Arboricultural Impact Assessment

Site: 2 Ullswater Close, Bromley, BR1 4JF

Ref: TCL-NT-UC/AIA

Prepared for: Nick Towler

Prepared by: Tree Craft Ltd, Hillside Farm, Rushmore Hill, Knockholt, Kent, TN14 7NL.

Issued: 29th May 2018

Contents

1. Introduction

1.1. Instruction

1.1.1. Tree Craft Ltd have been instructed by Mr. N. Towler to survey the trees growing at 2 Ullswater Close, Bromley, BR1 4JF in relation to the proposed development of the dwelling with an extension to the east.

1.1.2. The instruction is to fulfil the requirements of London Borough of Bromley who require the information to make an informed decision.

1.2. Scope of report

1.2.1. The scope of the report is as follows;

- Undertake a survey of trees on the site and within influencing distance of the site without prior reference to the proposed development;
- Provide a tree constraints plan for the site including root protection areas and canopy spreads;
- Provide an arboricultural method statement specifically in relation to the physical protection of trees, to reduce the impact on the adjacent trees; and
- Prepare a detailed tree protection plan.

1.3. Documents provided

1.3.1. The tree protection plan is derived from a combined topographical survey and the proposed layout, drawing number *CAD_2 Ullswater Cl, Bromley, BR1 4JF.dwg*, received by email on 23rd May 2018.

2. Site Assessment

2.1. Site visit

2.1.1. This schedule is based on a tree inspection undertaken by Christian Williams of Tree Craft Ltd, on 23rd May 2018 when the weather was mild and clear. Deciduous trees were in leaf at the time of inspection. Where access to trees was obstructed, obscured or on adjacent properties, measurements and dimensions have been estimated.

2.2. Site description

2.2.1. 2 Ullswater Close is an end of terrace property. The site is located on the eastern side of Coniston Road and situated to the north of Bromley town centre. The property is surrounded by a variety of residential properties.

2.2.2. There are 6 trees within the survey area, one of which is dead, the remainder are of low quality, providing minimal amenity value.

3. Arboricultural Impact Assessment

3.1. Method of data collection

3.1.1. As stipulated in BS 5837, each tree has been allocated to one of four categories (A, B, C or U), which reflected its suitability as a material constraint on development. Whilst trees in categories 'A', 'B' and 'C' are all a material consideration in the development process, the retention of category 'C' trees, being of low quality or of only limited or short-term potential, will not normally be considered necessary where they impose a significant constraint on development. Furthermore, BS 5837 makes it clear that young trees, even those of good form and vitality, which have the potential to develop into quality specimens when mature "*need not necessarily be a significant constraint on the site's potential*".

3.2. BS5837:2012 Tree Categorisation

3.2.1. The BS5837:2012 sets out the methodology for surveying trees on potential development sites in order to identify them within a prioritised system of retention categories, as summarised below:

A Category	Trees of high quality and value in such a condition as to be able to make a substantial contribution for a minimum of 40 years;
B Category	Trees of moderate quality and value in such a condition as to make a significant contribution for a minimum of 20 years
C Category	Trees of low quality and value currently in adequate condition to remain until new planting could be established and expected to remain for a minimum of 10 years, or young trees with a stem diameter less than 150 mm measured at 1.5 meters above ground level
U Category	Trees in such a condition that any existing value would be lost within 10 years and which should, in the current context, be removed for reasons of sound arboricultural or forestry management.

Retention categories A, B and C are sub-divided into sub-categories 1 – 3, as summarised below:

Subcategory 1	Arboricultural value;
Subcategory 2	Landscaping value
Subcategory 3	Cultural and conservation value

3.3. Summary of data

3.3.1. This report considers the extension of 2 Ullswater Close. The appraisal addresses the proposed development and the impact that it has on trees, which are to be retained or removed.

3.3.2. The survey includes 6 individual trees. The comments for each tree vary and are given in detail in the BS5837:2012 Tree Schedule in Appendix 3 and summarised in Table 1 below:

Activity	Trees Affected
Tree Protection	Tree No. 1, 2, 3 ,4 & 5
Tree Removal Category U	Tree No. 6
Tree Pruning	Tree No. 1, 2, 3, 4, & 5

Table 1: Summary of trees that will be influenced

3.3.3. The location of each tree and their associated constraints including canopy spread, and root protection areas with the proposed development are illustrated on plan number TCL-NT-UC TPP in Appendix 4.

3.3.4. There are 5 category C trees, all are sited within the property. They are considered of low quality with a minimum of 20 years life remaining.

3.3.5. There is one dead Category U tree located on site.

3.3.6. Generally, category C and U trees are considered to be of low quality or are young specimens, which can be readily replaced, therefore, should not be considered a constraint to future development.

4. Arboricultural Appraisal

4.2. General Notes

4.2.1. The appraisal considers the whole development and the impact that it has on trees, which are to be retained or removed. In this instance the original tree constraints survey has been prepared with prior understanding of the site design proposal. This is undertaken as per the recommendation within Clause 4.4.1.2 of the British Standard *BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations which states;*

- *Tree surveys undertaken after a detailed design has been prepared can identify significant conflict: in such cases, the nature of and need for the proposed development should be set against the quality and values of affected trees. The extent to which the design can be modified to accommodate those trees meriting retention should be carefully considered.*

4.2.2. To aid assessment of the impact and implications of the proposed access drive, the trees and their constraints are given on plan TCL-NB-BR TPP at Appendix 4.

4.2.3. The current proposal does not require the removal of any trees for the development of the site. T1, T2, T3, T4 and T5 are covered by an area Tree Preservation Order and are key landscape features. Retention of these trees is achievable if adequate precautions are followed to protect them, these precautions are specified in the arboricultural method statement, which is included in this report, and should be referred to when the need arises. If the steps detailed in the report are carried out, the development proposal will have no significant impact on the contribution of the remaining trees to local amenity or character.

4.3. Below ground constraints.

4.3.1. The below ground constraints are generally summarised as the root protection areas (RPA). The RPA is an area equivalent to a circle with a radius 12 times the diameter of the trees measured at 1.5 metres for single stemmed trees. For trees with more than one stem, one of the two calculation methods below should be used where there are either 2 - 5 stems or 5 or more stems. In all cases, the stem diameter(s) should be measured in accordance with Annex C, and the RPA should be guided from Annex D of BS5837:2012.

4.3.2. The RPA is an area in which no ground works should be undertaken without due care in relation to the retained tree(s) and this is to avoid soil compaction, changes in levels or soil contamination which could alter the trees condition and/or stability. The shape of the RPA and its exact location will depend upon arboricultural considerations and ground conditions.

4.4. Conflicts between trees and the proposal

Existing incursions within RPAs

4.4.1. There has been no previous encroachment into the RPAs of T1, T2, T3, T4 and T5.

New incursions within RPAs

4.4.2. In total there are 4 trees – T1, T2, T3 and T4 that are impacted upon, in relation to the development within the RPA, by the extension to the side of the property. The extent of incursions is minimal and is detailed below:

- T1 – Extent of incursion is $2m^2$ of the total RPA of $46m^2$ therefore equating to approximately 4%;

- T2 – Extent of incursion is $2m^2$ of the total RPA of $28m^2$ therefore equating to approximately 7%;

- T3 – Extent of incursion is $2m^2$ of the total RPA of $26m^2$ therefore equating to approximately 8%,

- T4 – Extent of incursion is $2m^2$ of the total RPA of $96m^2$ therefore equating to approximately 2%;

4.4.3. The general principle set out within BS5837:2012 is that permanent new surfacing should not exceed 20% of an existing unsurfaced area within an RPA, though in the case of T.2. it is not new surfacing, but a replacement of an existing surface with a cellular confinement system, see Appendix 6, overlaid with a permeable surfacing.

4.4.4. The area where the incursion will be required within the RPA of T1, T2, T3 and T4 is at the point where the extension extends to the west of the property. To ensure that foreseeable damage does not occur, whilst the work is undertaken in this area the Arboricultural Consultant will be on site throughout.

4.5. Remedial Tree Works

4.5.1. There is one tree - T6, that requires removal due to it being dead. T1, T2, T3, T4 and T5 require their crowns to be reduced in size, see Appendix 3 for specifications.

Mitigation of damage

4.5.2. Retention of trees and their on-going health depends on the protection and procedures put in place to ensure that the protection remains in place while there is a risk of damage. This is carried out through an arboricultural method statement that can be used in the planning process and specifically referred to in the planning conditions. The arboricultural method statement for this site is set out in Section 7 of this report. Application of this method statement will permit all the retained trees to survive without any adverse impact and allow them to continue to contribute to local amenity and character

Above ground constraints.

4.5.3. The crowns of T1, T2, T3 and T4 extend over the garden and proposed extension, to avoid damage to the crowns during construction, prevent nuisance and conflict for light once the extension is constructed, the trees should be pruned as per the schedule in Appendix 3. Works should be carried out, where possible, to British Standard 3998:2010 'Tree work – Recommendations' by a suitably trained arborist.

5. Statutory Tree Protection

5.1. Legal status

5.1.1. The Local Planning Authority (LPA) has been contacted to establish whether any trees contained within the survey are protected by either a Tree Preservation Order (TPO) or are within a Conservation Area as part of this report. It has been confirmed by London Borough of Bromley that 2 Ullswater Close is located within an area Tree Preservation Order.

5.1.2. A Tree Preservation Order (TPO) is an order that is made by the local planning authority in respect of individual trees, groups of trees or woodlands. The order is made in the interests of public amenity. TPOs can be made following an initial enquiry and therefore the information gained is only reliable for that day and further enquiries should be made prior to the commencement of development or tree works.

5.1.3. Once a TPO has been served it is a criminal offence to carry out the following works without the prior written consent of the local planning authority:

- Cutting down,
- Uprooting,
- Topping,
- Lopping,
- Wilful Damage, or,
- Wilful destruction.

5.1.4. Also, whilst the cutting of roots is not expressly covered it is likely to damage the tree so as such requires the local planning authority's written permission.

6. Appraisal Conclusions

6.1.1. The proposed extension will not have a negative impact on T1, T2, T3 and T4 as the incursion by the development is minimal, any unforeseeable damage to roots can be avoided by following the guidance detailed in the Arboricultural Method Statement (See section 7).

6.1.2. There are no tree removals as a direct requirement of the proposal.

7. Arboricultural Method Statement

7.1.1. Once any removals or preliminary pruning has taken place, this arboricultural method statement describes how trees will be protected and managed during the construction works. As explained in BS 5837:2012, it is based on the best available information at this stage in the planning, it may need updating as more details become available. Its purpose is to detail any protection measures that are required and when they should be implemented.

7.2. Arboricultural Supervision

7.2.1. As recommended within section 6.3 of BS 5837: 2012, a consulting arborist will be employed by the developer to assist on management of the trees on the site, provide an auditable system of arboricultural site monitoring and advise at the anticipated construction phases below;

7.2.2. Site supervision schedule

Stage	Action	Arboricultural Supervision (Y/N)	Notes
1	Pre-commencement meeting*	Y	Site Agent(SA) and LPA tree officer, contractor to attend
2	Tree works	Y	Following completion of tree works
3	Installation of tree protection	Y	PRIOR to ground works
4	Removal of existing surfaces	Y	SA to advise Arboricultural Supervisor (AS) prior to commencement
5	Pile location, fencing footings and root assessment	Y	SA to advise AS prior to commencement
6	Construction phase	Y	AS to monitor tree protection at agreed and suitable intervals
7	Remove tree protection fencing	Y	No tree protection to be removed without prior agreement with the AS
8	Hard/soft landscaping	Y	Brief landscape company & sign off

Table 3: Preliminary site supervision schedule

7.2.3. Effective site monitoring will be undertaken from the outset of the project and at agreed intervals thereafter. The frequency of monitoring may well decrease following the proper installation of all tree protection measures. Above is a recommended programme of arboricultural supervision. (This programme may alter dependent upon site circumstances or by agreement.)

7.2.4. The process for recording the tree protection measures will involve:

- Site Agent to contact Arboricultural Supervisor with a minimum of 5 days' notice of any site work commencement.
- Arboricultural Supervisor (AS) to monitor site to agree tree protection fencing. When all tree protection is installed in accordance with the tree protection plan, the AS is to

arrange with LPA tree officer and relevant contractors **the pre-commencement site meeting** in order to agree the subsequent works within RPAs of retained trees and importantly the lines of communication between the on-site contractors, the AS and the LPA tree officer and incident reporting,

- AS to record all site visits and distribute reports to LPA tree officer and contractors for their records.
- Subsequent to completion, AS to sign-off and complete.

7.2.5. The frequency of tree protection monitoring depends upon the nature of the project. In this case, it will be appropriate for the site agent to organise with the AS monitoring visits to be twice in the initial 28 days from commencement and thereafter once every 28 days for two months and then by agreement.

Interested Party	Name	Company/LPA	Contact Number	Comment/Responsibility
Site Agent	TBC			Day to day site management; coordination of timings; contact with project Arboriculturist.
Main Contractor	TBC			Legal and administrative running of the project; finance; appointment of and liaison with all project consultants
Arb. Supervisor	C. Williams	Tree Craft Ltd	07774 783888	Tree protection and management; dissemination of tree related information
LPA Tree Officer	C. Ryder	L.B. Bromley	020 8313 4956	Tree protection and management
Site Engineer	TBC			Technical advice and design
Architects	TBC	Hoc Studio Architects	01689 810894	Design
Pre-commencement means i) before any works including tree felling or pruning and ii) before any ground works or demolition commences and upon completion of the initial installation of the tree protection, including ground protection.				

Table 4: Contact List (to be completed prior to works commencing)

7.3. Specific tree protection requirements

7.3.1. A copy of the arboricultural method statement will be available on-site at all times.

7.3.2. The specific tree protection operations, in roughly the order that they will be carried out, are explained in detail in the following subsections. Where appropriate, more detailed guidance is referenced in Appendix 5 and extracts of the tree protection plan are included below to supplement the following explanations.

7.3.3. Installation of CEZ

7.3.4. The CEZ boundary is shown on the tree protection plan as the dashed blue line. Its location is approximate because its precise position will need to be finalised on site, depending on the local site conditions. If necessary, BS 5837 allows the fencing

location to be moved, provided the exposed CEZ is protected by ground protection, but this would need to be formally agreed by all parties at the pre-commencement meeting. Once the tree works have been carried out, the appropriate fencing and ground protection will be installed before any construction work starts.

8. References

- British Standards Institution (2012) BS 5837: Trees in relation to design, demolition and construction – Recommendations
- National Joint Utilities Group 'Guidelines for the Planning, Installation and Maintenance of Utility Services in Proximity to Trees' (NJUG 10, Volume 4, 2007)
- British Standard 3998:2010 *'Tree work – Recommendations'*
- The Town and Country Planning Act 1990
- The Town and Country Planning (Tree Preservation) (England) Regulations 2012

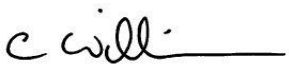
9. Caveats and limitations of report

The limitations detailed below apply to this report;

- The survey and this report are concerned with the Arboricultural aspects of the site only.
- The survey is restricted to trees within the site or those outside the site that may be affected by the proposed conversion.
- It is based on a ground level tree assessment and examination of external features only – described as the 'Visual Tree Assessment' method expounded by Mattheck and Breloer (The Body Language of Trees, DoE booklet Research for Amenity Trees No. 4, 1994).
- Only trees of significant stature that were included in the supplied topographical survey were surveyed. In general, trees with a stem diameter at 1.5m above ground level of less than 75mm have been excluded unless they have particular merit that warrants comment. In general, woody shrub species are not included.
- No plant tissue samples were taken and no internal investigation of the trees was carried out. No soil samples were taken or soil analyses were carried out. The risk of tree-related subsidence to structures has not been assessed.
- The tree survey recommendations are only valid for a year.
- No specific assessment of wildlife habitats has been carried out and this report does not consider these aspects.
- The inspection of the trees for the purposes of assessing their condition and work requirements is made on the basis that they will be annually inspected in the future to

identify any changes in condition and review the original recommendations. For these reasons, the tree assessment advice only remains valid for one year from the date that the trees were last inspected.

10. Review

Completed by		
Name	**Signed**	**Date**
C. Williams		25th May 2018
Reviewed by		
Name	**Signed**	**Date**
R. Arnold		28th May 2018

Appendix 1: Qualifications

Curriculum Vitae
Christian Williams *ATechA Dip Arb L4 (ABC)*

Professional Qualifications
FdSc in Arboriculture – ongoing
Level 4 Diploma in Arboriculture
Lantra Professional Tree Inspection Course
Level 2 Certificate in Arboriculture

Membership to Professional Bodies
Associate member of the Institute of Chartered Foresters
Technical member of the Arboricultural Association

Career

October 2015 – onwards	Tree Craft Ltd - Arboricultural Consultant
August 2003 – October 2015	Gristwood and Toms Ltd – Arboricultural Consultant /Project Manager
January 2002 – August 2003	Freelance climber in France
July 1997 – December 2001	Gristwood and Toms Ltd – Lead Climber

Continuing Professional Development
BS5837 Tree assessment for planning applications: Methods for construction/ solutions for development sites
BS5837 Tree assessment for planning applications: Clarification of categories in BS 5837
Institute of Chartered Foresters – Trees People and the Built Environment II
Arboricultural Association – Arboricultural Consultancy
Treeworks Environmental Practice - Tree Work Seminar No.21
Arboricultural Association - Tree Pests - Learning to live with visitors to the urban forest
Sussex Wildlife Trust - Protected Species and the Planning Process
Forestry Commission - FC SE & London Tree Health Conference
Arboricultural Association - Valuing and Managing Veteran Trees
London Tree Officers Assoc. - Seminar on tree risk management
Institute of Chartered Foresters – Trees, people and Cities 2
Hull University - Trees & Invasive Species
Barchams - Big Barn Conference 2015
MTOA - Decay assessment seminar with Frank Rinn
Ancient Tree Forum – Annual Conference 201

Appendix 2: Survey Methodology

- The trees on the site were originally surveyed without reference to site layout.

- The position of each tree was plotted with reference to the supplied ordinance survey plan.

- Small trees with a stem diameter less the 75mm were not surveyed.

- Each individual tree has been given a tree identification number, the groups and hedges clearly defined for the purpose of this report. Metal tags have not been used for this survey as identification on site does not require this. The tree numbers associated with each tree are cross referenced within the schedule and plans at Appendix 3 and 4.

- The tree species have been recorded with common names.

- All tree heights have been assessed using a clinometer and where indicated in groups the height of the tallest tree was measured unless otherwise stated. Tree heights are given in metres.

- All stem diameters were measured at 1.5 metres above ground level and are given in millimetre units (unless otherwise stated where “gl” is an abbreviation for ground level where diameter was measured just above root flare, “est” is an estimate and “av” is an average).

- The canopy spread is recorded in either the four cardinal points.

- The height of the ground clearance is given in metres and is an estimate of the height of the first branch above ground level.

- In absence of detailed information on the age the following classification has been used:

Young	Out-planted trees that have not yet established
Early Mature	Established trees up to 1/3 of expected height and crown
Semi-Mature	Early mature: Between 1/3 and 2/3 of expected height and crown
Mature	Between 2/3 and full expected height and crown
Fully Mature	Full expected height and crown
Over Mature	Crown beginning to break-up and decrease in size

- The structural condition of the trees has been assessed and is summarised as:

Good	Very few defects
Varied	Some defects rectifiable with minor tree surgery
Poor	Some defects rectifiable with major tree surgery
Dangerous	Significant defects only rectifiable with felling

- The physiological condition has been recorded to provide an indication of the tree's general health and vitality. The trees have been described thus:

Good	Healthy and with no symptoms of significant disease.
Varied	Disease/stress present or vitality is impaired.
Poor	Disease/stress present and vitality significantly impaired
Dangerous	Significant disease present or vigour is extremely low.

- Each tree was individually assessed and comments, where appropriate, were recorded for the condition of each tree's roots, main stem and crown.

- General comments have also been made where appropriate, with recommendations when relatively immediate works are given.

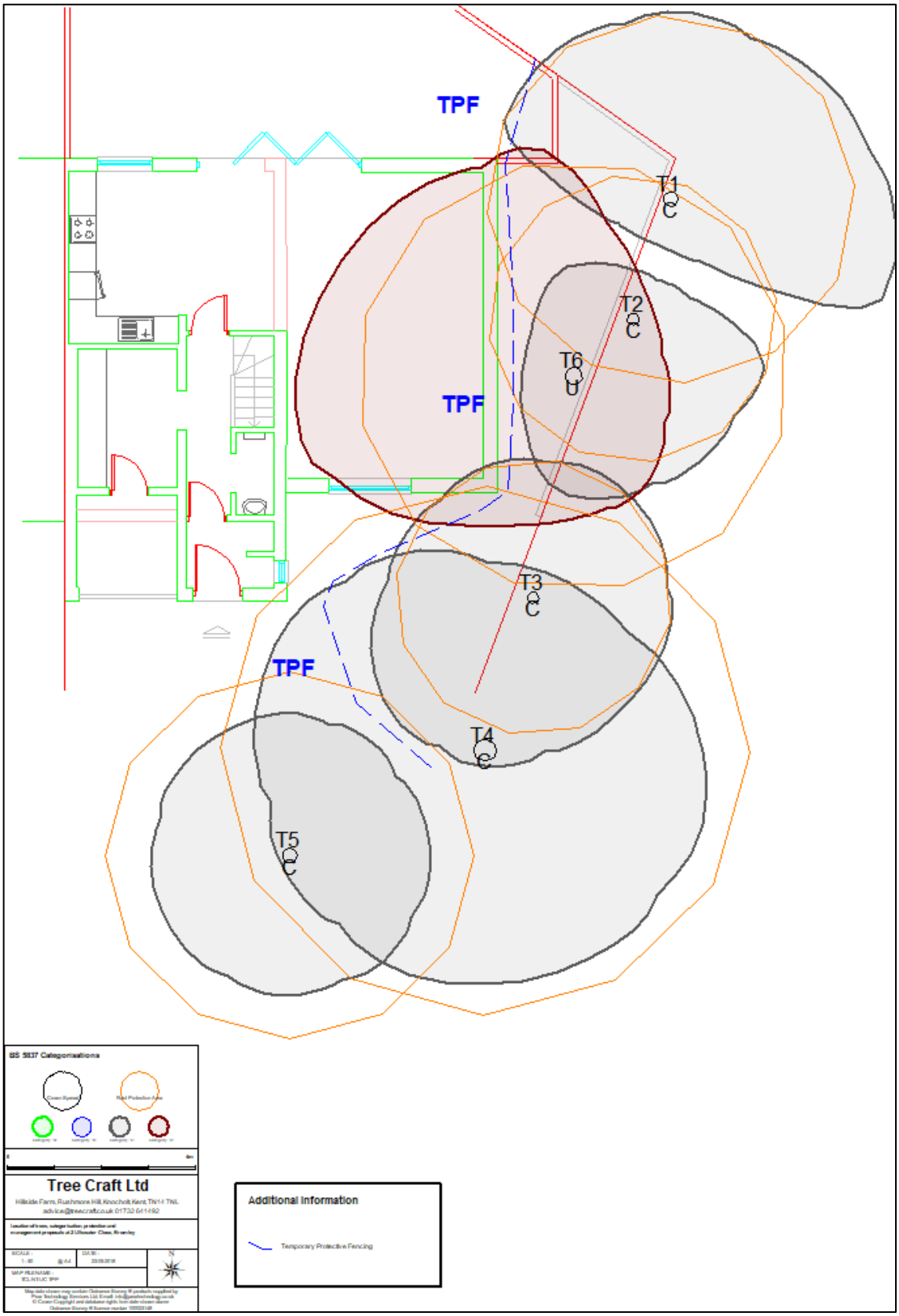
- Estimated remaining contribution has been categorised as: less than 10 years, 10-20 years, 20-40 years or over 40 years, based upon an assessment of the tree's potential safe useful life expectancy. The remaining contribution in years has not always been directly followed in relation to the retention categories of the trees as trees may have a long remaining life however be of little significance in terms of development.

Appendix 3: Schedule

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; and/or • Trees infected with pathogens of significance to the health and/or safety of other trees nearby, or very low-quality trees suppressing adjacent trees of better quality. *NOTE: Category U trees can have existing or potential conservation value which it might be desirable to preserve;* see 4.5.7.			Dark Red (127-000-000)
Trees to be considered for retention				
	1 Mainly arboricultural qualities	**2 Mainly landscape qualities**	**3 Mainly cultural values, including conservation**	
Category A **Trees of high quality** with an estimated remaining life expectancy	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 semiformal 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).	Light Green (000-255-000)
Category B **Trees of moderate quality** with an estimated remaining life expectancy of at least 20 years	Trees that might be included in category A, but are downgraded because of impaired condition (e.g. presence of significant though remediable defects, including unsympathetic past management and storm damage), such that they are unlikely to be suitable for retention for beyond 40 years; or trees lacking the special quality necessary to merit the category A designation.	Trees present in numbers, usually growing as groups or woodlands, such that they attract a higher collective rating than they might as individuals; or trees occurring as collectives but situated so as to make little visual contribution to the wider locality.	Trees with material conservation or other cultural value.	Mid Blue (000-000-255)
Category C **Trees of low quality** with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150 mm	Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories.	Trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value; and/or trees offering low or only temporary/transient landscape benefits.	Trees with no material conservation or other cultural value.	Grey (091-091-091)

Tree ID	Tree Type	Life stage	Height (m)	Height to first branch (m)	Number of Stems	Diameter (mm)	Spread - N (m)	Spread - E (m)	Spread - S (m)	Spread - W (m)	Mean crown clearance (m)	Phys Condition	Structural condition	Category	Life Expectancy in years	Comments	Recommendations
T1	Sycamore	Y	9	5W	1	320	1	4	4	5	4	Fair	Fair	C1	10-20	Stem covered in ivy. Asymmetrical crown.	Reduce in height by 2m reduce the lateral spread by 1m
T2	Sycamore	Y	10	5W	1	250	2	1	3	4	4	Fair	Fair	C1	10-20	Stem covered in ivy. Asymmetrical crown.	Reduce in height by 2m reduce the lateral spread by 1m
T3	Sycamore	Y	10	3E	1	240	3	3	3	4	5	Fair	Fair	C1	10-20	Average tree for age and species	Reduce in height by 2m reduce the lateral spread by 1m
T4	Sycamore	SM	12	3N	1	460	5	5	4	5	6	Varied	Fair	C1	10-20	Dead wood throughout crown	Reduce in height by 3m reduce the lateral spread by 2m. Remove dead wood
T5	Whitebeam	SM	5	1W	1	320	3	3	3	3	2	Fair	Fair	C1	10-20	Average tree for age and species	Re-reduce back to previous reduction points
T6	Sycamore	Dead	11	5W	2	530	3	6	5	2	6	Poor	Poor	U	n/a	Dead twin-stemmed tree	Remove and grind stump

Appendix 4: Plan



Appendix 5: Tree Protection

Tree protection for this site

The CEZ is the RPA surrounding retained trees, this should be protected from any intrusion by the construction activity. Practically, this can be achieved by a combination of fencing and ground protection, to be agreed on at the initial meeting. All the protective measures must be installed before the start of any site works that could affect trees, either by fencing or ground protection or a combination of both. No protective measures should be removed or temporarily dismantled without consulting the supervising Arboriculturist.

Protective fencing

The primary form of protection will be through the use of fencing. The precise form of fencing can vary provided it is fit for purpose and prevents damaging activities within the protected area. The Heras 151 system of fencing is commonly used to provide this level of protection.

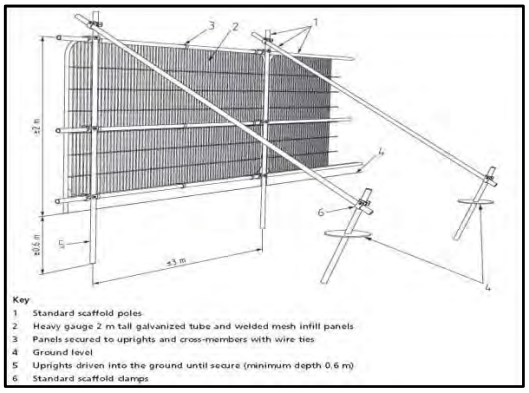


Figure 1: Fencing recommendation taken from BS:5837


Photo 1: Heras fencing

The Heras fence panels (Photo 1) should be joined using a coupling system such as the Heraslock Anti-tamper coupler, using a minimum of two clamps per panel side, and separated vertically by a distance of 1m. The panels should be secured to the ground using bracing poles or some other suitable form of support that ensures that they are fit for the purpose of excluding site traffic from the protected area and remain rigid and complete.

Ground protection and trunk protection

Ground protection and protection of the tree stems is recommended during the demolition and construction in process. Ground protection is aimed at preventing soil compaction, soil contamination, damage to surface roots and disruption of the natural soil profile. Hoarding around the stem is aimed at protecting the tree from direct damage. Specification of ground protection and trunk hoarding is detailed in Photos 2 & 3:

Photo 2: Ground protection

Photo 3: Hoarding to protect the stem

Removal of material

Removing existing surfacing and structures is a high-risk activity for any adjacent roots and the following guidance must be observed:

- Appropriate tools for manually removing debris may include a pneumatic breaker, crow bar,sledgehammer, pick, mattock, shovel, spade, trowel, fork and. Secateurs and a handsaw must also be available to deal with any exposed roots that have to be cut.

- Machines with a long reach may be used if they can work from outside RPAs or from protected areas within RPAs, but they must not encroach onto unprotected soil in RPAs.

- Debris to be removed from RPAs manually must be moved across existing hard surfacing or temporary ground protection in a way that prevents compaction of soil. Alternatively, it can be lifted out by machines, provided this does not disturb RPAs.

- Great care must be taken throughout these operations do not to damage roots.

- If appropriate, leaving below ground structures in place should be considered if their removal may cause excessive root disturbance.

Access

Roots frequently grow adjacent to and beneath existing surfacing and structures, so great care is needed during access and demolition. Damage can occur through physical disturbance of roots and/or the compaction of soil around them from the weight of machinery or repeated pedestrian passage. This is not generally a problem whilst surfacing and structures remain in place because they spread the load on the soil beneath and further protective measures are not normally necessary. However, once that protection is removed and the soil below is newly exposed, the potential for damage to roots becomes an issue. In summary,

there should be no vehicular or repeated pedestrian access unless existing ground protection is retained or new protective measures are installed (photo 3). All exposed RPAs must be protected until there is no risk of damage from the development activity.