11 Salisbury House
Rodwell Close
Ruislip
Middx
HA4 9NE
Treesense.ac@gmail.com
www.treesense.co.uk

020 8737 0073

Site Details: 14 Hollycroft Avenue, London, NW3 7QL

Prepared for: Mr. M. Malley

Prepared by: Mr. C. J. Wallis *Tech Cert (ArborA), AHort II (Arb.)*

Title: MAL_14HA_AIA_001

Published Date: 6th December 2015

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.

The AIA and report are necessary to support an application for planning consent, to demonstrate that development proposals at the above address will not adversely impact on the physiological health or structural condition of nearby trees.

The development scheme relates to:

- Demolition of the existing double storey rear extension;
- Construction of new double storey extension with increased footprint;
- Resurfacing of existing rear patio surface.

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:
    - Prepare an Arboricultural Impact Assessment (AIA) to evaluate the potential direct and indirect effects of the proposed design and associated construction activity on nearby trees.
    - Categorise the trees at and adjacent to the site to ascertain their suitability for retention.
    - Identify the tree constraints to the development to assist with scheme feasibility, conception and design.
    - Make recommendations for measures to be taken to protect the retained trees during the development process, to safeguard their short and long term health and condition, including those trees which are situated on adjacent properties / land to the proposed development site.
    - Provide all relevant tree data including species, dimensions, life stage, condition assessments and make preliminary management recommendations where necessary.
    - Highlight the arboricultural implications that the development process may have on the retained trees.
    - Provide a method statement to show the necessary controls required to mitigate those identified implications.
    - Produce findings in a written report for submission to the local planning authority.

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) **for planning purposes only**. Information provided by third parties used in the preparation of this report is assumed to be correct.

2.0 – Report Limitations – (*The scope of this report is restricted by the following limitations*)

- *All observations of tree conditions were from ground level, a visual assessment of external features only, assisted as required by the use of binoculars, a metal probe (for cavity testing) and a rubber sounding mallet (for audible resonance testing) where necessary.*
- *Below ground tree roots and buried parts were not inspected.*
- *A topographical survey of the development site was not provided prior to the tree survey.*
- *All relevant tree positions were included on the Proposed Site Plan (PR01) as provided by Alexander Owen Architecture.*
- *The provided Proposed Site Plan (PR01) was used as the basis to create the Tree Constraints and Tree Protection Plans which feature in the AIA report.*
- *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 are 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.*
- *Geotechnical analysis and soil assessment will be necessary at the site to understand the soil structure and sub soil conditions in respect of the scheme feasibility.*
- *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 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 survey.*
- *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).*
- *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 and Tree Protection Plan are drawn to the scale indicated in Sections 8.1 and 9.1.1 respectively.*

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 project. 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.

3.0 – Background and Process

The rear extension re-development proposed at the above property is currently in the initial 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 initial 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 AIA was commissioned after an initial design proposal had been prepared and therefore, the tree constraints initially may not have been taken fully into consideration. The identified tree constraints should inform and assist with the final design, including any necessary engineering solutions and demolition/construction methods which will need to be explored in respect of minimising 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.*

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;

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 14 Hollycroft Avenue features a semi detached family house, with a lower ground floor apartment (14a), a small front garden and a spacious private garden to the rear of the building.

The front garden is predominantly hard surfaced with a small raised planting area at ground floor level, located towards the front of the garden. Additionally, a lightwell features at the front in respect of the lower ground floor apartment.

The frontage does not currently feature a dropped kerb for vehicle access onto the front hard standing, however it is understood that this is currently in the process of being addressed as a separate exercise.

Within the raised planting bed at the front of the property, a number of ornamental shrubs and low laying plants feature, including one larger *Syringa vulgaris* (Lilac) tree.

A mature *Platanus x hispanica* (London Plane) and a young *Sorbus aucuparia* (Rowan) feature on the public footpath in front of the Property. These street trees are under the management control of the Local Authority.

The rear garden can be accessed via a side passage on the southeast side of the dwelling. The side passage leads down to the rear garden which is essentially at lower ground floor level. The rear garden is predominantly lawn surfaced, with planting around the borders. A *Tilia.sp* (Lime), a *Magnolia grandiflora* (Evergreen Magnolia) and a *Prunus cerasifera* (Purple Leaf Plum) were observed around the borders of the rear garden and were duly included in the Arboricultural Impact Assessment (AIA).

In addition to on site trees at the rear, two neighbouring trees were also included in the AIA. A mature *Acer pseudoplatanus* (Sycamore) features close to the development area on the boundary line in the neighbouring rear garden to the southeast (No.16). A young *Taxus baccata* (Yew) tree features close to the boundary line in the rear garden to the northwest (no.12).

Other significant trees were also observed in nearby neighbouring gardens, but are located well over 12 times their stem diameter away from the development area. These other trees were not individually assessed, as the data collected from larger trees in closer proximity to the site will ascertain scheme feasibility and dictate the positioning of tree protection measures at the site.
These other trees would not feature Root Protection Areas (RPA) which spread further than those calculated for the individuals in closer proximity to the site.

In all, eight significant individual trees were surveyed for inclusion in the Arboricultural Impact Assessment (AIA).

It is understood that the property is situated within a Conservation Area.

All trees considered in the *BS 5837:2012* AIA study are shown on the Tree Constraints / Tree Protection Plans in Sections 8.0 and 9.1 respectively.

Details of all the individual trees surveyed for inclusion can be found in the Individual Tree Data Table in Section 5.0 below, with further tree data comments provided in Section 5.2.

5.0 – Individual Tree Survey 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 Management Recommendations	Estimated Remaining Contribution (Years)	Category
1	*Acer pseudoplatanus (Sycamore)*	20	725	N – 6 E – 6 S – 6 W – 5	9 – S	8	M	Physiological Condition – Good Structural Condition – Good Neighbouring tree located close to the boundary line. Historical branch loss/removals on the north and east sides of the stem. Wounds occluding with central cavities visible. Significant wound wood around the cavities is evident. Some minor deadwood visible in the crown.	_	20+	B 1
2	*Magnolia grandiflora (Evergreen Magnolia)*	7	1 – 125 2 – 100 3 – 75 4 – 100 SE - 200	N – 3 E – 2 S – 3 W – 1	2 – S	1.5		Physiological Condition – Good Structural Condition – Good Trimmed back on the western side to allow clearance over garden footpath.	_	20+	B 1
3	*Tilia.sp (Lime)*	20	725	N – 4 E – 5 S – 4 W – 4	4 – S	4	M	Physiological Condition – Fair Structural Condition – Fair Previously pollarded tree with extensive re-growth from the historical pollard points evident. Appearance suggests the tree has been reduced within the last 5 years but not re-pollarded. New shoot growth visible extending from the previous pruning points. Major and minor sized deadwood visible throughout the crown including broken and hanging branches. Dead Ivy vines also attached to the scaffold branches of the crown framework.	GMR – Crown clean to remove all hazardous deadwood and dead Ivy.	10+	C 1
4	*Prunus cerasifera (Purple Leaf Plum)*	8	325	N – 5 E – 3 S – 3 W – 4	1 – S	2.5	M	Physiological Condition – Fair Structural Condition – Fair Minor deadwood visible in the crown. Distinctive growth habit to the north due to competition of dominant nearby trees to the south of the tree.	_	10+	C 1
5	*Taxus baccata (Yew)*	7	200 (Est.)	N – 4 E – 2 S – - W – 2	2 – N	2	Y	Physiological Condition – Good Structural Condition – Good South side crown suppression due to the presence of the northern extension branches of T4.	_	20+	B 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 Management Recommendations	Estimated Remaining Contribution (Years)	Category
6	*Platanus x hispanica (London Plane)*	14	800	N – 3 E – 4 S – 3 W – 4	8 – S	9	M	Physiological Condition – Fair Structural Condition – Fair Previously pollarded tree on a regular basis, including recently as part of the local authority street tree management programme. New shoot growth being produced. Street tree, surrounded by hard standings of the vehicle carriageway, public footpath and nearby residential front gardens / driveways. Small area of unmade ground around the stem base and buttress roots.	_	10+	C 1
7	*Sorbus aucuparia (Rowan)*	6	125	N – 1 E – 2 S – 2 W – 2	3 – S	3	Y	Physiological Condition – Fair Structural Condition – Poor Managed by the local authority. Street tree, surrounded by hard standings of the vehicle carriageway, public footpath and nearby residential front gardens / driveways. Small area of unmade ground around the stem base. Suspected vehicle impact damage low on the north (carriageway) side of the stem. Damaged cambium and exposed heartwood, but not showing signs of extensive decay. Wound wood visible suggesting quite an old injury. Unremarkable tree of small stature exhibiting defects as described above which shouldn't constrain a proposal.	_	<10	C 1
8	*Syringa vulgaris (Lilac)*	5	125	N – 3 E – - S – 2 W – 2	1.5 - N	1	M	Physiological Condition – Fair Structural Condition – Fair Located in the raised planting bed at the front. Unremarkable tree, abundant climbing vegetation including Ivy on the stem and throughout the branch framework.	_	<10	C 1

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 is 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 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 – Clearance height from the ground of the first major structural branch of the trees' crown and it's 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 initial arboricultural practices to be undertaken before construction activity begins
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)

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

GMR = General Management Recommendation

5.2 – Tree Data Notes

The trees detailed individually in Table 5.0 above are those to be considered as potentially affected by the proposed development project.

The tree survey identified that all on site and neighbouring trees are in suitable condition for retention and are to be protected accordingly above and below ground level. A dead stump approximately 3m in height features on the southeast side boundary, which should be removed.

Recommendations for tree surgery work may have been made in the interest of good tree management (*General Management Recommendations*) and are not necessarily required in relation to the proposed development project.
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. (See Section 12).

Any General Management Recommendation (GMR) which may have been made to remove hazardous deadwood from the crowns of trees with TPO's or trees within Conservation Areas, do not require permission from the local authority before actioning. However, it is considered good practice to inform the local authority of the intended deadwood removal works.
All neighbouring and street trees are outside of the management control of the applicant.

All recommended tree work must be undertaken in accordance with guidelines set out in *BS 3998:2010 Tree work – Recommendations.*

The following sections provide information regarding the categorisation of the surveyed trees and the tree constraints identified following the tree survey 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 works 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.

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

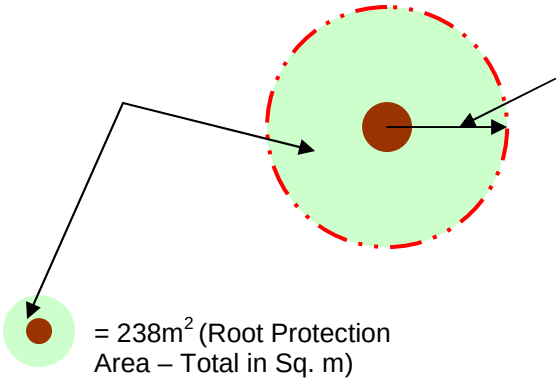
The following sections relate to the protection of the trees categorised for retention, during the construction process at the development site, and to trees which are growing adjacent to the development site.
The first of these sections identifies and details the tree constraints at the site, which are required to assist with the design proposal and scheme feasibility and to ensure the correct levels of tree protection measures are later applied.

7.0 - Tree Constraints

The tree constraints are the influences the trees will have below and above ground level in relation to the development area and site overall. The below ground restraints are represented by the trees Root Protection Areas (RPA), the above ground restraints 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 RPA radius is taken from the centre of the tree stem, encircling the tree to give the RPA Area (example based on T1 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 Root Protection Areas (RPA) for the trees which were assessed as part of the Arboricultural Impact Assessment (AIA).
The RPA's have been calculated using stem diameter measurements (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	8.7	238
2	2.4	18
3	8.7	238
4	3.9	48
5	2.4	18
6	9.6	290
7	1.5	7
8	1.5	7

7.2 – Above Ground Constraints

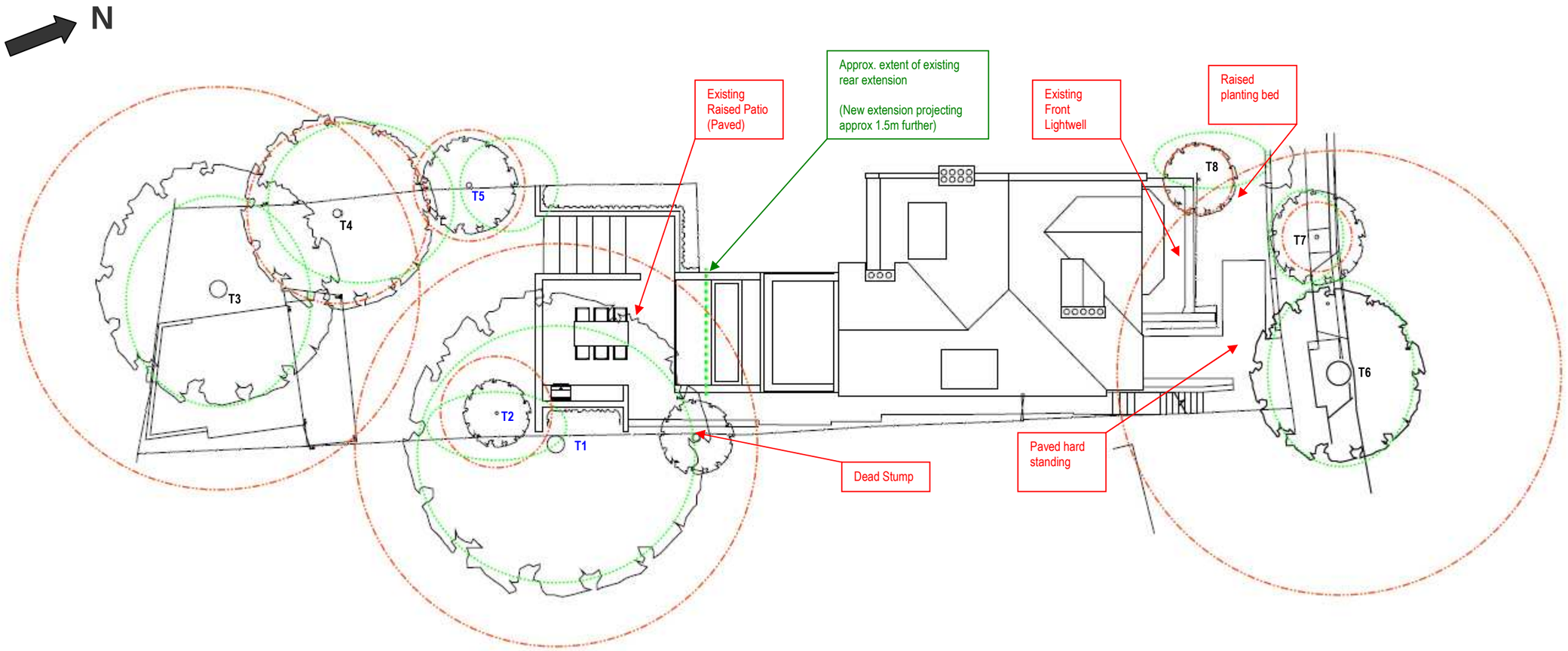
The above ground constraints caused by tree heights and the spread of branches can pose constraints to the development project in respect of demolition work, new building design, position and operational space requirements.
For example, if the lateral branch spread of a tree extends into areas where 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 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 the proposed dwelling.

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) and Tree Protection Plan (TPP) in Sections 8.0 and 9.1 below, indicate 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.

8.0 – Tree Constraints Plan (TCP)



Key to Symbols

T# = Category B Tree

T# = Category C Tree

= Root Protection Area (RPA)

= Crown Spread N, E, S, W

8.1 - Tree Constraints Plan Notes:

The Tree Constraints Plan (TCP) in Section 8.0 is provided for illustrative purposes only, and is shown to approximate 1:200 scale based on the Proposed Site Plan (PR01) provided by Alexander Owen Architecture.

The TCP is provided only to indicate the position, category and numbering of the surveyed individual trees/tree groups and provide an indication of the tree constraints by showing a graphic of the calculated Root Protection Areas (RPA) and the relevant tree crown spreads (if the crown spreads are deemed to potentially pose an above ground constraint to the development and/or associated site activity).

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 (if required), unless otherwise detailed or advised.
For example, if very low branches spread beyond the RPA, barriers should be extended to encapsulate any low branches which would otherwise be at risk of being damaged.

As described in section 7.1 above, tree root systems do not necessarily show the symmetry indicated in the above 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.

8.2 – Tree Constraints Assessment & Findings

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 project and to determine the layout of tree protection measures to create the Construction Exclusion Zones (CEZ) at the site.

In terms of constraints to the development proposal below ground level and the impact on Root Protection Areas (RPA), an encroachment of the new extension footprint into the RPA of T1 (when shown as a nominal circle) is evident.

The RPA's have all been calculated based on the stem diameter measurements taken at 1.5m above ground level and shown as nominal circles, using formulas detailed in *BS 5837:2012 Trees in relation to design, demolition and construction - Recommendations* (Section 4.6 of the standard).

Based on the nominal RPA circle for T1, the area of incursion (i.e. the area of the circle sector into which the proposed extension footprint encroaches) is calculated at 15.9m^2. This equates to 6.7% of the total calculated RPA (238m^2).

The above calculations have been made using the mathematical formula for calculating the area of sectors within a circle, based on the nominal RPA circle for the tree.

Sector area calculation formula:

(m = Sector's central angle in degrees)

$$A = \frac{m}{360^\circ} \times \pi \times r^2$$

It should be acknowledged that the symmetry of the RPA in this instance will not be a true reflection of the root spread for T1, due to prevailing conditions at the site. Between the tree and the area of development there is an existing paved patio surface which is also raised in relation to the level of the ground where the tree is growing. Surrounding the tree to the south, east and west are expansive areas of unmade ground (lawns, planting beds etc.) both in the neighbouring and site gardens. The existing raised patio will restrict extensive lateral spread of the root system, as soil conditions are likely to be unfavourable beneath the hard standing, which is at the same ground level as the building.

Tree roots tend to develop in greater abundance where soil conditions are favourable for their survival and development, where moisture and nutrients are more readily available. (*i.e. areas of unmade ground where moisture can permeate into the soil easily and where the decomposition of organic matter into the soil provides the base nutrients for the tree to use*).

Taking the nominal RPA circle as a worst case scenario, the 6.7% incursion of the proposed extension footprint is still considered acceptable without detrimentally impacting on the physiological health of the tree.
The more likely scenario is that the impact on the RPA is in fact, much less. At this extremity of the RPA circle only ephemeral feeder roots would be encountered (if at all), which regenerate seasonally and in more favourable rooting environments as detailed previously. Major, woody roots which give the tree anchorage and stability will not be encountered at this extremity of the nominal RPA.

All other trees assessed do not show RPA crossovers into the area where the new extension is proposed. All trees however, will require safeguarding against the potentially adverse effects of associated construction activity. This includes the two street trees at the front (T6 and T7), which may be at risk of direct impact above ground level, in respect of their stems.

With regards to crown spreads and crown heights, none of the assessed trees pose an above ground constraint to the proposal.

It is also proposed that the existing patio surface is to be replaced as a final phase of the development, in relation to the new extension. The removal of the existing paving slabs must be undertaken by hand and the existing sub base will be left in situ and re-used. Only the surface finish is proposed to be replaced. Temporary ground protection over the existing patio is recommended as an additional precaution during the extension construction. (See Tree Protection Plan in Section 9.1.)

Suitable tree protection measures in the form of barrier fencing, to create a Construction Exclusion Zone (CEZ) in the rear garden and around T6 and T7, must be installed before any development works begin, including bringing tools and materials onto site.
The CEZ fencing must be the first apparatus to be installed at the site and the last apparatus to be removed on completion of the project.
Tree protection measures must be installed at the site to create CEZ's, to safeguard the trees both above and below ground level (where RPA sectors currently feature in areas of unmade ground).

The Tree Protection Plan (TPP) in Section 9.1 indicates the layout of the required CEZ measures, with further tree protection information provided in Sections 9.2 – 9.3.

All of the relevant arboricultural implications are addressed in Sections 10.0 and 10.1 below, detailing what control measures are required to mitigate the identified implications to the trees.

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

Retained trees on and 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, development (including soil stripping) 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 determine the Construction Exclusion Zones (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 RPA's 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 the low 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 RPA's 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.

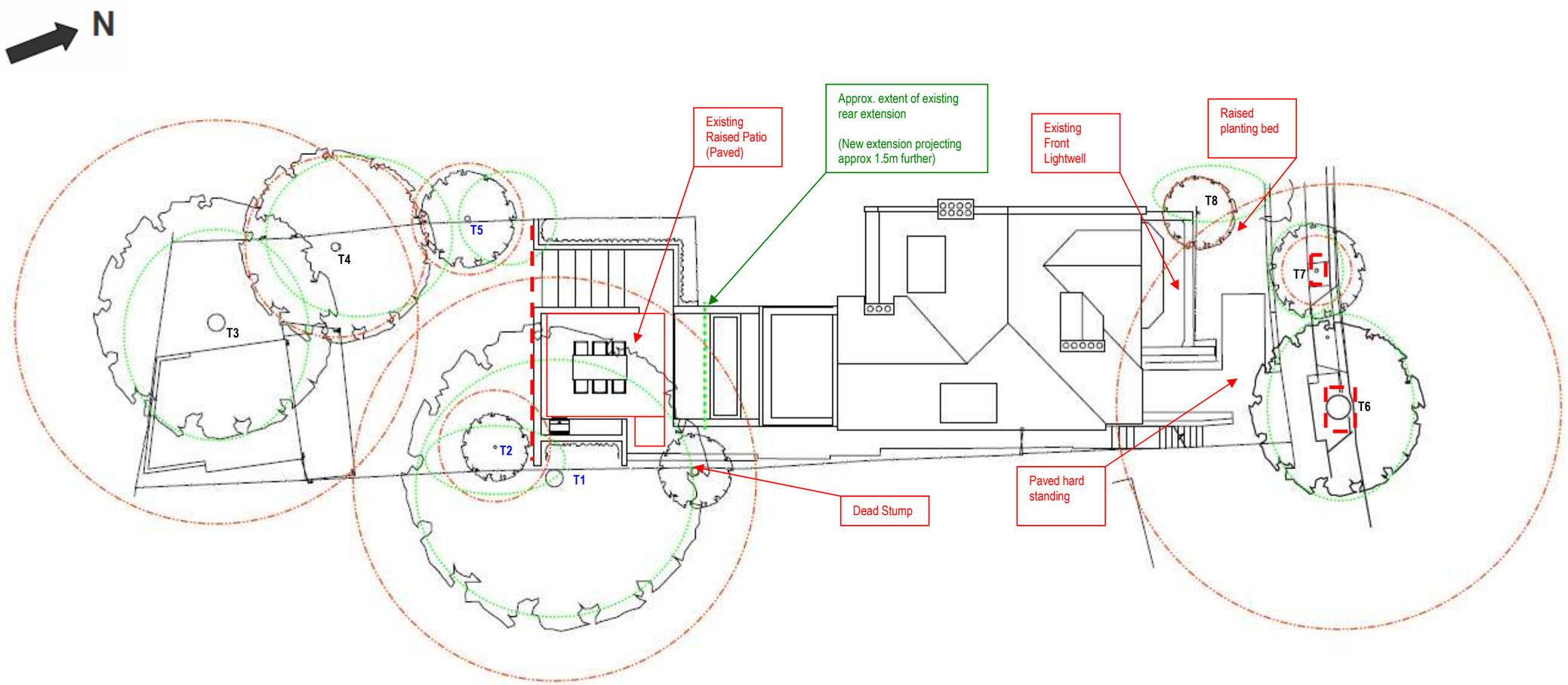
Fires on site should be avoided if possible. Where they cannot be avoided, they should not be lit where heat could affect foliage or branches. The potential size of the fire and wind direction should be taken into account when determining the fires location and it should be attended at all times until 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 maintained at all times.

9.1 – Tree Protection Plan (TPP)



Key to Symbols

T# = Category B Tree

T# = Category C Tree

= Root Protection Area (RPA)

= Crown Spread N, E, S, W

= Barrier Fencing – Construction Exclusion Zone (CEZ)

= Temporary Ground Protection

9.1.1 – Tree Protection Notes

The above Tree Protection Plan (TPP) is for illustrative purposes only, and is shown to approximate 1:200 scale based on the Proposed Site Plan (PR01) supplied by Alexander Owen Architecture.
The TPP is provided only to indicate the position, category and numbering of the surveyed trees to be retained and provide an indication of the tree constraints by showing a graphic of the calculated Root Protection Areas (RPA) and tree crown spreads.

Positions of barrier fencing and ground protection measures (if required) are shown on the plan and are to conform to the specifications detailed in Sections 9.2 and 9.3 respectively.
Do not scale from this drawing, all dimensions to be checked on site using details provided in Sections 5.0 and 7.1.

The indicated barrier fence lines on the TPP which create the Construction Exclusion Zones (CEZ) at the front and rear of the site are suggested as the simplest and most effective layouts to exclude all construction activity from the trees above and below ground level.

A full and detailed specification and construction methodology is to be supplied separately by our client.

The calculated RPA's for the trees at the rear of the site which feature in areas of unmade ground (including neighbouring trees) can all be excluded by installing the CEZ fencing as shown on the TPP.
The fencing installed to the shown layout will prevent all access and construction activity from the trees above ground level and will safeguard the calculated RPA's which would otherwise be exposed.

The stems for T6 and T7 will be contained behind barrier fencing or suitable hoarding also, to safeguard them against potential direct impact damage. The RPA's in the main for these trees do not feature in open or unmade ground. The fencing around these trees must extend to exclude the small areas of unmade ground around the base of the stems.

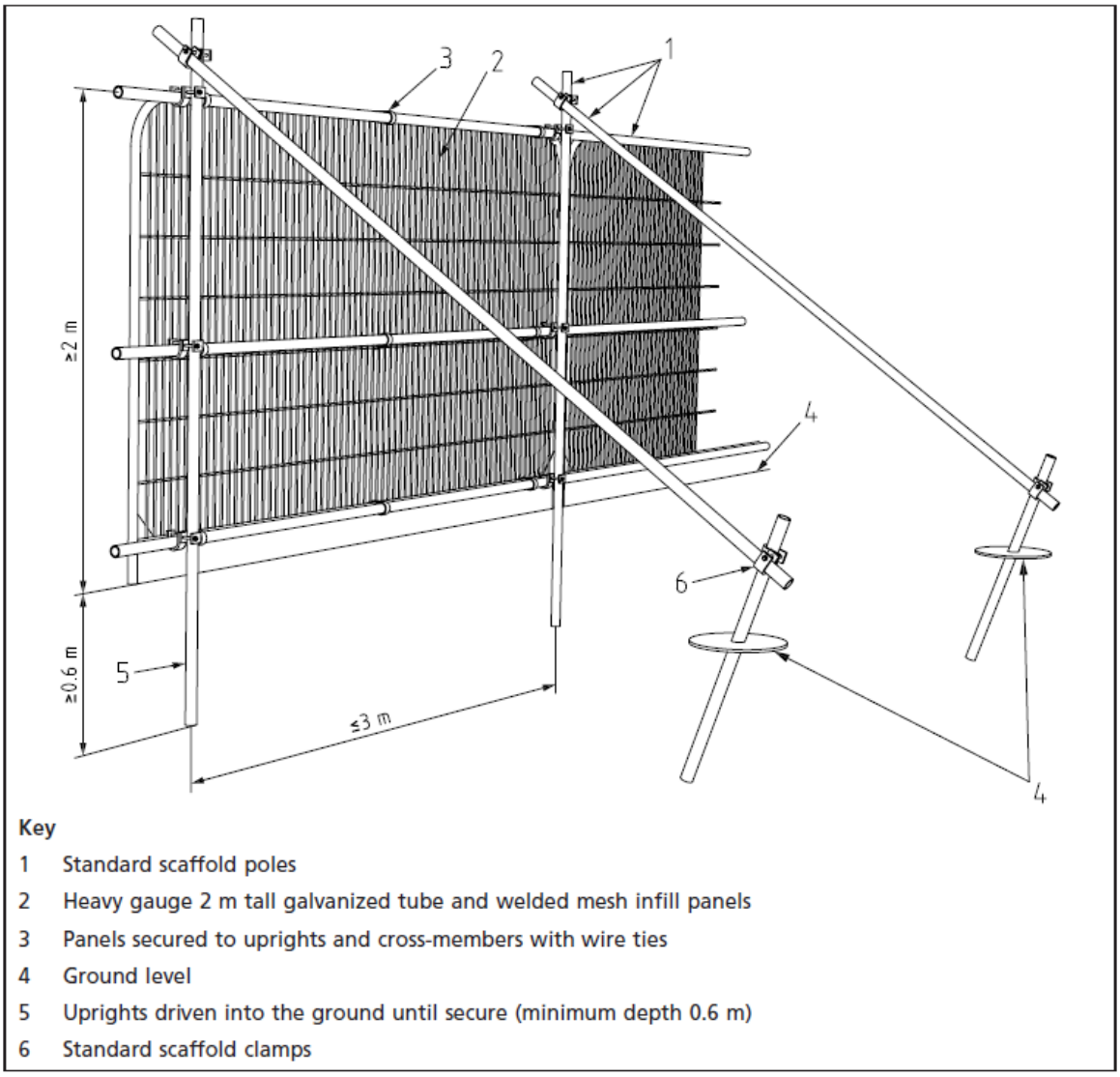
Tree protection measures are to be installed before development work begins and after any preliminary management recommendations have been completed. CEZ's are to remain in place throughout the course of the development process until completion and must be the final part of the work site to be dismantled and removed.

CEZ fencing must conform to the specifications detailed in Section 9.2 below.

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

Figure 2 Default specification for protective barrier

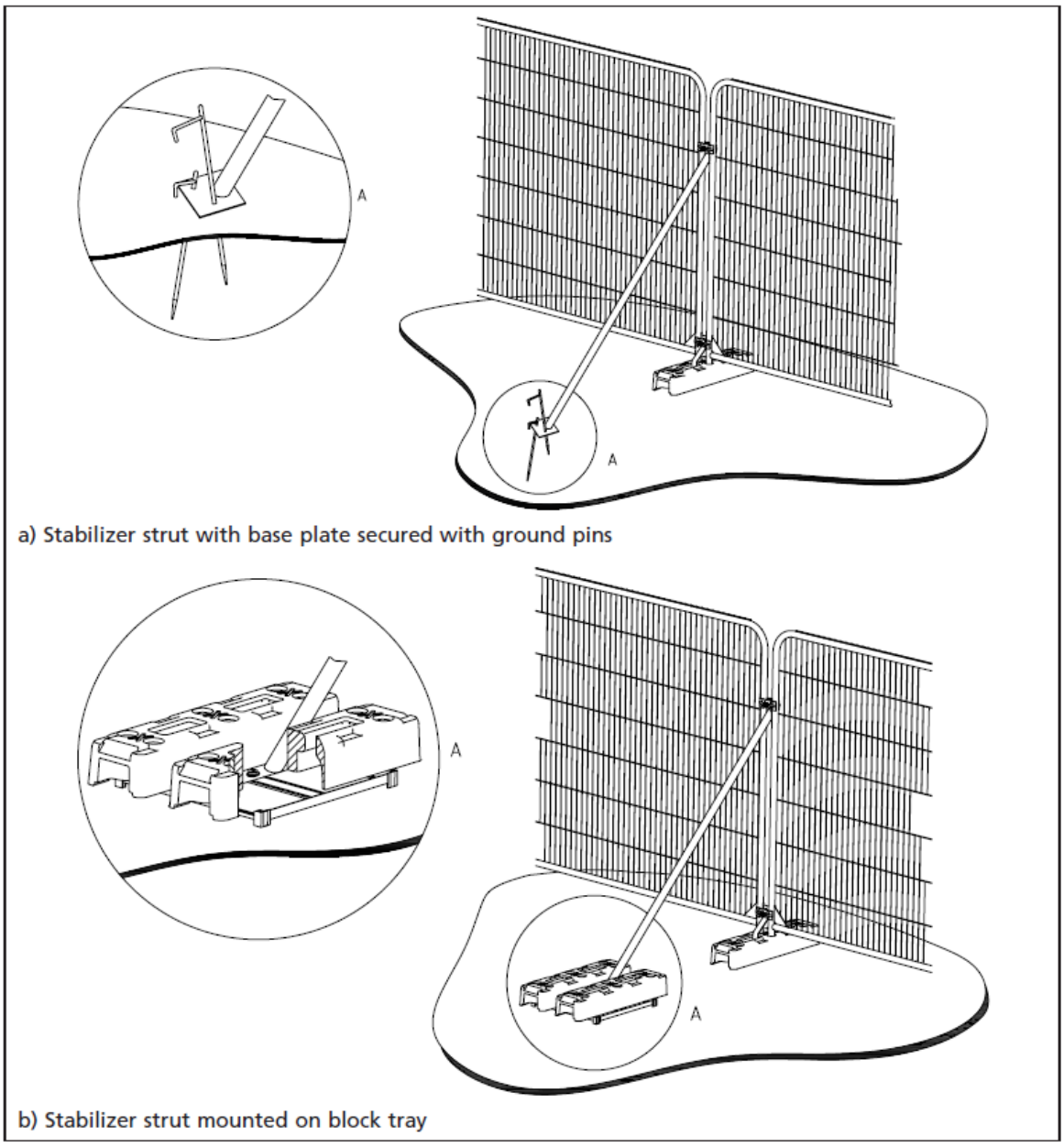


Key

1 Standard scaffold poles
2 Heavy gauge 2 m tall galvanized tube and welded mesh infill panels
3 Panels secured to uprights and cross-members with wire ties
4 Ground level
5 Uprights driven into the ground until secure (minimum depth 0.6 m)
6 Standard scaffold clamps

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. In most cases, barrier fencing should conform to and be installed to the specification shown in figure 2 above. This specification of fencing is preferred as it is resistant to impact, can be re used and allows for inspection of the protected area.

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

N.B – Depending on the intensity of construction activity, site circumstances and associated risk of damaging incursion into a tree's RPA, an alternative level of protection may be suitable in place of the default level of protection.

Figures 3a and 3b above give examples of above ground stabilising systems which may be appropriate in certain circumstances.

In the case of the development project at 14 Hollycroft Avenue, the Construction Exclusion Zone (CEZ) fencing at the rear of the site will conform to the default specification shown in Figure 2.
This specification is necessary as it is resistant to impact, not easily moved and allows for regular inspection of the excluded area.

Fencing to safeguard T6 and T7 will conform to the specification shown in Figure 3b or 2m closed board hoarding due to the existing hard standing ground conditions which surround the trees.

No storage of bulk materials, construction waste or preparation of building materials is permitted beyond the Construction Exclusion Zone (CEZ) fencing. (See Arboricultural Method Statement (AMS) in Section 10.1.

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.

Temporary ground protection measures are not strictly required, as no areas of unmade ground will be exposed outside of the Construction Exclusion Zone (CEZ) fencing. See Tree Protection Plan 9.1.

However, it is recommended as an additional precautionary measure that the existing patio surface is covered during the main construction phase. A similar specification to that shown in point a) above would be acceptable.

10.0 – Arboricultural Implications

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

- **Soil compaction in tree root protection areas caused by**:
  - Development activity – pedestrian and plant movement around the site throughout the course of the development project;
  - Storage of bulk building materials at the site;
  - Skips and storage of bulk building waste before collection and removal from the site;
  - Temporary site unit positions and contractor's car parking areas.

- **Root severance caused by:**
  - Excavations for the proposed extension foundations;
  - Excavations for the installation of new underground services, including drainage and soakaways;
  - The removal of any existing hard surfaces.

- **Soil contamination caused by:**
  - Spilt or discharged building materials (including fuels and spillages resulting from the mixing and preparation of cement and concrete);
  - Building waste storage either short or long term (including skips).

- **Direct damage to trees above ground level (stems and crowns) caused by**:
  - Resulting rubble from the existing extension demolition phase;
  - Storing building materials against tree stems and buttress roots;
  - Vehicle collision with tree stems and crown branches;
  - Travel paths of crane booms and jibs coming into contact with tree crowns;
  - Fixing temporary lighting / signage etc to tree stems and branches;
  - Pruning of branches to facilitate operational space for the development;

- **Restriction of aqueous and gaseous exchange in the soil caused by:**
  - Non permeable hard surface installation in outside areas.

Site specific controls relating to 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)

The table below indicates the potential Arboricultural Implications at the site during the construction phases and details the appropriate control measures to be employed.

Implication	Control
• **Soil compaction in Root Protection Areas (RPA)** *Soil compaction by pedestrian movements and wheeled/tracked plant operations can cause tree root death by compacting soil to a state which is detrimental to tree root health. Heavily compacted soil restricts aqueous and gaseous exchanges in the soil environment which are vital for healthy root development.*	• The RPA's calculated in areas of unmade ground for all on site and neighbouring trees at the rear (T1 – T5) will be wholly excluded by the installation of barrier fencing to create a Construction Exclusion Zone (CEZ). *(See Tree Protection Plan 9.1).* • Barrier fencing or suitable hoarding will be installed around the stems of T6 and T7 at the front, including the small areas of unmade ground around their stem bases and buttress roots. The remainder of the calculated RPA's for T6 and T7 do not feature in unmade ground. *(See Tree Protection Plan 9.1).* • T8 is located in a raised planting bed surrounded by barrier planting. • Protective fencing to create the front and rear Construction Exclusion Zones (CEZ) is to be installed to the layout design shown on the Tree Protection Plan 9.1 and to specifications detailed in Section 9.2 without deviation. • All pedestrian and vehicular access will be excluded entirely from all tree RPA's in unmade ground by the existing boundary fencing and the installed CEZ fencing. No access inside the CEZ is permitted at any time. • Bulk building materials and waste are to be stored outside of the CEZ at all times. • Temporary site facilities such as washroom, welfare, and secure storage units (if required) must also feature outside of the CEZ. • Contractor's car parking will be available on the Hollycroft Avenue. Parking bays will need to be suspended as residential parking restrictions are in force. • Skips will be located on the road at the front of the property for ease of removal and replacement. Skips must be enclosed inside well lit secure hoardings. Parking bay suspensions will be required. • Temporary ground protection measures as detailed in Section 9.3 and as shown on the Tree Protection Plan in Section 9.1 are to be installed as an additional precaution over the existing rear patio. • The rear patio surface **only** is to be replaced as a final phase of the project. The surface sub base is to remain intact and in situ for re-use. • Construction access to the rear of the site will be via the southeast side access passage. • All tree protection measures (Construction Exclusion Zone fencing and temporary ground protection), must be installed before any materials or machinery is brought on to the site. • Tree protection measures must be the last apparatus removed from the site on completion. • A detailed construction site set up methodology and plan was not available at the time of writing and must be submitted by the development team separately. • The site set up must consider and abide by all tree protection requirements detailed within the AIA report.

• **Root severance** *Root severance caused by excavations or by the removal of hard standings inside Root Protection Areas (RPA) can result in the loss of abundant fibrous root networks.* *This loss of roots can greatly reduce a trees ability to perform its physiological life processes. The loss of major woody roots can also compromise a tree's anchorage and greatly increase the risk of trees being wind thrown.*	• The proposed new extension footprint shows an encroachment into the calculated RPA for T1, when shown as a nominal circle. • The incursion has been calculated at 15.9m^2. This equates to 6.7% of the total calculated RPA (238m^2). • The incursion is negligible and considered acceptable. Additional consideration is given to the existing features at the site such as existing structures and ground level differences and the likely root distribution in more favourable surrounding ground conditions. The nominal RPA circle shown for T1 is not a true reflection of the likely root distribution considering these factors. (See Section 8.2). • As an additional precautionary measure, initial trial excavations using hand tools only are to be undertaken in the areas where new foundations are required for the extension. • In the unlikely event that tree roots are encountered at this extremity of the nominal RPA circle, they will be ephemeral feeder roots only which regenerate seasonally where soil conditions are favourable. No major, woody roots which give the tree anchorage will be encountered at this extremity of the RPA. • If tree roots are discovered in the course of trial or main excavation works, those exposed which are over 25mm in diameter will be immediately wrapped or covered to prevent desiccation and protect from temperature changes whilst exposed. The project Arboriculturist is to be advised immediately before any action is taken. • Any roots exposed over 25mm in diameter will not be severed without prior consultation with the project Arboriculturist. • Full specification and details concerning the suitability of the foundation design, including greater detail of the construction methodology will be provided separately by the development team, with due consideration to the tree constraints detailed in this report. (This information was not available at the time of writing). • Geotechnical analysis and soil assessment will be necessary at the site to understand in greater detail the soil structure and sub soil conditions. • No excavations have been proposed to be required for the installation of new underground services where tree RPA's have been calculated. (Such as drainage and water mains pipes, soakaways, power or telecommunication infrastructure etc.) • If required, their locations and positions will need to be determined with due consideration to the below ground tree constraints shown in this report and with further consultation with the project Arboriculturist. • All existing hard standings at the site are to remain in situ throughout the demolition and new extension construction phases of the development. • The rear patio surface is to be replaced as a final phase of the project. **Only the surface finish is to be replaced. The existing patio sub base is to remain intact and in situ for re-use.** • The existing patio features large paving slabs which are to be lifted and removed using hand tools only.

• **Soil contamination** *Soil contamination caused by the spillage of contaminate building materials such as concrete, fuels or paint for example, can severely pollute the soil in which tree roots populate. Heavily contaminated soil can lead to tree root death.*	• Bulk building materials and waste (including skips) will be stored outside of all installed Construction Exclusion Zones (CEZ) at all times, in designated site compound areas. • Contaminate materials such as oils, fuel, chemicals and gases will be stored and handled away from the CEZ and are to be stored and handled in accordance with the *Control of Substances Hazardous to Health Regulations 2002 (COSHH).* • The preparation of building materials will occur only in designated site compound areas at the site outside of the CEZ. • 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 RPA's 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 Project Arboriculturist for advice. • A detailed construction management plan and site setup plan was not available at the time of writing and must be submitted by the development team to the LPA for approval.

• **Direct damage to trees above ground level (stems, buttress roots and crowns)** *Trees can be severely damaged by construction activity above ground level.* *Tree stems, crown branches and buttress roots are all at risk of suffering direct impact damage from pedestrian and vehicle movements, material and waste storage around them, the use of cranes and other plant which use jibs or booms and by fixing temporary signs and lighting to them.*	• The existing extension demolition phase will employ a "top down, pull back" method of demolition. This will involve dismantling the roof and internal rooms by hand and pulling the building inwards within its own footprint to restrict the spread of resulting rubble. • All building materials to be used in the construction phases will be stored in designated storage areas at the site and outside of all Construction Exclusion Zones (CEZ) at all times. • All on site tree stems and buttress roots will be excluded behind impact resistant Construction Exclusion Zone (CEZ) fencing as indicated on the Tree Protection Plan in Section 9.1. • Neighbouring trees are additionally excluded above ground by existing boundary fence lines. • Vehicle and plant machinery (if required) will only operate in areas outside of the front and rear CEZ's. (No information regarding plant requirements and use were made available from the development team at the time of writing). • A detailed construction management plan and site setup plan was not available at the time of writing and must be submitted by the development team to the LPA for approval. • All tree stems and buttress roots will be wholly excluded and safeguarded against any potential vehicle collision damage by the impact resistant CEZ fencing. • The CEZ fencing will exclude all pedestrian and vehicle access to on site and neighbouring trees above ground level. • Crown heights have been measured and in all cases do not pose a height clearance constraint to the development or operational requirements. • The CEZ fencing will remain in situ throughout all phases of the development to completion and will be the last apparatus to be removed from the site. • No crane use has been proposed to be used at the site. • No signage or temporary lighting is permitted to be fixed to any tree stem or branch. • Site hoardings and fencing will display relevant signage with words to the effect of "Construction Exclusion Zone – Keep Out".
• **Restriction of aqueous and gaseous exchange in the soil** *The installation of new, non permeable hard standings over tree Root Protection Areas (RPA) can greatly restrict water and oxygen from entering the underlying soil.* *Tree roots depend heavily on goods availability of water, nutrients and the exchange of Oxygen, Nitrogen and Carbon Dioxide in the soil to survive.*	• No new areas of non-permeable, hard surfacing are proposed in any areas where tree RPA's have been calculated in currently unmade ground at the property. • The rear patio surface is to be replaced as a final phase of the development project. • The patio surface **only** is to be replaced. The existing patio sub base is to remain intact and in situ for re-use.

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 assign tree protection monitoring duties to one or more individuals working at the site who will be responsible for all tree protection monitoring and supervision.
- The fencing and 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.

11.0 - Report Summary

This report has been produced following a tree survey conducted in accordance with BS 5837:2012 Trees *in relation to design, demolition and construction – Recommendations*. The assessment seeks to advise the development team on arboricultural matters, assist with scheme feasibility and to advise on the tree protection measures to be employed at the site throughout all construction phases of the development.

The information produced within this report follows the tree survey conducted on the 1st December 2015. The 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 survey.

It is concluded that the current proposed scheme is feasible from an arboricultural standpoint, based on the findings and recommendations detailed within this report.

In terms of associated site activity, the protective Construction Exclusion Zone (CEZ) fencing to be installed at the front and rear of the site will ensure the safeguarding of all trees on and adjacent to the site, both above and below ground level.
All building material storage areas, site facilities, material preparation areas and general access around the site by operational staff will not be restricted by the CEZ fencing.

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 Arboricultural Impact Assessment (AIA) 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, engineering methods and a detailed construction management plan will be supplied by the development team separately.

.

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 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. Again, permission is not required for emergency tree work on dead, dying or dangerous trees within a Conservation Area; however the Local Authority should 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