D F Clark
Bionomique Ltd

Tree report BS 5837(2012)
Arboricultural Impact Assessment
To accompany a planning application
At
73 Parliament Hill, Hampstead, London.

12 August 2015
Our Reference DFCP 3249
Rhodri Jones

Executive summary

An arboricultural survey has been carried out and this report prepared to support a planning application to create a rear extension of the property at 73 Parliament Hill, Hampstead London. Trees that could be affected by the proposal or that may have been reasonably considered to have an influence on it were inspected.

This report seeks to provide information in accordance with British Standard *BS 5837:2012, Trees in relation to design, demolition and construction.*

This report's purpose is to allow the local planning authority to assess the tree information as part of the planning submission.

There are 4 subject trees, 1 of which has been assessed to be of good quality, which is in an adjoining property and due to substantial changes in soil level and a visually obvious pruning history, is unlikely to have an effect on the proposal. While the remaining trees have a low amenity value and are of poor quality, in accordance with BS 5837.

The only impact of the proposal will be to remove and replace one tree T1, to create access and as such the development will have little impact on the visual amenity of the area.

If the recommendations made within this report are followed, the development should be achievable in arboricultural terms and should be acceptable to the local planning authority.

1.0 Introduction

1.1 Instruction

DF Clark Bionomique Ltd was instructed on 10th August 2015 to produce an Arboricultural Impact Assessment for a proposed single story, rear extension at 73 Parliament Hill, London NW3.

It has been produced in accordance with the principles of British Standard *BS 5837:2012, Trees in relation to design, demolition and construction - Recommendations* (BS 5837) and includes the following information to accompany a planning application:

- details of significant trees including an assessment of condition using BS 5837 categorisation;
- a plan showing tree survey information, retention categorisation and root protection areas (RPA)[1];
- an assessment of the impact of the proposal on trees and any wider impact that has on local amenity and any impact trees may have on the proposed development;
- a tree protection plan showing the location of tree protection barriers and/or ground protection and any areas requiring specialist methods of work;
- identifying where an arboricultural method statement may be required; and a schedule of tree works to facilitate construction.

1.2 The proposal

To extend, improve and modernise a single storey rear extension to the property.

1.3 Scope and purpose of this report

This report's purpose is to allow the local planning authority (LPA) to assess the tree information as part of the planning submission.

It covers trees on the site and those adjacent to the site which could be affected by such a development. It is concerned with the impact the development may have on trees and the effect retained trees may have on the development. An assessment of the impact of any works close to trees to be retained has been made and methods of work within

[1] *Root Protection Area (RPA) - A layout design tool indicating the minimum area surrounding the tree that contains sufficient rooting volume to maintain the tree's viability, and where the protection of the roots and soil structure is treated as a priority. Clause 4.6.2 of BS 5837 states that the RPA may be changed in shape, taking into account local site factors, species tolerance, condition and root morphology.*

RPAs are given where enough detail is known. Areas requiring specific, detailed arboricultural method statements (AMS) have been identified. A stand-alone AMS along with a revised tree protection plan may need to be produced at the technical design stage following planning consent.

Tree roots can be asphyxiated and die if the rooting environment becomes compacted and soil structure damaged which can easily occur, particularly on clay soils, even with the passage of light vehicles.

The report covers arboricultural issues however non-arboricultural matters may be referred to such as soils, ecology, construction methods etc. This should be viewed as provisional and the appropriate expert should be consulted where required.

Trees are long-lived organisms which take a long time to mature and if considered at an early stage can complement and increase the value of a development.

1.4 Legal constraints

Camden Council confirmed on 10^{h} August 2015 that there are no trees or groups protected by a tree preservation order (TPO), yet that that the site is within the South Hill Park conservation area (CA).

1.5 Tree work recommendations

The tree surgery schedule found in Appendix 6 and trees shown for removal on the tree protection plan in Appendix 5 are based on the proposed layout and change of land use.

1.6 Other information included in this report

The following information is included in Appendix 1:

- documents and information provided;
- legal constraints and liabilities;
- survey methodology;
- contacts; and
- Reference documents.

2.0 Site visit and observations

2.1 Site visit

A site visit was undertaken on 12th August 2015 by Rhodri Jones, Senior Arboriculture consultant. The weather was dry with good visibility.

2.2 Site description

The site is located within the Hampstead village area of London, an urban area in north London, which closely links into Hampstead Heath with the majority of the surrounding area composed of a blend of managed open space and private dwellings.

The site in itself has a traditional layout of irregular terraces of between approximately 30-90cm depth, informal areas of bare soil and crazy paved areas, within which are a variety of overgrown and over mature shrubs and small trees. Levels across the site vary due to the previous construction works and the natural land form, the observations suggest that the levels drop substantially from the West to the East and towards the house to such an extent that root zones are higher than current building foundations levels.

The Adjoining gardens have tree cover which benefits the greening of the area, especially the adjoining rear garden which has two mature and apparently well maintained London Planes that confer substantial amenity value due to their size and overhang into the garden and are clearly visible from the front street and all areas of the house and neighbouring dwellings. The Plane trees overshadow the two subject trees in the Eastern part of the garden of 73 Parliament Hill and have to a degree restricted their form and growth.

The general soil type is understood to be a slowly permeable, seasonally wet, base-rich clay loam (Cranfield University). Trial pits have indicated areas of made ground across the location, commensurate with building work and garden construction.

2.3 The subject trees

There are a total of 4 subject trees, which are the subject of this report. Details of the trees as found at the time of the survey are in the tree survey sheets at Appendix 3 and their locations are found on the plan at Appendix 4.

Photo 1

Showing the rear of the house, with the approximate area for the proposed development; and T1 in the top right section of picture

Photo 2

Change in levels across site indicate variable fall in levels of more than 1000mm

Photo 3

Showing T1 and damage to the party wall.

Photo 4

Showing T1, within a group of small conifers that are below survey schedule size.

3.0 Arboricultural impact assessment

3.1 Trees to be removed

Only T1 will need to be removed to facilitate development. The tree is of moderate quality, yet has a large stem defect at approximately 1m. The main issues with the tree which are of concern are the unsuitability of the tree for its current location which it has outgrown.

The tree has caused and is causing ongoing structural damage to the party boundary wall of 75 Parliament Hill. The tree is causing lateral and direct root damage, due to the trees proximity and direct contact with the wall, the different levels between the sites and removal and replacement nearby would provide a sensible cost effective arboricultural solution and avoid ongoing financial inconvenience to both parties and confer amenity value on the site for many years to come.

Due to the aspect the existing tree is substantially shading the flank wall and living quarters of 75 Parliament Hill and due to the tree being an evergreen there is no relief from the issue such as may be found with a broadleaf.

In this instance, an Acer griseum is a sensible replacement tree that would provide improved amenity value in the relatively constrained site.

Root protection area incursions

The only incursion with T1, is where the corner of the proposed building line falls within a small percentage of the tree's theoretical RPA, yet due to the change in levels the proposed construction zone is in the main part unaffected. Due to the overall condition of T1 and that it is causing progressive damage to the party wall and the necessity to replace it in a location 2 metres to the west this is of illustrative information.

As T1 has been formally maintained to have a smaller than usual crown of foliage, it is acceptable to assume that the theoretical RPA may be larger than the tree's realistic moisture and structural needs. A slight incursion into the theoretical RPA of this tree will therefore have minimal effect on tree health, especially bearing in mind the substantial drop in soil level, immediately outside the likely RPA of the tree and when considered replacement is the most sensible approach.

There is a theoretical incursion with T4 yet again due to the substantial fall in levels and the clearly evident pruning history of the tree, it is unlikely that the tree will be affected. This is based upon the understanding that the majority of tree roots are located within the

top 600mm of the soil, where there is free access to oxygen, nutrients and water.

3.2 Protection of retained trees

Protection measures, usually a combination of barriers and ground protection must be in place before any works, including site clearance, begin, and stay in place for as long as a risk of damage remains. The protection of trees must take account of the buildability of the proposal, including services, and ensure that all activities such as storage of materials, parking and the use of plant and vehicles can be accommodated outside of RPAs. Particular care and planning is necessary in the operation of excavators, lifting machinery and cranes to ensure all vehicle movements and lifting operations will not impact on retained trees.

Details of tree protection barriers and ground protection can be found in the preliminary arboriculture method statement section of this report.

3.3 Post-development pressures

Shade cast by trees can be viewed negatively when it affects main habitable rooms and existing and mature height shading arcs can be found on the tree constraints plan to aid the design of the layout. In addition to shade, there may be future pressure to prune or remove trees if development occurs too close to the tree due to concerns over leaves and the perception of risk from falling branches and trees and the sheer size and mass of nearby trees.

Due to the proposal of replacement of T1, shade will not be an issue and the ongoing issues of structural damage to the boundary wall and the extra cost incurred by the ongoing over pruning to retain the tree in its current position will be removed.

3.4 New planting

In the context of the loss of trees, a tree planting scheme is proposed. Planting locations should be determined at the planning stage and protected and if required improved during the development to ensure a suitable soil structure. In this instance the suitable planting location would be 2 metres to the West of the existing T1

3.5 Tree survey plan (TSP)

The plan found at Appendix 4 is based on provided information and all scaled measurements and site boundaries must be checked against the original documents. This plan should only be used for dealing with the tree issues. It shows the existing trees

numbered and categorised in accordance with BS 5837. Below ground constraints are represented by the RPA. This is shown as a circle denoting the theoretical area containing enough rooting volume to maintain the tree's viability. Tree roots often do not grow in an even, symmetrical pattern, particularly in urban areas where underground obstructions, compacted soil and other conditions unsuitable for good root growth, influence the position of roots. The RPA is shown as a circle unless there is a reasonable certainty of the location of roots. It is most likely, however, that if available, roots will be proliferating within soft areas such as grass, shrub beds etc., rather than beneath hard surfaces and structures. The above ground constraints the trees represent by virtue of their size and position are shown by their crown spreads and as shading arcs for existing and ultimate height where appropriate. The survey plan is an aid to design and should not be used post consent on site; the tree protection plan is to be used for this purpose.

3.6 Tree protection plan (TPP)

The plan found at Appendix 5 is based on provided information and all scaled measurements and site boundaries must be checked against the original documents. This plan should only be used for dealing with the tree issues. Trees to be retained have black centres and green outlines whilst trees to be removed have red centres and a red, dashed, outline. Tree protection is shown as barriers and/or ground protection defining the Tree Protection Zone (TPZ)[2] and any areas requiring non-standard methods of demolition or construction are shown.

3.7 Tree root influence on structures

The suggested ultimate height of trees is based on physiological and site conditions and may differ from industry tables. Its purpose is to inform shading, visual aspects and post-development pressures and not necessarily foundation design.

[2] *Tree Protection Zone. An area based on the RPA in m^2 identified by an arboriculturist, to be protected during development, including demolition and construction work, by the use of barriers and/or ground protection fit for purpose to ensure the successful long-term retention of a tree.*

4.0 Preliminary arboricultural method statement

4.1 Introduction

This section identifies where works with the potential to affect trees require specialised working methods and/or materials. Where sufficient detail of proposals is known, or generic information is applicable, details are included. If insufficient details of proposals are known, a detailed arboricultural method statement (AMS) may be required, or conditioned by the local planning authority, following planning consent. This should be produced at the detailed design stage with the design team. Any operations, including access, within an RPA should be described within the AMS in order to demonstrate that the operations can be undertaken with minimal risk of adverse impact on trees to be retained. This section also includes details of how trees to be retained can be protected throughout the development process. Specific work methodology can be found in Appendix 8.

4.2 Site clearance and set-up

4.2.1 Vegetation/debris/materials clearance. Tree protection barriers and/or ground protection must be in place before site clearance takes place. If necessary, localised vegetation clearance in order to install the barriers can be undertaken using hand tools only (including chainsaws, brushcutters etc.) but without the use of tracked or wheeled plant and machinery.

4.2.2 Temporary site buildings, materials/plant storage, vehicular access and parking. Temporary site cabins, marketing trailers and other site buildings can be used within RPAs if agreed with the LPA. They will need to be installed on appropriate ground protection with no excavation taking place. All temporary services must be installed above ground level

4.2.3 All site storage areas, cement mixing and washing points for equipment and vehicles and fuel storage must be outside RPAs. No discharge of potential contaminants should occur within 10m of a retained tree stem or where there is a risk of run-off into RPAs.

4.3 Tree surgery works

Tree surgery and felling works including stump removal. See Appendix 6 for details. Within TPZs, stumps, shrubs and other vegetation must be removed by hand or using specialised stump grinding machinery to minimise root damage to retained trees. Where poisoning of stumps is specified, this must be carried out by trained and qualified

operatives. Only chemicals approved for this purpose and used in accordance with the manufacturer's instructions will be used.

4.4 Site investigation and remediation works

Soil and archaeological investigations, contaminated soil removal, Japanese knotweed control, and other works not strictly part of the development but often needing extensive excavation. This has the potential to damage trees if within RPAs. The project arboriculturist should review any proposals to see if there are any conflicts with trees to be retained, and if so, discussions to find a mutually acceptable solution should occur.

4.5 Removal of existing structures and hard surfacing

Specialist methods required to minimise impact on trees, roots and soil structure.

Hard surfacing is to be removed close to trees T1, and this shall be carried out in accordance with the methods in Appendix 8.

4.6 Tree protection zone installation using tree barrier protection and/or temporary ground protection

Barriers must be fit for the purpose of excluding site personnel and machinery. The default specification detailed within Section 6 of BS 5837(2012) should be used unless a different specification has been agreed with the LPA.

In areas where it is not possible to erect protective barriers, ground protection must be used to protect soil structure and roots. This must be fit for purpose and appropriate to the level of pedestrian/vehicular use. See Appendix 7 for details.

4.7 Excavations including foundations, services, retaining structures, kerbs etc.

During the design stage every effort must be made to keep all new structures and services outside RPAs. Foundation design that minimises the impact on soil structure and roots is sometimes acceptable. Conventional strip or pile and beam construction is unlikely to be permissible. The use of piles supporting above-ground beams or a raft is more likely to be acceptable. This type of construction results in higher finished levels which can have an impact on finished building heights and level threshold requirements so this must be considered during design. When existing services within RPAs require upgrading or new services have to be installed in RPAs, conventional excavation techniques are usually unacceptable. Trenchless installation should be the preferred option but if that is not feasible, any excavation is likely to have to be carried out by hand or using a compressed air lance under arboricultural supervision.

4.8 Installation of new hard surfacing

Any proposal for new surfacing within RPAs must be able to demonstrate a minimal impact on soil structure and roots and this includes the ability for movement of water and air in and out of the soil. The use of no-dig, cellular confinement systems using porous sub-base and finished surface materials can be acceptable in some circumstances. This has implications for finished levels.

4.9 Use of piling rigs and cranes and other high plant and vehicles

The use of piling rigs, cranes and other high machinery are often used close to trees and it will be necessary to demonstrate this can be achieved without damaging upper parts of retained trees.

4.10 Site hoarding and signs

If site hoarding or signage is to be erected within RPAs it will be necessary to show the design has taken account of retained trees in respect to the positioning of the hoarding/sign and posts, and methodology of installation, such as lining post holes to avoid the caustic effect of wet concrete on tree roots. See Appendix 8.

4.11 New landscaping

Landscape operations have the potential to damage trees if not carried out appropriately; in addition the removal of protective barriers to carry out landscape operations may allow other contractors in previously protected areas.

4.12 Auditable system of arboricultural site monitoring

Monitoring tree protection and supervising any agreed works within RPAs including a schedule of site specific events requiring input of supervision. Report on findings as an audit trail of compliance for the client and local authority (ref. subsection 6.3 of BS 5837).

4.12.1 Pre-commencement site meeting

Before any site works begin, a site meeting between the site manager and project arboriculturist should be held and to which the LPA tree officer will be invited. The purpose of the meeting will be to discuss tree protection measures detailed in this document and to agree the sequence of events where they can impact on trees. At this meeting a programme of tree protection will be agreed by all parties to form the basis of any monitoring and/or supervision arrangements between the project arboriculturist and the developer.

4.12.2 **Site management**

It is the responsibility of the main contractor to ensure that the details of this report are known, understood and followed by all site personnel. As part of the site induction, all site personnel who could have an impact on trees should be briefed on specific tree protection requirements. Copies of the report and plans should be available on site at all times.

4.12.3 **Site monitoring and supervision**

Once work begins on site, the project arboriculturist should visit site at an interval agreed at the pre-commencement site meeting. The interval should be sufficiently flexible to allow the supervision of key works as they occur. These are likely to include the following although this is not an exclusive list:

- tree pruning and felling and site clearance close to trees;
- installation of tree protection barriers;
- installation of ground protection; and
- Any agreed works in root protection areas.

The project arboriculturist's role is to monitor compliance with arboricultural conditions and advise on any tree problems that arise or modifications that become necessary. Following every site visit, a report will be sent to the local authority tree officer and the client/developer. Tree site supervision reports are useful not only as an audit trail for the client and local planning authority, showing compliance to tree protection conditions, but also to provide evidence of retention and protection of 'ecological features of value' which is required under Code for Sustainable Homes section Eco 3.

Should any issues or compromises occur during the development which have an impact on any retained tree it is the responsibility of the site manager to inform the project arboriculturist who will notify the LPA tree officer of the issue and any proposed remedial works.

4.13 Contact details for the relevant parties

To include:

- The site manager or other person on site responsible for ensuring tree protection is in accordance with that agreed.
- The LPA tree officer and/or case officer.
- The project arboriculturist.
- Any other relevant party.

5.0 Conclusions

5.1 Only one section of low amenity hedging will be removed as part of this proposal.

5.2 The proposed building may fall within a slight portion of the theoretical RPA of T3, however the tree has been formally and historically maintained to have a small crown and therefore justifies a reduced root protection area. A slight incursion of the theoretical RPA will only have minimal impact of the health of the tree.

5.3 Provided tree protection and methods of work close to trees outlined in this report are followed, the impact of the development on trees will be minimal.

6.0 Recommendations

6.1 That post planning consent, a detailed arboricultural method statement is produced (if required) with the design team to ensure all works proposed within root protection areas can be achieved with minimum impact on retained trees. This should cover in particular, the hard surfaces where close to retained trees if the design requires excavation deeper that the existing surfaces.

6.2 During construction, the arboricultural method statement should be followed by all site personnel and supervised at key stages by the project arboriculturist. A copy of it and associated plans should be kept on site and be part of the site induction where applicable. Supervision/monitoring reports to be issued after each inspection as a record of compliance and audit trail for the local authority.

6.3 The routes of proposed services should be assessed by the project arboriculturist and a detailed arboricultural method statement produced in conjunction with the services engineer and contractor if services are to be routed within root protection areas.

6.4 Foundation design should take into account trees to be retained, trees to be removed and new trees to be planted.

6.5 Tree protection barriers and any ground protection must be in place before any works begin.

6.6 That works to trees outside the site are undertaken by the council's approved contractors.

Rhodri Jones

Senior arboriculture consultant - DF Clark Bionomique Ltd

Appendix 1 **Survey and background information**

1. **Methodology**

The trees were surveyed from ground level without detailed investigations. All trees with a trunk diameter of 75mm or above were surveyed, as recommended in BS 5837. All dimensions were estimated unless otherwise indicated. Obvious hedges and shrub masses were identified where appropriate. Information collected is in accordance with recommendations in subsection 4.4.2.5 of BS 5837 and includes species, height, diameter, branch spread, crown clearance, age class, physiological condition, structural condition and remaining contribution. Each tree was then allocated one of four categories (U, A, B or C) to reflect its suitability as a material constraint on development.

2. **Documents and information received**

Proposed single storey rear extension, drawing from Michael Seiersen.

3. **Contacts**

Table 4

Name	Company/organisation & position	Tel.No.
Mr Mert Alas	Mert and Alas	
Mr Rhodri Jones	Senior Arboricultural Consultant DF Clark	01621740876
Mr Al Smith	Tree Services Manager, London Borough of Camden	02079744444

4. **Reference documents**

- *British Standards Institution (2012) BS 5837: Trees in relation to design, demolition and construction – Recommendations;*
- *National Joint Utilities Group (2007) Volume 4, Issue 2: Guidelines for the planning, installation and maintenance of utility apparatus in proximity to trees;*

5. Legal constraints and liabilities

Tree preservations orders: There are no tree preservation orders which affect the site.

The tree protection status is correct at the time of report production but can be subject to change. It is therefore the responsibility of any persons undertaking tree works operations to the trees which are the subject of this report and in accordance with our recommendations, to undertake their own statutory tree protection checks with the local planning authority, to include TPO, conservation area (CA) and planning conditions prior to works commencing.

Conservation Areas: The site is within the South Hill Park conservation area (CA).

Common Law: This enables pruning back of the crown and roots of trees on adjacent land where they overhang neighbouring property, providing the work is reasonable and does not cause harm. This right does not override TPO and CA legislation.

Ecological constraints: The Wildlife and Countryside Act 1981, as amended, The Conservation of Habitats and Species Regulations 2010 and the Countryside and Rights of Way Act 2000, provide statutory protection to species of flora and fauna including birds, bats and other species that are associated with trees. These could impose significant constraints on the use and timing of access to the site. It is the responsibility of the main contractor and tree surgery contractor to ensure that no protected species are harmed whilst carrying out site clearance or tree surgery works. Unless competent to do so, the advice of an ecologist must be sought.

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Appendix 2 **Key to tree survey sheets**

Key to terms

T = Tree **G** = Group **H** = Hedge **S** = Shrub mass

Age Class:

NP = Newly planted.

Y = Young - an establishing tree that could be easily transplanted.

SM = Semi-mature - an established tree still to reach its ultimate height and spread and with considerable growth potential.
EM = Early mature - a tree reaching its ultimate height and whose growth is slowing however it will still increase considerably in stem diameter and crown spread.
M = Mature - a tree with limited potential for further significant increase in size although likely to have a considerable safe useful life expectancy.
OM = Over mature - a senescent or moribund tree with a limited useful life expectancy.
V = Veteran - a tree older than typical for the species and of great ecological, cultural or aesthetic value.

Dia: Diameter of stem in millimetres at 1.5m above ground level for single-stemmed trees or in accordance with Annex C of BS 5837 for multi-stemmed trees or trees with low forks or irregular stems.

Stems: Numbers of stems or M/S = multi-stemmed.

Ht: Height in metres.

Ult ht: Ultimate height likely to be achieved for this tree in this location. The suggested ultimate height of trees within this report is based on physiological and site conditions and may differ from industry tables. Its purpose is to inform shading, visual aspects and post-development pressures and not necessarily foundation design.

Cr ht 1: Height of first significant branch above ground level and direction of growth.
Cr ht 2: Height of canopy above ground level.

NSEW: Crown spread at the four cardinal points. Ø = average crown radius.

BS cat: Category in accordance with Table 1 and section 4.5 of BS 5837.
U - Unsuitable for retention. Existing condition is such that they cannot be realistically retained as living trees in the context of the current land use for longer than 10 years. Note, category U trees can have existing or potential conservation value which it might be desirable to preserve.
A - High quality and value (non-fiscal) with at least 40 years remaining life expectancy.
B - Moderate quality and value with at least 20 years remaining life expectancy.
C - Low quality and value with at least 10 years remaining life expectancy, or young trees with a stem diameter below 150 mm.

A, B and C category trees are additionally graded into: 1) mainly arboricultural values; 2) Mainly landscape values; 3) Mainly cultural values including conservation.

Cond: Physiological condition. G = good; F = fair; P = poor; D = dead.

Life exp: Estimated remaining contribution in years.

RPR: Root protection radius in metres based on stem diameter.

RPA: Root protection area. A layout design tool indicating the minimum area surrounding the tree that contains sufficient rooting volume to maintain the tree's viability, and where the protection of the roots and soil structure is treated as a priority. Assessed according to the recommendations set out in clause 4.6 of BS 5837. It is calculated by multiplying the radius squared by 3.142. Clause 4.6.2 of BS 5837 states that the RPA may be changed in shape, taking into account local site factors, species tolerance, condition and root morphology.

TPZ: Tree protection zone. An area based on the RPA in m^2 identified by an arboriculturist, to be protected during development, including site clearance, demolition and construction work, by the use of barriers and/or ground protection fit for purpose to ensure the successful long-term retention of a tree.

Preliminary recommendations: Preliminary recommendations for tree surgery found within the tree survey sheets are based on findings at the time of the tree survey and are not based on any development proposal and are usually works for safety or sound arboricultural reasons and are irrespective of any change in land use.

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Appendix 3

Tree survey sheets

Site: 73 Parliament Hill							**Weather:** Sunny and warm				
Surveyor name: Rhodri Jones							**Tree Survey Table - DF Clark Bionomique Ltd**				
Date: 12 August 2015	**Client:** Mert Alas										
Tree No.	**Species**	**Tree height (m)**	**Stem dia at 1.5m / (mm)** **RPA radius (metres)**	**Crown spread (metres) N ES W**	**Age class**	**Physiological condition**	**Est. Years**	**BS Cat**	**Crown clearance (m from ground level)**	**Structural condition / Comments**	**Preliminary management recommendations**
T1	Variegated holly *Ilex spp*	8	260	N – 1.5 E – 1.5 S - 2 W - 2	M	fair	Less than 10	C3	1	Large stem defect at 1m. causing structural damage to boundary wall, poor form and over pruned due to outgrowing situation	Replace tree with Acer griseum 2m to west.
T2	Fruiting pear Pyrus spp	6	300	N – 2.5 E - 2 S - 2 W - 2	M	poor	Less than 10	C3	2.5	Poor form, low vigour, large stem defect.	None at time of survey
T3	Flowering cherry *Prunus kanzan*	6	180	N – 2 E – 3 S – 3 W - 3	Sm	Fair	Less than 10	C1	2	Overshadowed by trees from adjacent garden, large stem defect at 2m	None at time of survey

Tree No.	Species	Tree height (m)	Stem dia at 1.5m / (mm) RPA radius (metres)	Crown spread (metres) N ES W	Age class	Physiological condition	Est. Years	BS Cat	Crown clearance (m from ground level)	Structural condition / Comments	Preliminary management recommendations
T4	Plane *Platanus x hispanica*		1200+(Estimated)	N - 8 E - 8 S - 8 W – 8 All estimated due to access problem	M	Fair	20	B1	3	In adjacent garden, well managed reasonable condition.	None at time of survey

Appendix 4

Tree survey plan DFCP 3249 TSP

See plan appended separately

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Appendix 5

Tree protection plan DFCP 3249

See plan appended separately

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Appendix 6

Tree surgery schedule

Tree surgery recommendations

All tree works to be undertaken in accordance with *BS 3998:2010 Recommendations for tree works*, or industry best practice.
Where appropriate, arising's from tree works should be retained on site as ecological habitat features.

Table 5

Tree no.	Species	Proposed works	Reason
T1	Variegated holly	Replace this tree at a location 2m west of current, with Acer griseum, 12-14 cm Girth 75-100ltr containerised tree.	To facilitate the development

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Appendix 7

Tree protection barriers

Design of welded mesh, Heras type tree protection barrier

Barriers should be fit for the purpose of excluding construction activity and appropriate to the degree and proximity of work taking place. The default specification should be in accordance with 6.2.2.2 of BS 5837, as set out below.

Specifications: Barrier shall be a minimum 2 m high. It shall consist of a vertical and horizontal scaffold framework, well braced to resist impacts, as illustrated below. The vertical tubes should be spaced at a minimum interval of 3 m and driven securely into the ground. Onto this framework, welded mesh panels should be securely fixed. See Figure 2 overleaf.

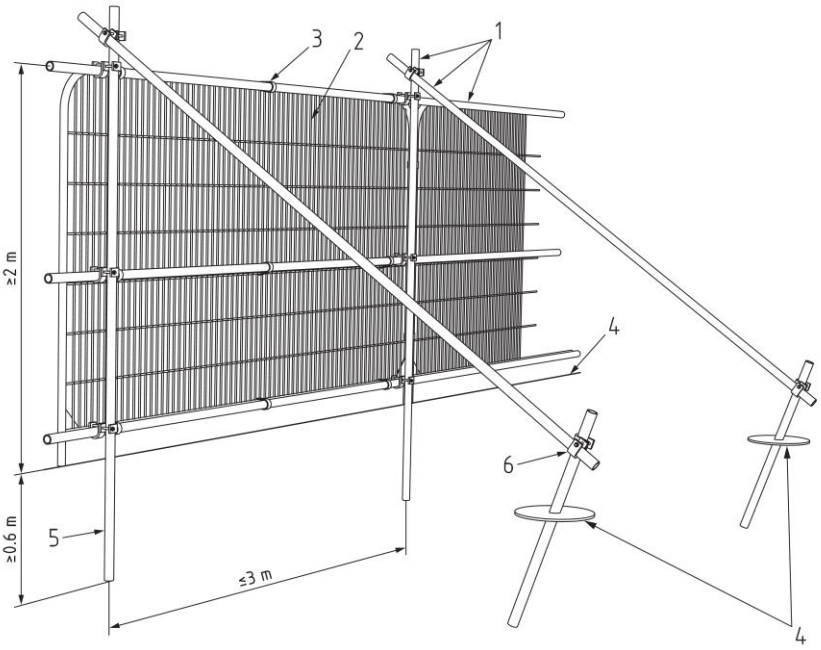
Where site circumstances and associated risk of damaging incursions into the RPA do not necessitate the default level of protection, an alternative specification may be used if agreed with the local authority. An example would be 'Heras' type welded mesh panels on rubber or concrete feet. The panels should be joined together using a minimum of two anti-tamper couplers, installed so that they can only be removed from inside the fence. The panels should be supported on the inner side by stabiliser struts. See Figure 3 overleaf. All-weather notices should be attached to the barrier with words such as 'TREE PROTECTION ZONE - NO ACCESS.

Location: Barriers shall be positioned on the perimeter of the Root Protection Area to define the Tree Protection Zone or as specified in the Tree Protection Plan.

Shown on the Tree Protection Plan by a dashed black line

Figure 1 Example **of welded mesh barriers in use**

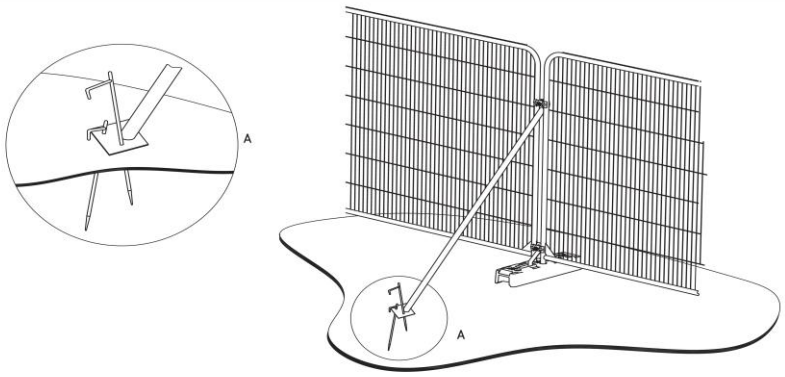
Figure 2 **Default specification for protective barrier**



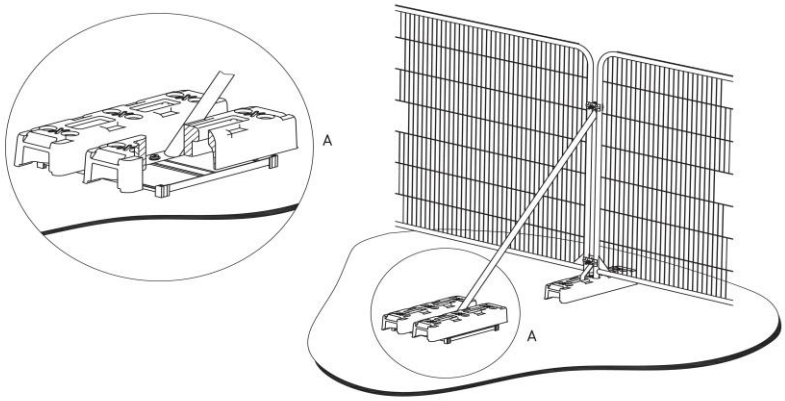
Key

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

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


TREE PROTECTION AREA
KEEP OUT !
(TOWN & COUNTRY PLANNING ACT 1990)
TREES ENCLOSED BY THIS FENCE ARE PROTECTED BY PLANNING CONDITIONS AND/OR ARE THE SUBJECTS OF A TREE PRESERVATION ORDER.
CONTRAVENTION OF A TREE PRESERVATION ORDER MAY LEAD TO CRIMINAL PROSECUTION
ANY INCURSION INTO THE PROTECTED AREA MUST BE WITH THE WRITTEN PERMISSION OF THE PROJECT ARBORICULTURIST

Appendix 8

Methods of work close to trees

Guidance for working within RPAs

This guidance sets out the general principles that must be followed when working in RPAs.

1.0 Removal of hard surfaces within RPAs

1.1 All structures including hard surfaces, walls and fences within tree protection zones (TPZ) must be removed following the methods detailed below to minimise damage to tree roots.

1.2 The use of conventional tracked and wheeled machinery causes damage to soil structure from compaction and damage to roots from excavation and must not be used within the TPZ. All areas of hard surfacing requiring removal within a TPZ will be broken up using a hand held pneumatic drill or mounted hydraulic breaker attached to a digger located outside the TPZ. The broken rubble will then be removed by hand.

1.3 The only exception to this is where the hard surface is of such a size as not to be reachable from outside the TPZ. In this situation a rubber tracked mini-digger will be used. The maximum working height of the machine must be less than the lowest branch of any overhanging trees.

1.4 The mini-digger will work from the existing hard surface pulling the debris away from the tree/s.

1.5 No excavation of existing soil beneath the hard surface will take place.

1.6 Immediately after removal of the hard surface, topsoil or sharp sand must be used to cover the soil surface and any roots to prevent drying out.

1.7 Upon completion, the protective fencing must be moved out to the edge of the TPZ or ground protection used if access is required.

2.0 Demolition of existing buildings and structures

2.1 All structures including hard surfaces, walls and fences within or adjacent to a TPZ must be removed following the methods detailed below to minimise damage to tree roots and upper parts of the tree.

2.2 Protective fencing and ground protection **MUST** be in place before demolition begins.

2.3 Buildings within RPAs must be demolished by pulling inwards, away from the tree.

2.4 Debris fallen within TPZs must be removed by hand.

2.5 Removal of foundations within RPAs must be undertaken from within the footprint of the building, away from the tree, with excavation on the tree side of the foundation kept to the strict minimum required to effect removal. This operation should be supervised by the appointed arboriculturist. If trenches left by removal of foundations are not to be reused as part of the development, they must be backfilled with topsoil suitable for root growth, where found within identified root protection area`s (RPA`S).

2.6 All removal of fences, sheds, garden structures, low walls etc., must be undertaken by hand where within TPZs.

3.0 Services

3.1 The location and direction of new services should be designed to allow for services to be routed away from the RPAs of retained trees.

3.2 If any services need to run through a TPZ the main contractor must contact the arboricultural consultant before any works are undertaken. Agreement will then be sought from the LPA tree officer on methodology. Works will only begin with the agreement of the LPA. Methodology used must comply with *NJUG Volume 4: Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees*, which can be summarised as:

- Hand excavate only.
- Work carefully around roots only cutting as a last resort.
- Do not cut roots over 25mm in diameter without referring to the project arboriculturist.
- For roots less than 25mm in diameter use a sharp tool to make a clean cut leaving as small a wound as possible.

4.0 New hard surfaces within RPAs

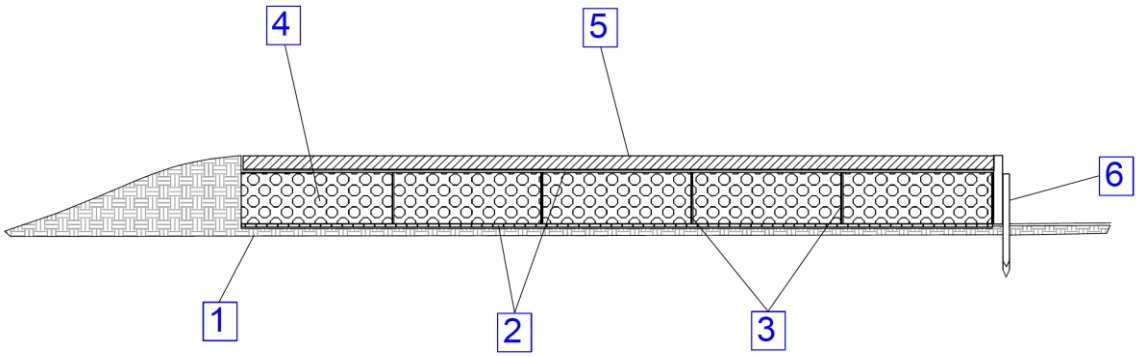
4.1 Where it has been agreed with the LPA that hard surfaces are acceptable within RPAs of retained trees, these will require designing to be of above ground, no-dig construction to minimise impact on tree roots and soil structure. In addition, finished surfaces of the car parking and paved areas will need to be of porous design to allow water and air passage in and out.

4.2 An illustrative example of a cellular confinement no-dig system can be found below. The actual system will need to be designed by a structural engineer to accommodate the loadings anticipated.

4.3 The principles to follow are:

- No excavation other than the removal of existing hard surfaces if required, or the removal of surface vegetation and no more than 50mm of leaf litter, vegetation debris etc.
- A method to spread and support the load of the hard surface and anticipated usage without causing compaction of the soil structure beneath.
- The use of a porous sub-base and finishing layer to allow water and air diffusion in and out of the soil.
- Porosity must be designed to be long-term and not to block with fine particles in the short-term; therefore irregular, no-fines aggregate must be used.
- The pH of the aggregate must be considered as many conventional road stones have very high pH values which can damage susceptible trees and therefore aggregates with a near neutral pH should be preferred.

Example of a Cellular Confinement System



Notes

1. Existing ground
2. Geotextile membrane
3. Cellular confinement system
4. 20/40mm clean angular stone
5. Porous surface layer
6. Timber retaining edge

5.0 Fencing, hoarding, signs etc. within RPAs

5.1 Where posts are to be installed within RPAs the holes must be dug carefully by hand. If roots with a diameter of 25mm or greater are found, the position of the post must be moved. Roots smaller than 25mm diameter can be cut with sharp tools leaving as small a wound as possible. The sides of the hole should be lined with an impermeable membrane such as plastic sheeting to prevent the caustic and toxic effects of wet cement in the concrete from damaging tree roots.

6.0 Landscaping works within RPAs

6.1 Landscape operations within root protection areas have the potential to damage trees if not carried out with care; in addition the removal of protective barriers to carry out landscape operations may allow other contractors in previously protected areas.

6.2 If protective fencing is taken down to facilitate landscaping operations, the area of the TPZ must be delineated by pins and marker tape, spray paint, or some other method to clearly show the extent of the TPZ.

6.3 The preparation of soil for planting and turfing must be carried out by hand where within TPZs. Cultivation should be kept to a minimum and new topsoil added must not exceed 100mm in depth within 1m of the stem of any tree.

6.4 Topsoil and other materials must be transported by wheelbarrow on running boards when working within TPZs.

Appendix 9

Specific report caveats

Specific report caveats

- The survey was based on a drawing provided by the client.
- No topographical survey was provided and therefore tree locations are based on site measurements and may not completely accurate.
- No internal diagnostic equipment was used other than a sounding mallet and probe.
- The survey is concerned solely with arboricultural issues.
- Any work with trees will discharge the due diligence requirements of all relevant wildlife and countryside legislation.
- Trees are dynamic living organisms whose health and condition can change rapidly. Any changes to the tree or conditions close to the tree may change the stability and condition of the tree and a further examination would be required and may affect the validity of this report.
- This report is valid for 12 months.

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QA

Issue/Revision:	Final
Date:	25 August 2015
Comments:	For issue
Prepared by:	Rhodri Jones TechArborA
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