and provide an indication of the tree constraints by showing a graphic of the calculated Root Protection Areas (RPA) and relevant tree crown spreads.

Positions of barrier fencing and temporary ground protection measures are shown on the plan as required and are to conform to the specifications detailed in Section 9.2 and 9.3 respectively. Approximate locations for site compound/material storage areas outside the CEZs are also indicated.

Do not scale from this drawing, all dimensions to be checked on site using details provided in Sections 5.0 and 7.1.

Measurements annotated on the TPP (which are based on RPA calculations detailed in Section 7.1) are to be used to measure out and determine the positioning and installation of the Construction Exclusion Zone (CEZ) fencing and ground protection at the site, unless otherwise detailed or advised.

The indicated barrier lines to create the CEZs and temporary ground protection measures are suggested as the simplest and most effective layout to exclude all construction activity from the retained trees above and below ground level, throughout all development phases to completion.

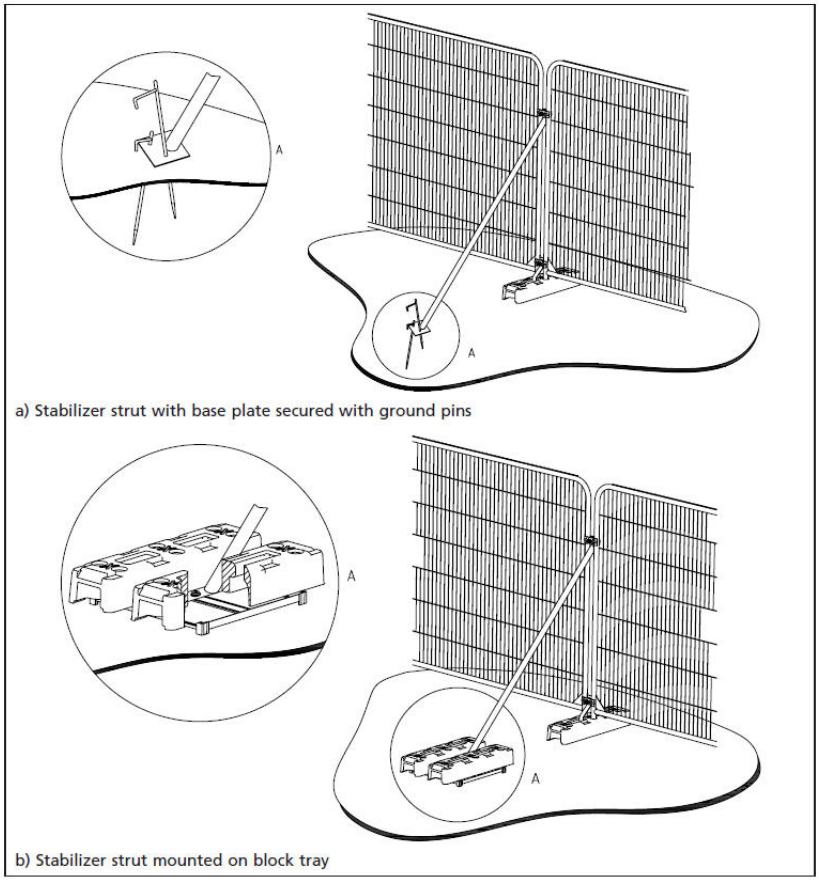
All required tree protection measures are to be installed before development work begins and after any Preliminary or General Management Recommendations have been completed. All tree protection measures are to remain in place and undisturbed throughout all development phases until completion.

The following sections detail the Construction Exclusion Zone fencing and ground protection specifications as detailed in BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations.

9.2 - Protective Barrier Specification

N.B - Barrier fencing should be fit for the purpose of excluding construction activity and appropriate to the degree and proximity of work being undertaken around them.

Figure 3 Examples of above-ground stabilizing systems



a) Stabilizer strut with base plate secured with ground pins

b) Stabilizer strut mounted on block tray

In the case of the development project at 2 Vine House, with consideration paid to the development intensity and prevailing ground conditions, barrier fencing to the specifications shown in Figure 3a will be the most suitable to create the Construction Exclusion Zone (CEZ) at the rear of the site.

Steel mesh "Heras" type fencing (minimum 2m height) with stabilizer struts and base plates secured with ground pins (as shown in Figure 3a above), will be used to create the Construction Exclusion Zones (CEZ) in the rear/side garden.

The CEZ fencing is to be installed to the layout as shown on the Tree Protection Plan (TPP) in Section 9.1 and positioned based on measurements and site features annotated on the TPP.

Additional temporary ground protection measures are also to be installed over soft landscaped areas outside of the CEZ fencing as an additional protection measure. (See Tree Protection Plan (TPP) in Section 9.1 and ground protection specification details in Section 9.3 below).

No site related access is permitted beyond the fence lines or inside the CEZs once installed, throughout all development phases.

The CEZ fencing must be installed prior to any site works commencing and must be the last apparatus to be removed from the site on completion, along with the temporary ground protection.

9.3 - Ground Protection Specification

Where construction working space or temporary construction access is justified within the RPA, this should be facilitated by a set-back in the alignment of the tree protection barrier.

In such areas, suitable existing hard surfacing that is not proposed for re-use as part of the finished design should be retained to act as temporary ground protection during construction, rather than being removed.

Where the set-back of the tree protection barrier would expose unmade ground to construction damage, new temporary ground protection should be installed as part of the implementation of physical tree protection measures prior to work starting on site.

New temporary ground protection should be capable of supporting any traffic entering or using the site without being distorted or causing compaction of underlying soil.

The ground protection might comprise one of the following:

a) For pedestrian movements only, a single thickness of scaffold boards placed either on top of a driven scaffold frame, so as to form a suspended walkway, or on top of a compression-resistant layer (e.g. 100 mm depth of woodchip), laid onto a geotextile membrane;

b) For pedestrian-operated plant up to a gross weight of 2 t, proprietary, inter-linked ground protection boards placed on top of a compression-resistant layer (e.g. 150 mm depth of woodchip), laid onto a geotextile membrane;

c) For wheeled or tracked construction traffic exceeding 2 t gross weight, an alternative system (e.g. proprietary systems or pre-cast reinforced concrete slabs) to an engineering specification designed in conjunction with arboricultural advice, to accommodate the likely loading to which it will be subjected.

In all cases, the objective should be to avoid compaction of the soil, which can arise from the single passage of a heavy vehicle, especially in wet conditions, so that tree root functions remain unimpaired.

For wheeled or tracked movements, within a tree RPA, the ground protection should be designed by an engineer to accommodate the likely loading. A “no dig” solution must be used to avoid root loss due to excavation. In addition the structure of the hard surface should be designed to avoid localized soil compaction. The use of a three dimensional cellular confinement system (CCS) acting as a load suspension layer is recommended and will avoid localized soil compaction by evenly distributing the carried weight over the track width and wheelbase of any vehicles that will use the access.

The ground protection specification detailed in Point B above is recommended and is fit for use only by pedestrian operatives (Highlighted Blue).

No wheeled or tracked plant machinery is proposed to be in use at the site and is not permitted to operate over this specification of ground protection.

10.0 – Arboricultural Implications

The potential direct impacts on trees which may arise from the proposed development and related construction activity, (identified following the tree constraints assessment are as follows:

- **Soil compaction;**
- **Soil contamination;**
- **Root severance;**
- **Direct damage to trees above ground level (stems and crowns);**

Site specific controls and mitigation measures to be implemented in respect of these implications can be found in the Arboricultural Method Statement 10.1 below.

10.1 – Arboricultural Method Statement (AMS)

Arboricultural Method Statement for tree protection throughout the duration of the proposed development works.

Control measures must be implemented as detailed below to safeguard all assessed retained trees above and below ground level against the potentially damaging effects of construction works and related site activity.

The Arboricultural Method Statement (AMS) below is to be read and implemented with reference to the Tree Protection Plan (TPP) in Section 9.1, to identify:

- Trees to be retained – identified by a circle showing the stem position and individually numbered on the plan;
- Protective fence positions - (Therefore, the Construction Exclusion Zones);
- Areas where temporary ground protection measures are to be installed.

A copy of this AMS and the Tree Protection Plan (TPP) shall be maintained on site at all times and must be made available to all site personnel to read and acknowledge.

A Site Personnel Induction Form (Template provided in Appendix B) must be completed and kept on file for all individual operatives working at the site, including sub contractors.

Construction Exclusion Zones (CEZ)

- No site related access, material storage, waste storage, or construction works are to be undertaken inside any Construction Exclusion Zone (CEZ) at the site. The Construction Exclusion Zones (CEZ) are to be afforded protection at all times and will be dictated by barrier fencing to the correct specification as detailed in Section 9.2.

- The protective fencing is required to be sited in accordance with the Tree Protection Plan (TPP) in Section 9.1, based on measurements and site features annotated on the plan, to ensure CEZ fencing is installed in the correct locations to offer effective protection.

- Temporary ground protection measures are to be installed over soft landscaped areas (lawns etc) which fall outside of the CEZ fence lines as an additional protective measure.

- All protective fencing shall be erected and temporary ground protection measures fully installed prior to the commencement of any site works. (e.g. before any construction materials, tools, or machinery are brought on site).

- Being installed on soft landscaped ground conditions, the specification of protective fencing to create the CEZs in the rear garden will be minimum 2m high, steel mesh “Heras” panels with stabilizer struts secured with base plates and ground pins as detailed in Section 9.2 – (Figure 3a).

- The fencing must have weatherproof signs attached stating that this is a **Construction Exclusion Zone and that ALL ACCESS IS PROHIBITED within the fenced off area.**
- Once installed the CEZ fencing must remain in place and undisturbed until completion of all development phases.

- Temporary ground protection measures must be installed where necessary as detailed on the Tree Protection Plan (TPP) in Section 9.1, to the specification detailed in Section 9.3, without deviation.

- Ground protection measures are necessary as detailed in Sections 8.1 and 8.2. The specification of temporary ground protection advised is suitable only for **pedestrian operative use only. No wheeled or tracked plant machinery is permitted to operate over the ground protected area.**

- The protective CEZ fencing and temporary ground protection measures may only be removed following completion of all construction work phases and once in place must remain undisturbed throughout the development process.
- Tree protection measures must be installed prior to any development works commencing and must be the last apparatus to be removed from the site on completion.

10.1 – Arboricultural Method Statement (AMS) – Cont'd

Access Details

- A Construction Management Plan (CMP) was not available at the time of writing and should be requested directly from the applicant, if required.
- No personnel or plant/vehicle access is permitted beyond the installed CEZ fencing at any time throughout the course of the development phases.
- The purpose of the CEZ is to prevent all site access and operations from occurring inside tree RPAs or near trees above ground level. Where operational access would be unacceptably restricted by CEZ fencing, the fencing is to be set back and temporary ground protection installed as detailed above.
- All site access will be via the pedestrian entrance from Hampstead Square to the south, or via the driveway crossover from Holford Road to the north.

Contractors car parking

- Some car parking may be available on the property driveway, or metered car parking spaces can be found on nearby residential roads around close to the site.

Site Welfare Facilities

- All temporary site welfare facilities, site office and storage areas for materials can be located within the curtilage of the rear garden, but must not enter the CEZs.
- Recommended Material Storage/Site Compound Areas are shown with a blue hashed line on the TPP in Section 9.1.

Storage Space & Waste Management

- No storage of bulk construction materials or plant machinery is permitted beyond the installed CEZ fencing at anytime.
- An area inside the west side garden but outside of the CEZ fence line has been recommended for material storage and material preparation. This storage area must be ground protected accordingly as detailed in Section 9.3 and as shown on the Tree Protection Plan (TPP) in Section 9.1.
- Recommended Material Storage/Site Compound Areas are shown with a blue hashed line on the TPP in Section 9.1.
- No dry or liquid waste is to be stored or discarded inside the installed CEZ fencing at any time.
- Contaminate materials such as oils, fuel, chemicals and gases will be stored and handled away from the CEZs and must be stored and handled in accordance with the *Control of Substances Hazardous to Health Regulations 2002 (COSHH).*
- No soil, demolition debris, or any other waste materials will be stored beyond the CEZ fencing, within the RPAs or under canopies of the retained trees, whichever is the greater. All construction related waste is to be removed from the site at the earliest opportunity.

- A Construction Management Plan (CMP) was not available at the time of writing and should be requested directly from the applicant, if required.

10.1 – Arboricultural Method Statement (AMS) – Cont'd

Construction within RPAs of retained trees

- Following the removal of T1, the proposed single storey extension footprint does not incur inside the calculated RPA for any of the retained trees, as shown on the Tree Constraints Plan (TCP) and Tree Protection Plan (TPP) in Sections 8.0 and 9.1 respectively.

Proposed new outside hard surfaces

- Where the new bin store is proposed to be cut in from the driveway, some ground lowering will be necessary along the north side of the east garden. Although not shown to impact on any tree RPA, as a precaution due to the adventitious nature of tree roots, all ground lowering excavations in this area must be undertaken using hand tools only.
- Should any woody tree roots over 25mm in diameter be exposed during the course of any excavation works, they must be immediately wrapped or covered in hessian cloth to prevent desiccation and protect from temperature changes whilst exposed and the project Arboriculturist advised immediately.

- No other new areas of hard standing over existing soft landscaped areas are proposed.

Underground Services

- No new underground service trenches are proposed to be installed inside calculated RPAs for the retained trees.

Additional Precautions

- All Preliminary / General Management Recommendations for tree surgery works to on site trees must be undertaken prior to commencement of the development phases and prior to the installation of the Construction Exclusion Zone (CEZ) fencing and temporary ground protection.

- Fires at the site are not permitted at any time.

- No notice boards, cables or other services will be attached to any tree stem, limb or branch.

- Should any woody tree roots over 25mm in diameter be exposed during the course of any hard surface removals or excavation works, they must be immediately wrapped or covered in hessian cloth to prevent desiccation and protect from temperature changes whilst exposed and the project Arboriculturist advised immediately.

- Any roots exposed over 25mm in diameter must not be severed without prior consultation with the project Arboriculturist.

- Consideration will be given at all times to ensure that sloping ground will not allow for any contaminating substances to travel into areas where tree RPAs may be affected.

- Should spillages of contaminates occur, water is readily available on site and will be used to flush spilt materials through the soil and avoid contamination to tree roots. At the time of any spillage the main contractor will immediately contact the Consulting Arboriculturist for advice.

- Any significant build up of dust or particulate material on tree foliage should be hosed down to prevent clogging of stomata in the leaves.

- No cranes or vehicles with extending booms/jibs are proposed to be in use at the site where tree canopies may be affected.

- Skips (if required) must be positioned where lorry lifting gear can operate unrestricted and without coming into contact with tree branches. The western end of the driveway, near to the garage is recommended.

10.2 - Responsibilities

- It will be the responsibility of the main contractor to ensure that the planning conditions attached to planning consent are adhered to at all times and that a monitoring regime in regards to tree protection is adopted on site.
- The main contractor must further assign tree protection monitoring duties to one or more individuals working at the site, who will be responsible for regular tree protection monitoring and supervision.
- The individual(s) assigned tree protection monitoring duties must:
    - Be present on site for the majority of the time;
    - Be aware of (a) the Tree Protection Plan and (b) the tree protection measures to be installed and maintained throughout the build;
    - Be responsible for ensuring all tree protection measures are adhered to as detailed in the Arboricultural Impact Assessment (AIA) report and Arboricultural Method Statement (AMS);
    - Ensure all site operatives without exception read and understand the tree protection and control measures detailed in the AIA and AMS;
    - Keep on file all individual Site Personnel Induction forms which must be signed by all site operatives indicating they have read and understood the control measures detailed in the AIA report and AMS;
    - Maintain a written record of regular Tree Protection / Construction Exclusion Zone inspections, to be kept up to date by the person(s) who have been designated the inspection and monitoring duties;
    - Have the authority to stop any work that is causing, or has the potential to cause, harm to any retention trees;
    - Be responsible for ensuring that all site operatives including sub contractors are aware of their responsibilities toward on/off site trees and the consequences of the failure to observe these responsibilities;
    - Make immediate contact with the project Arboriculturist in the event of any tree related problems occurring, whether actual or potential. *(Contact details including telephone number and email address is listed on the Title Page)*
- The Construction Exclusion Zone fencing, temporary ground protection and all signs must be maintained in position at all times and checked on a regular basis by the on site person(s) who have been designated that responsibility.
- The main contractor will be responsible for contacting the Local Planning Authority and the project Arboriculturist at any time issues are raised relating to the trees on site.
- If at any time pruning works are required permission must be sought from the Local Planning Authority first and then carried out in accordance with *BS 3998:2010 Tree Work – Recommendations* (As updated).
- The main contractor will ensure the build sequence and phasing is appropriate to ensure that no damage occurs to the trees during the construction processes. Protective fences will remain in position and undisturbed until completion of ALL construction works on the site.
- The main contractor will be responsible for ensuring sub-contractors do not carry out any process or operation that is likely to adversely impact upon any tree on site.

10.3 - Tree Work Standards

All recommendations for tree surgery works made within this report have been done so in the interests of sound arboricultural management and to ensure tree surgery works are performed to a professional standard in accordance with *BS 3998:2010 Tree work – Recommendations.* (As updated).

All remedial tree surgery work which is suggested in this report must be undertaken to conform to standards and procedures set out in *BS 3998:2010 BS 3998:2010 Tree work – Recommendations.* (As updated)

- Tree Sense Arboricultural Consultants are happy to recommend a trusted tree surgery contractor if required, to ensure that all recommended tree surgery work is performed to a high standard.
- Tree Sense Arboricultural Consultants only recommend contractors who are approved by The Arboricultural Association to ensure that the highest standards of tree surgery work are met at all times.

11.0 - Report Summary

This Arboricultural Impact Assessment (AIA) report has been produced following a tree survey conducted in accordance with BS5837:2012 Trees *in relation to design, demolition and construction – Recommendations*.

The information produced within the AIA report follows an initial tree survey conducted on the 23rd May 2019.

The AIA report provides an assessment of the trees associated with the above development site, based on information supplied by the development team and observations recorded at the time of the tree survey.

If any design changes are made to any aspect of the proposed development project due to the identified tree constraints, operational restrictions, geotechnical concerns or otherwise, revisions or additions to tree protection, damage mitigation measures and site layouts will need to be made and a revised report produced.

This is a Development Control, not a Building Control focused document. In regard to the latter, this deals with foundation depth and design in relation to trees using NHBC/Zurich national guidance. For advice, consult with the local council Building Control Officer or an approved NHBC inspector in order to gain Full Plans Approval or a Completion Certificate. The latter are governed by the Building Act 1984 and Building Regulations 2010. As such the above Building Control issues are outside the remit of a Consulting Arborist.

Full detailed specifications of the development project and engineering methods etc. will be supplied by the development team separately.

Detailed information regarding the site setup, plant use, waste management and construction methodology was not available at the time of writing and should be requested separately from the development team in a Construction Management Plan (CMP), as required.

The CMP must take fully into consideration and adhere to all required tree protection control measures, as detailed in the AIA report.

12.0 – Legal and Planning Consents

- Appropriate legal and planning consent should be gained before undertaking any tree work; for example if the tree(s) are subject to a Tree Preservation Order (TPO), permission must first be obtained from the Local Authority. Permission is not required for emergency tree work on dead, dying or dangerous TPO trees; however the Local Authority should still be advised.
- Six weeks notice is required to be given to the local authority via a Section 211 Notice for any proposed tree surgery work on trees situated within a designated Conservation Area. Permission is not required for emergency tree work on dead, dying or dangerous trees situated within a Conservation Area; however the Local Authority should still be advised.
- Tree owners have a responsibility as a common law duty of care, as well as responsibilities under statutory law, to ensure that trees growing within the boundaries of their property are maintained to reduce to an acceptable level the risk of potential harm befalling other people or property.
- In the course of undertaking any tree work, the client is advised to ensure that operational assessments and procedures are in place, and to take due consideration of the legal requirements.

- Key legislation includes (but is not restricted to):

    - The Wildlife and Countryside Act (1981)
    - Occupiers Liability Act (1957/84)
    - Highways Act (1980/86)
    - Town and Country Planning Act (1990/Regulations 1999/Amendment 2008/09)
    - Anti-Social Behaviour Act (2003) – Part 8 (High Hedges)
    - The Countryside Rights of Way Act (2000)
    - The Conservation (Natural Habitats etc.) Regulations (1994)
    - The Badgers Act (1992)

13.0 - Publications

- Other publications which are relevant to the development proposal to which further reference is advised includes but is not restricted to:

    - National House Building Council (N.H.B.C) Chapter 4.2 – (Building near trees);

    - National Joint Utilities Group (NJUG) Volume 4 – (Guidelines for the planning, installation and maintenance of utility apparatus in proximity to trees).

Chris Wallis *Tech Cert (ArborA), AHort II (Arb.)*
Tree Sense Arboricultural Consultants

Appendix A – Construction Exclusion Zone Inspection Form

Construction Exclusion Zone Inspection Form
Site Address:_____ **Client Name**:_____ **Inspected By**_____ **Inspection Date & Time**:_____

Construction Exclusion Zone – Barrier Fencing
Comments: **Action:**
Construction Exclusion Zone – Temporary Ground Protection
Comments: **Action:**
General Observations and Comments

Appendix B – Site Personnel Induction Form

Name:

Site Address:

Date:

Declaration	**Tick to Confirm**
I have read and understand the Arboricultural Method Statement and the requirements to be employed / actioned at the site regarding tree protection.	
I understand that all tree protection measures (fencing and ground protection) must not be moved or disturbed throughout the development project without prior agreement with the Consulting Arboriculturist.	
I understand that certain operations must only be undertaken under supervision of the Consulting Arboriculturist and/or must not be undertaken without their approval.	
I acknowledge that any concerns I have regarding the protection of trees at and adjacent to the development site will be brought to the attention of the Site Manager/Supervisor.	
I acknowledge that I must not cause direct or indirect damage to any on site or neighbouring tree, either above or below ground level during the course of my daily operational duties.	

SIGNATURE: _____

Appendix C – Supporting Photographs

The following photographs were taken at the time of the tree survey on the 23rd May 2019 and are provided to highlight certain findings and support recommendations which have been made in the report:

The Magnolia T1 is located within a low raised planting bed in close proximity to the southern elevation of the existing boiler house.

Major, woody roots have caused direct impact damage to the retaining wall where they have outgrown the containerised nature of the bed through years of incremental growth. The adjacent patio surface is also distorted and lifting up in places where roots beneath the paving are exerting force against the underside of the slabs. Again, through many years of secondary thickening, the roots have increased in diameter and are distorting the surface.

Appendix C – Supporting Photographs – Cont'd

The following photographs were taken at the time of the tree survey on the 23rd May 2019 and are provided to highlight certain findings and support recommendations which have been made in the report:

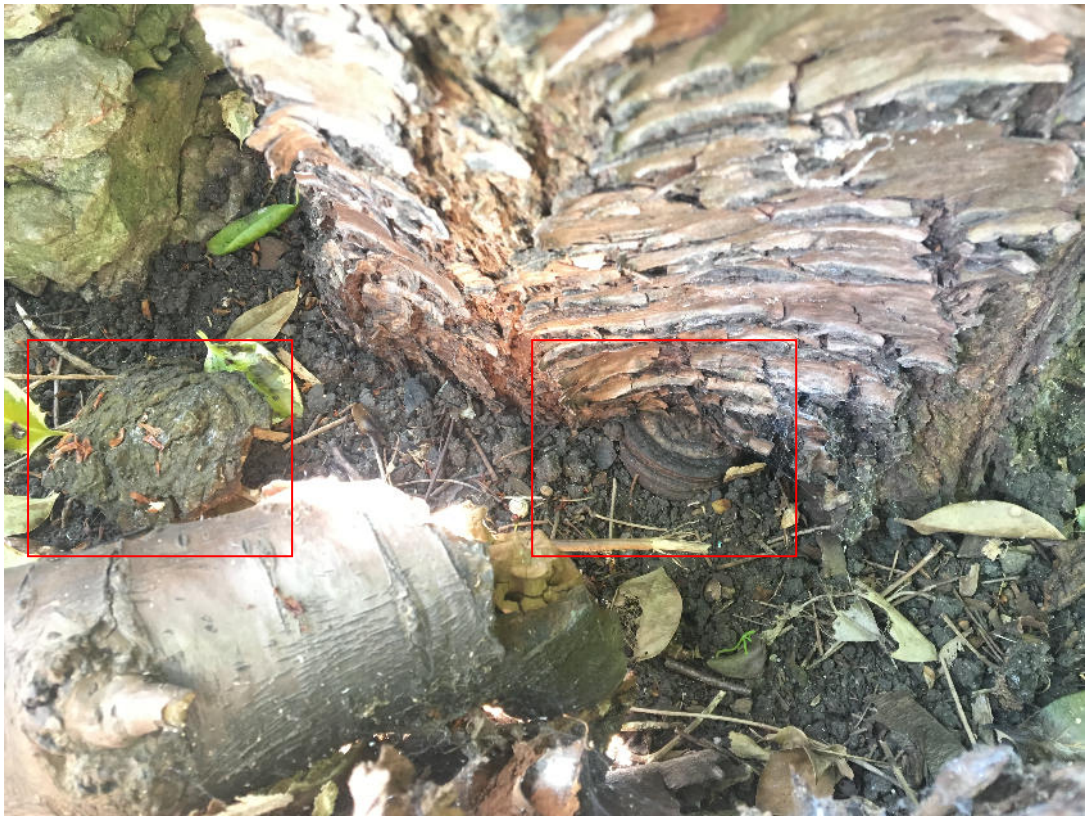
The stem base, buttressing and major roots of T1 are directly impacting on the southern elevation of the boiler house.

Significant cracks are present in the existing brickwork, visible on the outside behind the tree and in the lower photo taken from inside the boiler house; vertical and horizontal cracks are present which are consistent with the position of T1 on the other side of the wall and at the level of the stem base of T1.

The building has also been assessed by a Structural Engineer, who has also confirmed T1 to be a major contributing factor to the observed damage. Regardless of the proposed extension work, T1 will need to be removed.

Appendix C – Supporting Photographs – Cont'd

The following photographs were taken at the time of the tree survey on the 23rd May 2019 and are provided to highlight certain findings and support recommendations which have been made in the report:



T10 and T11 are both host to Ganoderma.sp fungus. Fruiting bodies are present at the stem bases of both trees, which also exhibit poor physiological health, with significant crown dieback evident. T11 is also shedding bark from the stem and probe testing an area of bark delamination on the lower stem signified onset heartwood decay in an advanced stage.

Both trees are located in the west side garden and considered to be in a high target area. The poor physiological health and structural condition of the trees exceed the risk tolerance level for their safe retention and are to be removed.