DR. FRANK HOPE

Forensic & Planning Arboricultural Consultant

Chestnut House, Northside, Thorney, Peterborough, Cambridgeshire PE6 0RL
Telephone: 01733 350500 Mobile: 07860 227002
Email: frank.hope@btconnect.com **Website:** www.frankhope.com

UPDATED ARBORICULTURAL IMPACT ASSESSMENT REPORT RELATING TO THE TREES WITHIN NUMBER 3 ETON AVENUE, LONDON.

CLIENT NAME:	Mr. David Draier C/O BB Partnership Ltd Studios 33-34 10 Hornsey Street London N7 SEL **Ref:** None specified
REFERENCE:	FH-BB-Partnership-62-Eton-Avenue-London-2016
DATE OF VISIT:	24th November 2016 **TIME:** 11.00am
PEOPLE PRESENT:	Dr. Frank Hope Mr Steve Taylor (BB Partnership Ltd)

1.0 FORMAL DETAILS.

1.1 My name is Dr. Frank Hope and I am an independent Arboricultural Consultant based at Chestnut House, Northside, Thorney, Peterborough. The practice specialises in arboriculture, urban forestry, biological sciences and project management. I have advised many major clients during the past thirty years, for example, Sainsburys, Midland Bank, Alfred McAlpine, P&O, Ministry of Defence, Environment Agency, Health and Safety Executive, Local Authorities, Insurance Companies and Loss Adjusters.

1.2 For five years (April 1998 to April 2003), I acted for the Office of the Deputy Prime Minister (ODPM) as an Inspecting Officer on Tree Preservation Order Appeals. This provided me with a detailed insight into

this topic.

1.3 In addition to having a doctorate and masters degree in Biological Sciences (research on woody plants), I hold the National Diploma in Arboriculture (RFS) which is the foremost practical British qualification in trees and their management. I also hold numerous general horticultural qualifications, the most notable of which is the National Diploma of Horticulture (now the Master of Horticulture (RHS)).

1.4 I am a retired Fellow of the Arboricultural Association, and a retired Fellow of the Institute of Groundsmanship. I am a past member of the education committee of the Arboricultural Association, past vice Chairman of the East Anglian Branch, and am a past member of the governing council. I am also a past member of the governing body of the East of England Show.

1.5 During 1997 I was one of three people commissioned by the Arboricultural Association to develop a computerised model capable of assessing the future risk of subsidence damage to buildings when trees are growing close-by.

1.6 For further detail on my qualifications and experience see Appendix -A-.

2.0 AUTHORITY AND BRIEF.

2.1 The initial authority for this commission was provided by Mr. David Draier of Modern Design Management Ltd, in the form of any email. This updated report includes information made available since the initial report was produced.

2.2 The objectives of this commission are to:

- inspect the trees growing within the grounds of number 3 Eton Avenue, London;
- discuss the implications of any legal protection of the trees;
- describe the overall condition and age of the trees, and assess their safe life expectancy;
- quantify the quality of the trees in accordance with the category rating definitions in British Standard 5837;

- make comment on the future management of the trees;

- provide guidance on the physical protection of the trees during the development of the site.

3.0 BRIEF DESCRIPTION OF THE SITE.

3.1 Number 3 Eton Avenue is a large, brick-built, multi-storey, detached residence located on a generally level site (See the picture below). There is a single-storey conservatory and small area of decking at the rear.

Picture showing the front of the property.

3.2 The front garden of the property is small, and enclosed by a 1.0 metre high, brick-built wall, with a row of 2.0 metre high Cherry Laurel (*Prunus laurocerasus*) hedging running along the boundary edge. A 2.0 metre high row of Privet (*Ligustrum ovalifolium*) is located along the eastern boundary. A small, young deciduous tree is growing within the hedge at the front of the property.

3.3 The front garden is covered mainly with gravel hard-standing, and flagging, and there is a wooden structure along the western side which stores rubbish bins.

3.4 The rear garden of the property is small, and rectangular in shape. It consists mainly of ornamental lawn, although there are threes trees present (See the pictures on pages 4 and 5 below), and mixed species shrubs are growing around the boundary edges. The garden is accessed from the house via a flight of four steps, although there is also access via a small wooden, lean-to structure at the eastern side of the house.

Picture showing the front garden of the property.

Picture showing the rear of the house.

Picture showing the rear garden of the property with the summer house in the rear, south-east corner.

3.5 A number of trees are present within the gardens to the rear of the property, but these trees are well away from the proposed development and will not be affected in any way. They can be left in situ, with no work required. No further mention will be made of these trees within this report.

4.0 THE PROPOSED DEVELOPMENT.

4.1 It is proposed to construct subterranean rooms to the underside of the existing property, and within part of the rear garden with lightwells to the front and rear of the property. Draft plans have now been produced, and pre-application discussions have been carried out with the Local Planning Authority.

5.0 INTRODUCTION TO TREE PROTECTION (STATUTORY).

5.1 Local planning authorities look upon trees as being highly beneficial to the locality. To ensure that any important specimens, or significant groups of trees, are retained, they may place **Tree Preservation Orders (TPOs)** on them. In other situations, villages or whole districts may be classified as **Conservation Areas**. In these instances certain trees in the designated area will be protected. When trees are protected, legal procedures must be followed before any work is carried out.

5.2 When trees are protected by Preservation Orders, no work should be carried out on them without prior written consent from the Local Planning Authority. Once an application is made, the Authority personnel must inspect the trees, and make a decision within a statutory eight week period as to whether the work can go ahead. If no decision is made within the eight week period, the appellant (person making the application) can appeal to the Planning Inspectorate, for non-determination. If the Local Authority refuses the application the appellant still has the right to appeal.

5.3 The legislation for Conservation Areas is slightly different to that of Preservation Orders. Trees with trunk diameters of less than 75mm at breast height are exempt from the legislation, and no application is required to carry out any work on them. Trees with trunk diameters of between 75mm and 100mm can be removed without permission, if their removal is to allow the further development of other trees growing close-by.

5.4 When an application is made to carry out work on a tree located within a Conservation Area, the Local Authority must make a decision within a statutory six week period (not eight as with TPOs). The Local Authority has three options, namely,

1. *Give written permission to carry out the work.*

2. *Make no written decision within the six week period. If this occurs the application is accepted by default, and the owner of the tree(s) can carry out the proposed work, but it must be completed within two years of the initial application.*

3. *Refuse consent to carry out the work. If this option is selected the Local Authority must protect the tree(s) with a Preservation Order. In this instance, the owner of the trees has the right to appeal, and* ***the Local Authority must be able to show that the tree(s) are, in fact, worthy of protection.*** (Bolding added by Dr. Hope).

5.5 If a tree protected by a Preservation Order, or is located in a Conservation Area, is killed, or wilfully destroyed, the owners of the tree, and the contractor who did the work, can both be prosecuted. The fines for killing or wilfully destroying a tree can be high, i.e. the current maximum is £20,000 per tree, and there is an automatic requirement to re-plant. The current maximum for minor unlawful infringements, such as pruning, is £2,500.

5.6 Trees which are dead or dangerous are exempt from the legislation (both Preservation Orders and Conservation Areas), although if such trees are removed, the onus of proving that they fell into one of these categories lies with the tree owner. Whenever possible it is strongly recommended that the Local Authority be given at least five days notice before any work on such trees is carried out.

5.7 No specific detail has currently been provided to confirm the legal status of the trees growing within the property. However, at the time of my site visit I was informed that the property is located within a Conservation Area.

5.8 As the property is located within a Conservation Area the trees are legally protected. It is recommended that no work should be carried out on the trees without prior consultation with the Local Planning Authority.

6.0 INTRODUCTION TO BRITISH STANDARD 5837.

6.1 British Standard 5837 is the industry standard, and nationally accepted, document for providing recommendations in relation to the juxtaposition of trees and buildings. Although not a statutory document, the British Standard now forms the basis for almost all arboricultural impact assessments relating to development sites. It was revised and updated in April 2012.

6.2 In an attempt to identify which trees are worthy of retention, the British Standard suggests a category rating for all trees growing on, or adjacent to, proposed development sites. The Cascade chart printed on page 8 below for ease of reference, explains the various categories identified within the British Standard.

6.3 The four broad categories and ratings in the current British Standard have been modified slightly from those of the previous editions. Category "R" is replaced with category "U", whilst categories "A", "B" and "C", retain the same three sub-categories.

6.4 One of the most fundamental changes in the new category rating system has been the recognition that trees that cannot be realistically retained as living trees in the context of the current land use for longer than 10 years are given the rating of "U".

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 an existing or potential conservation value which 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 **Tree 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 remedial defects, including unsympathetic past management and storm damage), such that they 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 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 150mm	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 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

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.ridgenage.com/palettefiles.html#files [viewed 2012-03-26]

An acceptable alternative to the use of a colour coding scheme on the plans is to suffix the tree category rating adjacent to the tree identification number, for example 217-A, 218-C etc.

6.5 Trees which are classified as having a British Standard 5837 category rating of "U", are of such poor quality, or have such a short safe life expectancy, that they should typically be removed from a site. Category "U" trees can sometimes be retained if they have a significant conservation value, and as long as they do not pose a safety hazard.

6.6 Item 4.5.8 of the British Standard acknowledges that when categorising a tree, the presence of any serious disease, or tree-related hazards should be taken into account. If the disease or hazard is likely to be fatal, or irremediable, or likely to require sanitation for the protection of other trees, it might be appropriate for the trees concerned to be included in the "U" category, even if they otherwise have considerable value.

6.7 The definition of category "C" in the British Standard has been modified to some extent compared to the previous 2005 edition. The current edition still recognises that category "C" includes low quality trees, with estimated safe life expectancies of between 10 years and 20 years, but it now incorporates young trees with stem diameters of below 150mm. The Standard notes that care is necessary with young trees, i.e. with stem diameters less than 150mm (1.5m above ground level). It accepts that with such trees, it might be acceptable to mitigate their loss, i.e. either by mitigation planting, or possibly relocating the trees elsewhere on the site.

6.8 The retention, or removal, of category "C" trees can sometimes be contentious, as Local Authorities invariably wish to retain as many trees on a site as possible. However, although the retention of category "C" trees is laudable, there are many circumstances, even if legally protected, where their removal is both sensible, and reasonable, due to other site related factors.

6.9 The current edition of the British Standard maintains the previous methodology of assessing the safe distance between trees and buildings, i.e. the assessment is based on tree trunk diameter, and is the basis of calculating a theoretical "Root Protection Area".

6.10 The basic calculation of theoretical Root Protection Areas is based on free-growing trees, with no significant spatial root constraints.

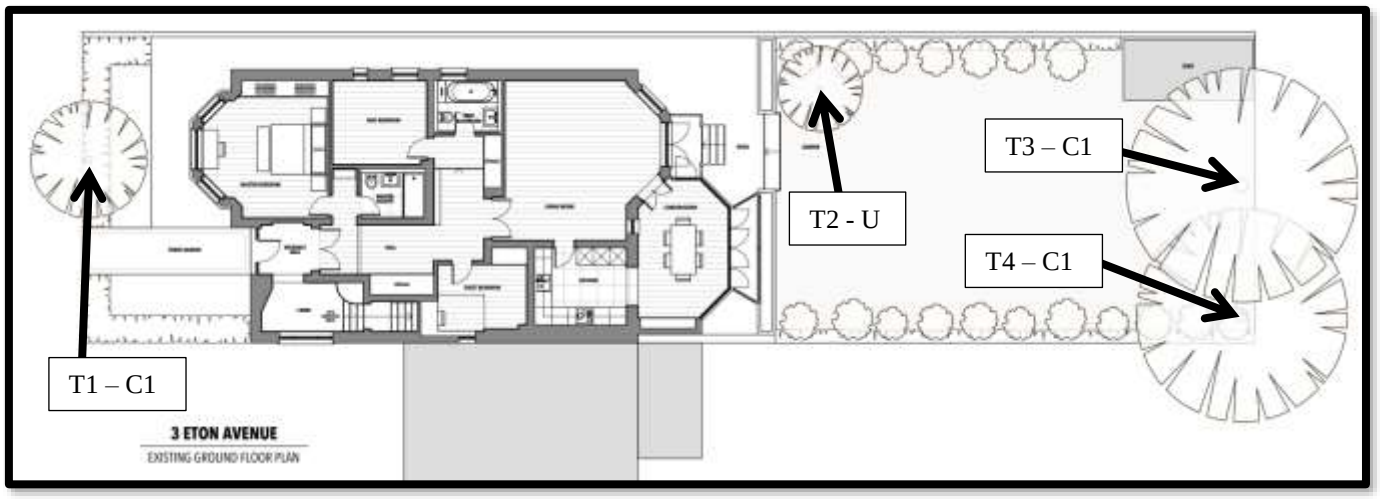
6.11 In addition to the concept of a "Root Protection Area", the British Standard provides increased guidance and recommendations on the physical protection of trees, prior to, and during, the development of a site.

7.0 INTRODUCTION TO THE INVESTIGATIONS.

7.1 I visited the site on the morning of the 24th of November 2016. The morning was dry but overcast. During the visit, I carried out a visual above ground assessment of the trees. No climbed or invasive investigation was carried out.

7.2 Under normal circumstances it is standard arboricultural practice to number each of the trees within a proposed area of development using small metal, or plastic tags. However, in this instance, only four trees were located within the property, and no identification tags were necessary (See the plan below).

Plan showing the existing ground floor plan of the property, with the trees in the gardens.



7.3 A scale plan (Constraints Plan) showing the position of the trees, and their theoretical Root Protection Areas, will be provided by the architects as part of the planning application. A copy of the plan is included on page 24 of this report for ease of reference.

8.0 DESCRIPTION OF THE TREES.

8.1 The plan above indicates the position of the existing house, and the location of the trees. The following "Field Notes" provide detail on the individual trees, and are correlated with the numbers on the plan.

Field Notes:

Tree T1: This is a small, young, deciduous tree located within the hedge at

the front of the property, within 150mm of the boundary wall (See the picture on page 3 above). It is currently only 4.0 metres tall, with an average crown spread of 4.0 metres. The crown of the tree has been reduced at least once during its lifetime. It has a trunk diameter of only 115mm. The tree has a low visual amenity to the Conservation Area, and has a British Standard 5837 category rating of "C1". It should not be used to adversely affect the proposed development at the front of the property (See item 6.7 above).

Tree T2: An extremely poor quality, fully mature flowering Cherry (*Prunus spp.*) located within the rear garden of the property, close to the eastern boundary. It is currently only 5.0 metres tall, with an average overall crown spread of 7.0 metres, and a trunk diameter of 285mm. The tree was originally grafted close to ground level (bottom-worked). The main branches emanate 2.2 metres above ground level. It has been severely pruned throughout its life and there is extensive decay within the pruning wounds. One of the branches is now dead, and others are dying back. All of the branches have been pruned back to the boundary edge. The tree has a very low visual amenity within the Conservation are, and has a British Standard 5837 category of "U". The tree is not worthy of a Preservation Order and should not be used to adversely affect the proposed development.

Picture showing the Cherry (Tree T2) in the rear garden of the property.

Picture showing the deteriorating graft union of the Cherry.

Picture showing the dead and decaying branches of the Cherry.

Close-up picture showing the dead and deteriorating branches of the Cherry.

Close-up picture showing the extent of decay in one of the limbs of the Cherry.

Picture taken from off Primrose Hill Road showing the minimal visual amenity of the Cherry.

Tree T3: This is a large, mature, poor quality Horse Chestnut (*Aesculus hippocastanum*) located close to the rear boundary of the property. It is currently in the region of 22.0 metres tall, with a maximum crown spread over the garden of 7.0 metres. Its overall crown spread is approximately 12.0 metres, although its shape has been affected by the adjacent Horse Chestnut (Tree T4). It has a trunk diameter of 750mm. The main section of crown over the garden consists of a solitary, poor quality arching limb which overhangs the summer house. The main trunk divides into two at a height of approximately 6.0 metres above ground level, and branches have been removed along the two main structural limbs close to the crotch point and lower crown. These branches are now showing signs of internal decay. There is a large strip of dysfunctional bark on the eastern structural limb running from the crotch point to a height of approximately 12.0 metres above ground level. This whole limb is becoming potentially dangerous and if allowed to fall it could affect the summer house and adjacent building. The bark is deteriorating within this area. The western structural limb appears generally healthy, but the union of the two structural limbs is weak. The canopy of the tree has been severely pruned throughout its life time, and dead wood is present. The tree has

suffered from a severe infection of Leaf Minor. It has a British Standard 5837 category rating of "C1", but it is borderline "U". If it continues to deteriorate it its current rate it has les than ten years of safe life expectancy. It does have a useful visual amenity to the Conservation Area.

It is important to note that although the Chestnut has a short, safe life expectancy, there is no requirement to remove it to allow the proposed development to go ahead. It can remain in situ if required, but should ideally be inspected on an annual basis to monitor its deterioration.

Picture showing the two Horse Chestnuts at the rear of the property (Tree T3 to the left).

Picture showing the branch on the Horse Chestnut (T3) arching down over the summer house. (Note also the line of dysfunctional bark).

Tree T4: This is the second very poor quality Horse Chestnut located in the rear garden to the west of tree "T3". It is currently in the region of 18.0 metres tall, with a very one-sided crown spread to the west. It has a trunk diameter of 650mm. The shape of the canopy has been affected by the branches of the adjacent tree (T3). Its canopy spread over the garden is 6.0 metres, but it is approximately 8.5 metres over the adjacent gardens. The canopy is only 1.0 metre in extent towards tree "T3". The main trunk divides into two at a height of 6.0 metres above ground level, and branches have been removed from the trunk from 2.0 metres above ground level into the upper canopy. The canopy has been severely pruned in the past. There are signs of weakness in the main trunk, up to the crotch point. A large branch has been removed just above the crotch point on the southern side of the tree to the garden. There is decay present, but at the time of the visit it was not possible to ascertain the extent of decay. The structural limb that overhangs the adjacent

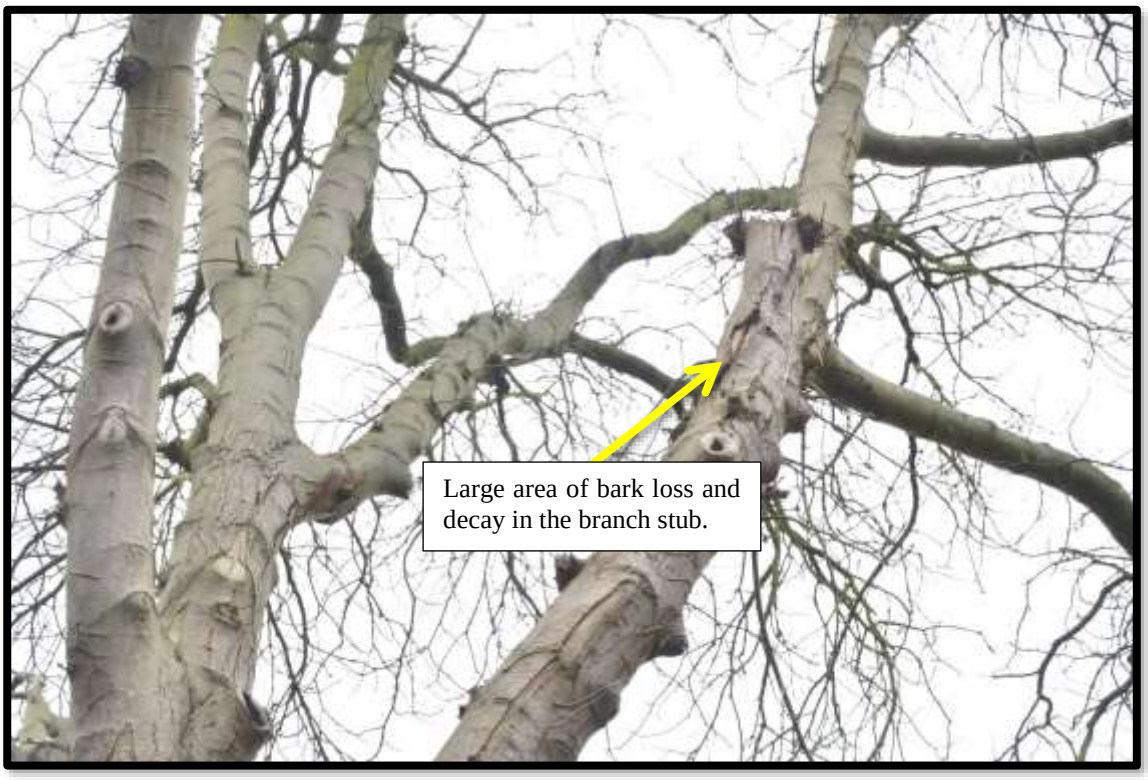
property to the west contains the remains of a large limb that has been removed in the past. The base of the limb is decaying significantly, and will be adversely affecting the safe life expectancy of the whole remaining limb. The tree has had a severe infestation of leaf minor. It has a British Standard 5837 category rating of "C1", although it is deteriorating and is borderline "U".

It is important to note that although the Chestnut has a short, safe life expectancy, there is no requirement to remove it to allow the proposed development to go ahead. It can remain in situ if required, but should ideally be inspected on an annual basis.

Picture showing the trunk of the Chestnut (T4)
(Note the open decaying wound close to the crotch point).

T4 Contd: The picture on the following page identifies the large decaying wound on the structural limb that overhangs the adjacent property to the west. This wound makes the overall structural limb potentially unsafe.

Picture showing the large decaying stub and the area of bark loss on the limb of the Horse Chestnut (T4) overhanging the adjacent property.



9.0 TREE SURVEY SUMMARY.

9.1 The following tree survey schedule provides detail on all of the trees within the site.

9.2 The survey summary is based on the Field Notes, and provides an estimate on the safe life expectancy of the trees.

TREE SURVEY SUMMARY

Tree No.	Species	Height (m)	Branch spread Av. m	Stem Dia Mm	Age class	Height of crown clearance m	Physiological condition	Structural Condition	Prelim. Recomms..	Remaining contri-bution in years	BS: Cat.
1	Deciduous spp.	4.0	N 2.0 S 2.0 E 2.0 W 2.0	115	Y	1.7	Average	Average	Could be removed.	>20	C1
2	Cherry	5.0	N 3.5 S 3.5 E 3.5 W 3.5	285	M	2.0	Very poor	Very poor	Remove	<10	U

3	Horse Chestnut	22.0 appr.	N 7.0 S 7.0 E 7.0 W 5.0	750	M	8.0	Very poor	Very poor	Retain in short term	<20	C1
4	Horse Chestnut	18.0 appr.	N 6.0 S 8.5 E 1.0 W 8.5	650	M	8.0	Very poor	Very poor	Retain in short term	<20	C1

10.0 THE DEVELOPMENT OF TREE ROOT SYSTEMS.

10.1 There is a general misconception that tree roots grow to great depths within a soil, and often have large "Tap-Root" systems (See Figure 1 below). However, in reality, the root systems of trees are typically shallow, and spread out for considerable distances (See Figure 2 below).

10.2 Tree roots typically grow parallel with the soil surface, rather than vertically, and on level sites the majority of their roots are within a depth of between 600mm and 1.0 metre below ground level.

Scanned copies of Figures 1 & 2 of AAIS – APN12.

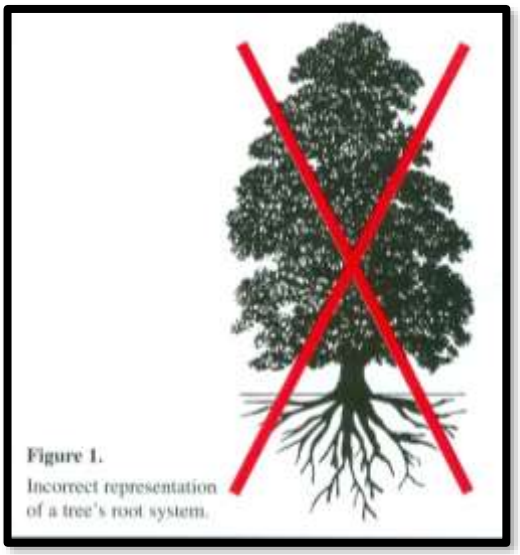


Figure 1.
Incorrect representation of a tree's root system.

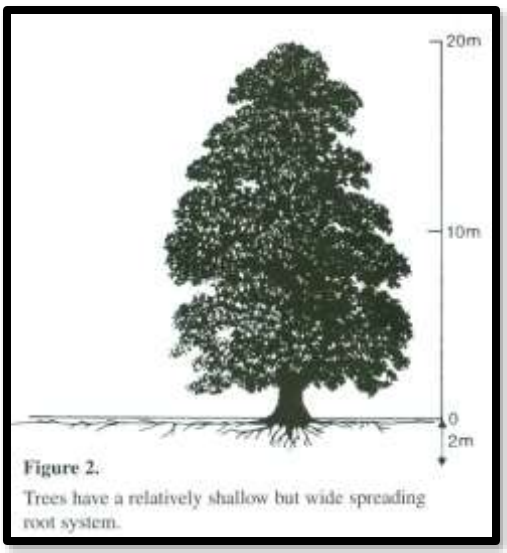


Figure 2.
Trees have a relatively shallow but wide spreading root system.

10.3 Roots can be up to 30cm or more in diameter at the base of the trunk of a tree, but sub-divide and taper rapidly as they extend from the trunk. In the vast majority of cases the roots are only 2-3cm in diameter, or much less, at a distance of 3.0 metres to 4.0 metres from the trunk.

10.4 **It is critical to appreciate that the calculation of circular Root Protection Areas as specified in British Standard 5837 only works when there are no constraints to the spatial root development of trees.**

Item 4.6.3 of British Standard 5837 clearly identifies the potential problems with using circular Root Protection Areas; item 4.6.3 states:

"Any deviation in the RPA of the roots from the original circular plot should take account of the following factors whilst still providing adequate protection for the root system:

a) ***the morphology and disposition of the roots, when influenced by past or existing site conditions (e.g. the presence of roads, structures and underground apparatus;*** (Bolding added by Dr Hope);

b) *topography and drainage;*

c) *the soil type and structure;*

d) ***the likely tolerance of the tree to root disturbance or damage, based on factors such as species, age, condition and past management.****"* (Bolding added by Dr Hope).

10.5 In some instances Local Planning Authorities attempt to suggest that the spatial development of tree roots can be prevented by the presence of roads or pavements growing close-by. However, in the vast majority of cases, trees can develop effective root systems beneath pavements and roads.

11.0 CAN TREE ROOTS BE SEVERED WITHOUT CAUSING HARM TO TREES?

11.1 As with the general misconception with the depth of tree root systems, there is also a general misconception that the pruning of roots will necessarily lead to damage to trees. However, as with pruning of branches, this is not the case.

11.2 It is generally accepted within the Arboricultural industry (See item 2 of the current British Standard 5837) that some roots can be severed without causing damage to trees. This is confirmed in The National Joint Utility Group publication entitled "NJUG Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees – volume 4, Issue 2, 2007", where it accepts that roots of up to 25mm diameter can be severed without specialist arboricultural input, and that roots with diameters greater than 25mm may also be severed in certain circumstances following advice from a qualified arboriculturalist. It is important to note

that although roots of less than 25mm may be severed, special care must be taken where clumps of roots of this diameter are present.

12.0 THE LIKELY TOLERANCE OF HEALTHY TREES TO ROOT DISTURBANCE.

12.1 Healthy trees produce a balance between their root systems and their branch/leaf structure. The balance of growth is known as the root:shoot ratio, and it ensures that the tree has enough roots to provide adequate moisture and nutrients to support the branches and leaves. If the root:shoot ratio of a healthy tree is altered to any extent, the tree will rapidly produce new growth to reinstate the balance.

12.2 As mentioned in item 11.0 of this report, it is important to appreciate that the pruning of a tree's root system does not necessarily mean that it will cause any lasting harm to the tree. This is the fundamental tenet of the use of theoretical Root Protection Areas as advocated within British Standard 5837. It is fully accepted within the British Standard and the Arboricultural Industry in general, that some **non-structural roots** can be pruned without harming trees. The critical points in relation to pruning roots are that of maintaining tree stability, and providing adequate amounts of roots for moisture and nutrient absorption.

13.0 THE TREE CONSTRAINTS PLAN - BELOW GROUND CONSTRAINTS.

13.1 British Standard 5837 recommends that the influence that healthy trees on, and adjacent to the site, will have on the layout of a development should normally be plotted on a plan called the "Tree Constraints Plan" i.e. as an aid to the design process. In the majority of situations, a theoretical **Root Protection Area** (RPA) is used as a design tool indicating the minimum area around a tree identified as containing sufficient roots and rooting volume to maintain the tree's viability, and where the protection of the roots and soil structure should be treated as a priority.

13.2 In order to avoid damage to the roots or rooting environment of retained trees, the RPAs should typically be plotted around each of the category A, B and C trees. This is a minimum area (for conventional foundations) in m^2, which should be left undisturbed around each retained tree. However, the British Standard does accept that it is possible to encroach within the Root Protection Areas in some instances.

13.3 Although the theoretical RPAs of category "C" trees should be plotted, they are typically of such poor quality that they should not normally be used as a constraint to the development of a site.

13.4 There is no requirement to plot trees that have British Standard 5837 category ratings of "U".

13.5 For single-stemmed, free-growing trees, the theoretical Root Protection Area should normally be calculated as being equivalent to a "**circle**" with a radius 12 times the effective trunk diameter.

13.6 For trees with more than one main stem, one of two calculation methods should be used. Annex "C" of the current British Standard 5837 describes the methodology of measuring the effective trunk diameters of trees.

13.7 The effective (combined) trunk diameter of trees with two to five stems should be calculated using the following equation:

$$\sqrt{(\text{Stem diameter 1})^2 + (\text{Stem diameter 2})^2 \ldots\ldots + (\text{Stem diameter 5})^2}$$

13.8 The effective (combined) trunk diameter of trees with more than 5 stems should be calculated using the following equation:

$$\sqrt{(\text{Mean stem Diameter})^2 \times \text{number of stems}}$$

13.9 Once the effective (combined) trunk diameter is calculated (for both single-stemmed and multi-stemmed trees), the **radius of the nominal RPA circle** can be ascertained, and the theoretical Root Protection Area can be calculated.

13.10 Where circular RPAs are relevant and used, the minimum safe distance between the trees and any soil excavations will be the radius of the nominal circle. For example, if a tree has a single stem (trunk), or combined stem diameter, of 200mm, the radius of the nominal circle will be 2.4 metres (200mm x 12), and the safe minimum distance between the centre of the trunk of the tree and any excavations (without any factors affecting root development) will therefore be 2.4 metres. The RPA would be calculated using the following equation:

Calculating the RPA

$$\text{RPA } (m^2) = \left(\frac{\text{combined stem diameter (mm) x 12}}{1000}\right)^2 \text{ x } 3.142$$

Simplistically the calculation for a 200mm diameter trunk would be as follows:

2.4 x 2.4 x 3.142 = 18.09 (18m^2).

13.11 Annex "D" of the current British Standard 5837 provides a table with pre-calculated Root Protection Areas.

14.0 THE CALCULATED ROOT PROTECTION AREAS.

14.1 The table below includes the radii of the theoretical circles of the trees located within the property. Three of the trees are of very poor quality, and one is very young. None of the trees should be used to adversely affect the proposed development.

14.2 The data for all of the trees have been included for completeness, and to comply with British Standard 5837. **The data for the safe distances should not be used as a confirmation that the trees are worthy of retention or pose a realistic constraint to the development of the site.**

No.	Location	Tree species	Radius of Circle.	RPA (m^2)
T1	Front garden	Deciduous spp. (C1)	1.5m	7.0
T2	Rear garden	Cherry (U)	3.6m	41.0
T3	Rear garden	Chestnut (C1)	9.0m	255.0
T4	Rear garden	Chestnut (C1)	7.8m	191.0

14.3 To comply with British Standard 5837 the calculated theoretical circular Root Protection Area figures of the category "C" trees in the above table, should normally be plotted on a plan known as the "Tree Constraints" plan, although in this instance, on the two Chestnuts in the rear garden are relevant. The category "U" tree, and the young tree have not be plotted (See the plan on page 24 below).

14.4 It is generally accepted within the Arboricultural industry that it is possible in certain circumstances to encroach into the theoretical Root Protection Areas by between 10% and 20% without hurting the trees if there is adequate unaffected contiguous root development space elsewhere, i.e. where addition root development will, or could, occur in the future.

14.5 The young tree at the front of the house (tree T1) has a very small theoretical Root Protection Area, and it is recommended that it be removed, and be replaced with a healthy young tree once the development is complete. It should not be used to adversely affect the proposed development.

Tree Constraints plan produced by BB Partnership Ltd.

14.6 The Cherry (T2) in the rear garden is deteriorating and has a short, safe life expectancy. It should be removed and should not be used to adversely affect the proposed development.

14.7 Both of the Horse Chestnuts (Trees T3 & T4) are deteriorating, and have short, safe life expectancies. They can be left in situ, but should not be used to adversely affect the development of the property. In my opinion, it would be appropriate to reduce the theoretical Root Protection areas of the trees by 20% on the northern side (within the garden). Such a reduction would have no adverse influence on the stability or safe life expectancies of the trees.

14.8 The following table provides guidance on realistic Root Protection Area distances between the trees and any excavations, i.e. taking into account the condition of the trees and site-related factors.

RECOMMENDED MINIMUM DISTANCES TO CONSTRUCTION (CONVENTIONAL FOUNDATIONS/EXCAVATIONS).

NO.	Tree species	Dist. from tree (m)
1	Deciduous spp.	Remove
2	Cherry	Remove
3	Chestnut	7.0
4	Chestnut	6.25

14.9 **In my opinion, none of the trees should be used to adversely affect the proposed development.**

15.0 TREE CONSTRAINTS - ABOVE GROUND CONSTRAINTS.

15.1 Item 5.2 of the current British Standard 5837 recognises that it is possible that some above-ground constraints may arise due to various tree-related factors. The British Standard identifies the following potential constraints:

i. the current ultimate height and spread of the trees;

ii. species characteristics, including evergreen or deciduous, density of foliage, and factors such as susceptibility of honeydew drip, branch drop, fruit fall, etc.

15.2 The current British Standard 5837 accepts that Access Facilitation Pruning is a recognised, one-off technique for removing branches on development sites.

15.3 All of the trees within the site have been severely pruned throughout their lives, and it would now be unreasonable, and unrealistic to attempt to prevent further pruning from being carried out.

15.4 The small tree at the front of the property (T1), and the Cherry (T2) in the rear garden should be removed. The Chestnuts have been severely pruned in the past, and have short, safe life expectancies.

15.5 The current proposal is to develop the property by constructing subterranean rooms, which will not affect the above ground parts of the

retained trees. The canopies of the Chestnuts will not be affected by the development.

15.6 In my opinion, there are no realistic above ground constraints affecting the proposed subterranean development of the site.

16.0 INTRODUCTION TO TREE PROTECTION MEASURES.

16.1 The majority of damage to trees on development sites occurs within a few hours of machinery first entering the site. The damage can occur in numerous ways. It can be direct, i.e. where the trees are physically hit by moving plant, or indirect, where the soil structure or levels are changed to such an extent that the moisture regimes are altered. It should also be appreciated that other agencies, such as spilt fuel, or fires can cause significant damage.

16.2 It is essential that tree protection measures are put in place before any demolition/construction takes place, and before any construction traffic is allowed on the sensitive sections of a site.

16.3 Section 6 of the current British Standard 5837 provides guidance and recommendations relating to the protection of the construction exclusion zone. Abbreviated notes from the British Standard, i.e. which are relevant to the protection of the trees within, and adjacent to number 3 Eton Avenue are identified below.

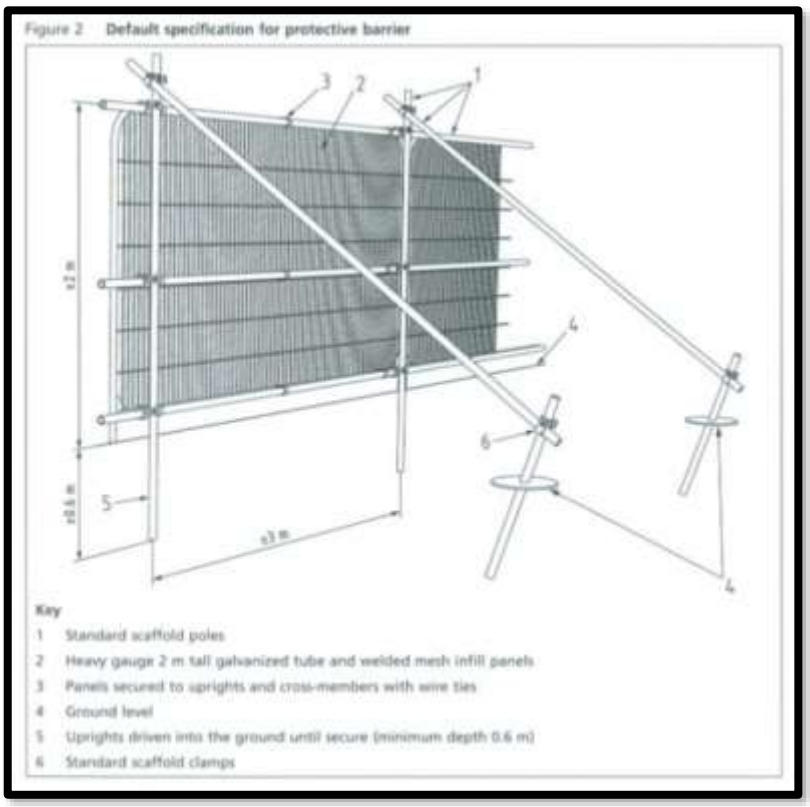
Barriers:

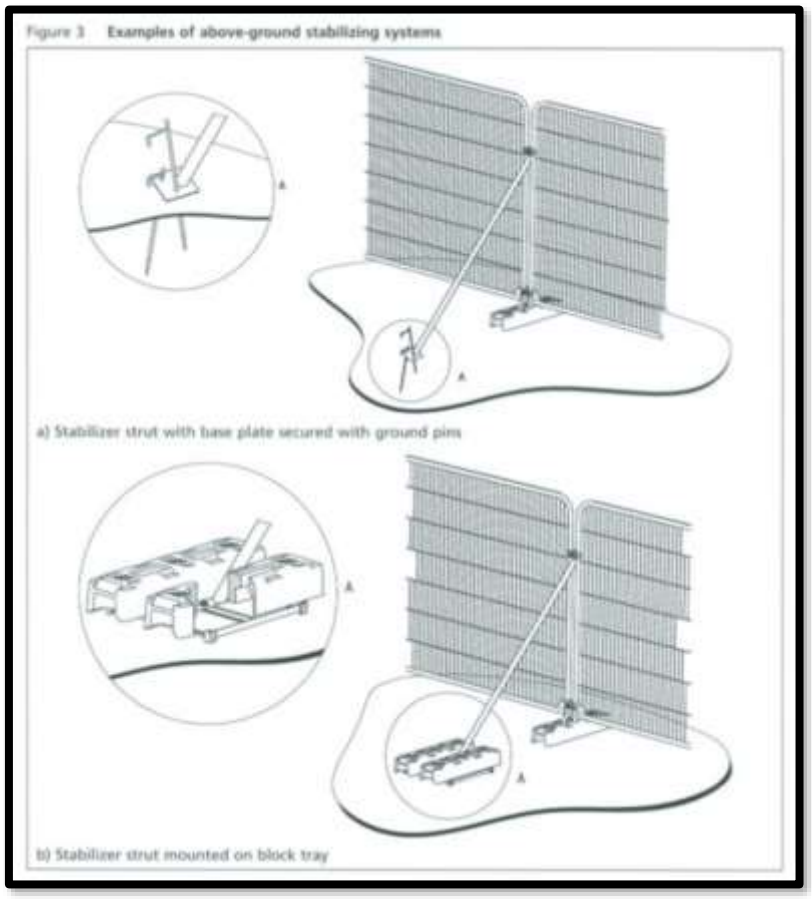
"Barriers should be fit for the purpose of excluding construction activity and appropriate to the degree and proximity of work taking place around the retained tree(s). Barriers should be maintained to ensure that they remain rigid and complete."

The default specification of the protection should consist of a vertical and horizontal scaffold framework well braced to resist impacts, as illustrated in Figure 2."

16.4 Figures 2 and 3 of British Standard 5837 are included below for ease of reference.

Figures 2 and 3 of British Standard 5837.





16.5 The only trees to be retained are the two Horse Chestnuts (T3 & T4) in the rear garden of the property. It is recommended that physical protection complying with Figures 2 and 3 of British Standard 5837 should be erected at a distance of 7.0 from the trees, and should run from the eastern to western boundaries of the rear garden.

16.6 Once the protective fencing has been erected the protected area should be sacrosanct, and under no circumstances should any personnel or equipment be allowed to enter the protected area. All subsequent work should be carried out from the construction side of the fencing.

16.7 No materials, such as bricks, petrol, gravel or cement should be stored beneath the crowns of the trees, and any site huts and latrines should be sited well away from the protected area. No fires should be allowed within 20.0 metres of the crowns of the trees.

16.8 No protective fencing should be removed until all of the construction works are completed.

16.9 It is essential that tree protection measures are put in place before any construction traffic is allowed on the sensitive sections of a site.

17.0 PHYSICAL PROTECTION OF THE TREES PRIOR TO, AND DURING, THE DEVELOPMENT PROCESS.

METHOD STATEMENT.

17.1 The small tree (T1) in the front garden, and the Cherry (T2) in the rear garden, will be removed prior to the commencement of any demolition and construction, and before any materials enter the site.

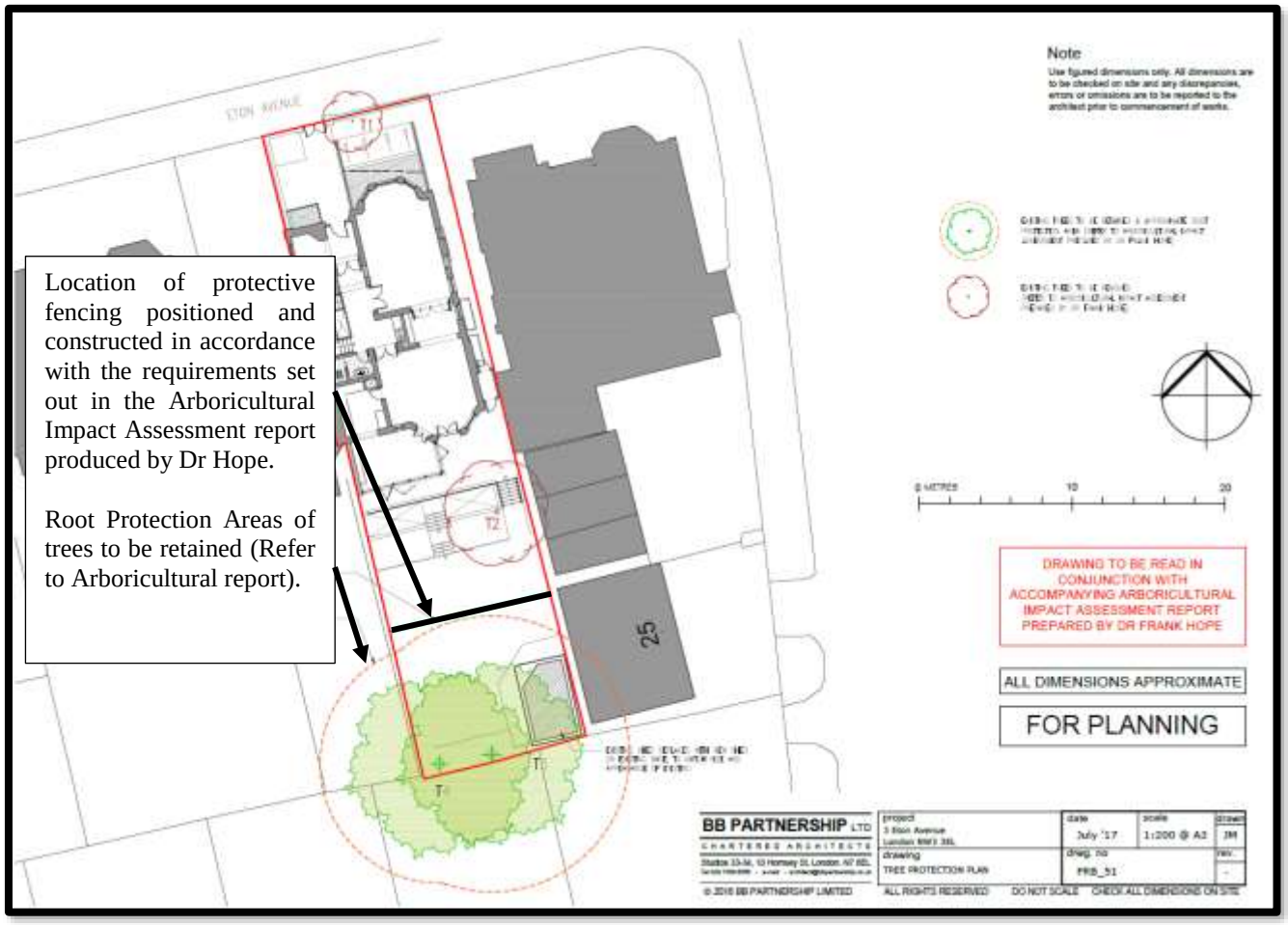
17.2 The two Chestnuts (T3 & T4) will be retained in situ.

17.3 The two Chestnuts will be physically protected before any demolition is carried out, and before any site traffic, or materials enter the site.

17.4 The physical protection will consist of a framework constructed of scaffolding posts, as identified in Figures 2 & 3 of British Standard 5837 (See page 27 above for detail), with modifications.

17.5 The position of the protective fencing is shown on the plan on page 29 below).

TREE PROTECTION PLAN PRODUCED BY BB PARTNERSHIP LTD.



17.6 In order to afford maximum protection of the two trees, the standard welded mesh infill panels will be substituted with 2.0 metre tall, marine-plywood sheeting so as to provide a solid barrier.

17.7 All-weather notices will be attached to the protective barrier (fencing), containing the words "CONSTRUCTION EXCLUSION ZONE – NO ACCESS". The notices will be placed approximately 2.0 metres apart, and will be retained in position throughout the development works.

17.8 The protective fencing will be positioned outside the northern edge of the Root Protection Areas of the two Chestnuts (See the plan above) so as to protect the maximum area of root development. It will run across the whole width of the rear garden from east to west so as to prevent any access into the protected area.

17.9 The Local Planning Authority Tree Officer will be offered the opportunity to visit the site and inspect the protective fencing prior to the

commencement of any demolition or construction works. The Officer will subsequently be provided with access at all times during normal working hours.

17.10 No materials, such as bricks, petrol, gravel or cement will be stored within the protected area, and any site huts and latrines will be sited outside the protected area. No fires will be allowed within garden of the property.

17.11 Once the protective fencing has been erected, and verified by the Local Planning Authority Arboricultural Officer, the protected Root Protection Area will be sacrosanct, and under no circumstances will any personnel or equipment be allowed to enter the protected area. All subsequent work will be carried out from the construction side of the fencing unless specifically agreed in writing with the Local Planning Authority.

17.12 If any tree-related problems arise in relation to the safety of the two trees, or any bad practices are noted, the work within the area will immediately be suspended, and will not recommence until the project Arboricultural Consultant identifies and agrees appropriate remedial actions.

17.13 All tree protection measures will be retained in place until all of the construction of the new extension is complete, and authorised by the Local Planning Authority officer.

17.14 Once the development is complete the protective fencing will be dismantled and removed from the site.

18.0 CONCLUSIONS AND RECOMMENDATIONS.

18.1 It is proposed to construct subterranean rooms to the underside of the existing property, and within part of the rear garden with lightwells to the front and rear of the property.

18.2 No detail has been provided in relation to the legal status of the trees, but it is believed that the property is within a Conservation Area. It is recommended that no work should be carried out on the trees without prior consultation with the Local Authority.

18.3 The small deciduous tree (T1) has little visual amenity to the Conservation Area, and could be removed, and then replaced once the development is complete.

18.4 The Cherry (T2) is a very poor specimen, and has less than ten years of safe life expectancy. It is not worthy of a Preservation Order, and should be removed.

18.5 The two Chestnuts (T3 & T4) are large trees with useful visual amenities to the Conservation Area. Unfortunately, both trees are deteriorating, and have short, safe life expectancies. There is no requirement to remove either of the trees to allow the development to go ahead. However, it would be prudent to inspect the trees on an annual basis, as they are reaching the point where large limbs could fail in the future.

18.6 Realistic Root Protection Areas are shown in table below.

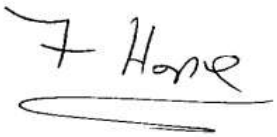
RECOMMENDED MINIMUM DISTANCES TO CONSTRUCTION (CONVENTIONAL FOUNDATIONS/EXCAVATIONS).

NO.	Tree species	Dist. from tree (m)
1	Deciduous spp.	Remove
2	Cherry	Remove
3	Chestnut	7.0
4	Chestnut	6.25

18.7 There should be no above-ground constraints to the development as the two Chestnuts (T3 & T4) have been severely pruned throughout their lifetimes, and it would now be unreasonable to attempt to prevent addition pruning in the future.

18.8 The two Chestnuts should be physically protected with wooden boarding, or as per Figures 2 and 3 of British Standard 5837.

18.9 Any works to the trees should be as per the recommendations in British Standard 3998 "Tree Work", 2011.



17th July 2017

APPENDIX -A-

Dr. Frank Hope

PROFESSIONAL QUALIFICATIONS AND EXPERIENCE

Dr. Hope has been involved with the land-based industries for the past 48 years. During this time he has worked for local government, the Royal Horticultural Society, the Institute of Groundsmanship and private industry. In the early 1970's he trained at the RHS Gardens Wisley and later became a practical arborist in the gardens. For four years he was a lecturer in Horticulture and Arboriculture at the Cheshire College of Agriculture, and has more recently been a part-time lecturer to the BTEC National Diploma course in Countryside management, at the Cambridgeshire College of Agriculture. He has been an Arboricultural and Horticultural examiner for the Royal Forestry Society, the Royal Horticultural Society and the Institute of Groundsmanship.

The majority of his work is based in East Anglia, and London, although he has taken commissions throughout the world. For example, in the 1980's he was involved in the management and harvesting of a 26,000 acre hardwood crop in Malaya. He carries out technical projects for a range of organisations on both Arboricultural and general Horticultural subjects, and has been involved in the proposed re-development of the Elephant and Castle, and the area around Waterloo station in London. He specialises in both legal and planning aspects of trees.

He has been a technical adviser to the Jockey Club and Racecourse Association, and organised all their training courses for over five years.

During 1997, Dr. Hope was one of three people commissioned by the Arboricultural Association to develop a computerised model capable of assessing the future risk of subsidence damage to buildings when trees are growing close-by. He has also given the Association advice on the Arboricultural Appendix to the ISE handbook.

Over the past 20 years, Dr. Hope has been involved in over 3,500 cases involving trees and subsidence damage to buildings. He regularly gives evidence in court, and has experience as a single joint expert. Notable cases in which he has been involved are Siddiqui & Sohanpal -v- London Borough of Hillingdon, Loftus Brigham -v- London Borough of Ealing, Dayani -v- London Borough of Bromley, Berent -v- Family Mosaic & The London Borough of Islington, Robbins -v- London Borough of Bromley, Battley -v- Wycombe District Council, and Middleton –v- Surrey County Council.

For five years (until April 2003), Dr. Hope acted for the Office of the Deputy Prime Minister as an Inspecting Officer on Tree Preservation Order Appeals, which provided him with a detailed insight into this topic.

In addition to having a Doctorate and a Masters degree in Biological Sciences (based on Arboricultural and Horticultural research), Dr Hope holds the National Diploma in Arboriculture (RFS), which is the premier practical qualification for Arboriculture, and the National Diploma in Horticulture (now the Master of Horticulture), administered by the Royal Horticultural Society. The Master of Horticulture is the world premier qualification for general horticulture. Dr. Hope is a past examiner for the final stages of the Master of Horticulture qualification. His personal qualifications are at the highest level; the major ones are as follows:

Doctor of Philosophy (Ph.D):	University of Bath, Biological Sciences Dept. The Development of a computerised Plant Establishment and Growth Model for use with Landscape Trees and Shrubs.
Master of Philosophy (M.Phil):	University of Bath Biological Sciences Dept. The Development of a Computerised Information Retrieval System for Decorative Plant Selection.
National Diploma in Horticulture:	Administered by the Royal Horticultural Society.
National Diploma in Arboriculture (N.D.Arbor):	Royal Forestry Society.
National Certificate in Arboriculture (Distinction):	Royal Forestry Society.

Wisley Diploma in Horticulture:	Royal Horticultural Society.
Advanced Diploma in Horticulture:	Writtle Agricultural College.
Certificate of Education:	Wolverhampton Teacher Training College, (Wolverhampton Polytechnic).

SOME PUBLISHED WORKS

Recognition and Control of Pest and Diseases of Farm Crops	Blandford Press 1980 ISBN 0 7137 0995
The Garden Planner	Hardback - Collins 1981 Softback - Fontana 1981 Softback - Pilot 1983 ISBN 0 00 4116622 Co-author of each edition
QL Gardener Manual	Sinclair Research 1985 ISBN 1 850 160449
The New Organic Grower	Cassall Publishers 1990 ISBN 0 304 34013 8
Turf Culture	Blandford Press 1978 ISBN 0 7137 0873 5
Turf Culture - A manual for the Practising Groundsman	Cassall 1990 ISBN 0-304-31854-X
Rasen	German Edition of Turf Culture ISBN 3-8001-5038-7
NVQ Levels 1 & 2 manuals	Technical author for the British Association of Landscape Industries (BALI) instruction manuals for general horticulture and turfculture at levels 1 and 2, for the National Vocational Qualifications.

Numerous articles on Horticulture, Arboriculture and computers in a range of magazines, e.g. Horticulture Week, The Groundsman, Personal Computer World.

SOME PUBLISHED SOFTWARE

Horticultural Key	Quanta magazine.
Plant Selector II	A.J. Harding Molimerx Ltd.
Computerised Ornamental Plant Retrieval System	University of Bath.
Genus Plant Selector	Intersearch Ltd.
Plant Establishment and Growth Model	University of Bath.
QL Gardener	Sinclair Research.