



TREE MENDERS TREE SURGERY

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ARBORICULTURAL IMPACT ASSESSMENT REPORT:

37 – 48 Lambs Close

Cuffley

Hertfordshire

EN6 4HD

REPORT PREPARED FOR:

Ludgate Property Development Ltd

REPORT PREPARED BY

Edmond Buonocore

Bsc Hons Psy BPS RFS

Ref: LmbsCls1015

Date: 06th October 2015

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Caveats

This report is primarily an arboricultural report. Whilst comments relating to matters involving built structures or soil data may appear, any opinion thus expressed should be viewed as qualified, and confirmation from an appropriately qualified professional sought. Such points are usually clearly identified within the body of the report. It is not a full safety survey or subsidence risk assessment survey. These services can be provided but a further fee would be payable. Where matters of tree condition with a safety implication are noted during a survey they will of course appear in the report.

A tree survey is generally considered invalid in planning terms after 2 years, but changes in tree condition may occur at any time, particularly after acute (e.g. storm events) or prolonged (e.g. drought) environmental stresses or injuries (e.g. root severance). Routine surveys at different times of the year and within two - three years of each other (subject to the incidence of the above stresses) are recommended for the health and safety management of trees remote from highways or busy access routes. Annual surveys are recommended for the latter.

Tree works recommendations are found in the Appendices to this report. It is assumed, unless otherwise stated ("ASAP" or "Option to") that all husbandry recommendations will be carried out within 6 months of the report's first issue. Clearly, works required to facilitate development will not be required if the application is shelved or refused. However, necessary husbandry work should not be shelved with the application and should be brought to the attention of the person responsible, by the applicant, if different. Under the Occupiers Liability Act of 1957, the owner (or his agent) of a tree is charged with the due care of protecting persons and property from foreseeable damage and injury.' He is responsible for damage and/or nuisance arising from all parts of the tree, including roots and branches, regardless of the property on which they occur. He also has a duty under The Health and Safety at Work Act 1974 to provide a safe place of work, during construction. Tree works should only be carried out with local authority consent, where applicable.

Inherent in a tree survey is assessment of the risk associated with trees close to people and their property. Most human activities involve a degree of risk, such risks being commonly accepted if the associated benefits are perceived to be commensurate.

Risks associated with trees tend to increase with the age of the trees concerned, but so do many of the benefits. It will be appreciated, and deemed to be accepted by the client, that the formulation of recommendations for all management of trees will be guided by the cost-benefit analysis (in terms of amenity), of tree work that would remove all risk of tree related damage.

Prior to the commencement of any tree works, an ecological assessment of specific trees may be required to ascertain whether protected species (e.g. bats, badgers and invertebrates etc.) may be affected.

Tree Constraints & Protection Overview

Client:	Ludgate Property Development Ltd	Case Ref:	LmbsClS1015
Local Authority:	Welwyn Hatfield Council	Date:	06 th October 2015
Site Address: 37 – 48 Lambs Close, Cuffley, EN6 4HD			
Proposal: Arboricultural Works On Building Site BS 5837 Root Protection Areas TPOs Conservation Areas			
Report Checklist	Y/N		Y/N
Arboricultural constraints on site	Y	Trees removal proposed	N
Tree Survey	Y	Topographical Survey	Y
BS5837 Report	Y	Conservation Area	Y
Tree Preservation Orders	Y		
Tree Protection Plan:	Y		
Tree Constraints Plan:	Y		
Arboricultural Impact Assessment:	Y		
Site Layout			
Site Visit	Y	Date: 28/09/15	Access Full/Partial/None
			F
Trees on Site	N	Off-site Trees	Y
Trees affected by development	Y	O/s trees affected by development	N
Tree replacement proposed:	N	On or off-site trees indirectly affected by development	Y
Trees with the potential to be affected			
All trees adjacent to the site require remedial works to make them safe for coexistence with public habitation.			
All trees adjacent to the site are required to adhere to the Highways Act (1980).			
Tree roots are unaffected because they are already beneath tarmac and compounded MOT.			
Comments			
Further urgent arboricultural works have been noted (see Appendix 2)			
Recommendations			
1	Proposal will mean the loss of important trees (TPO/CA)		N
2	Proposal has sufficient amelioration for tree loss		Y
3	Proposals provide adequate tree protection measures		Y
4	Proposal will mean retained trees are too close to buildings		N
5	Specialist demolition / construction techniques required		Y
6	The Proposal will result in significant root damage to retained trees		N
7	Further investigation of tree condition recommended		Y

RPA= Root Protection Area
 TPP= Tree Protection Plan
 AMS= Arboricultural Method Statement
 AIA = Arboricultural Implication Assessment
 BS5837: 2012 'Trees in relation to design, demolition and construction – Recommendations'

1. SUMMARY

- 1.1 This report comprises an arboricultural impact assessment of the revised proposals for 37 – 48 Lambs Close, EN6 4HD, reviewing any conflicts between the current proposals and tree constraints identified in our survey.
- 1.2 There are 4 trees and 1 hedge row surveyed around the site, of which 2 are 'C/b' category *(Low/Moderate Quality), 3 are 'A' category *(High Quality). In theory, only moderate quality trees and above are significant material constraints on development. However, the low quality trees will comprise a constraint in aggregate.
- 1.3 The principal primary impact in the current proposals is the activity of building works over the root protection zones of these off site trees. However, this site has been a car park for a significant period of time. Cars have been parking on top of the root protection zones for many years and the roots are protected by the compacted Mot and tarmac that lies above soil level. Furthermore the TPO'd trees T1 and T2 have had the weight of a full garage complex laying on top of their root systems for the same period of time.
- 1.4 Secondary impacts will be to adhere to the Highways Act (1980) and raise the crowns of all of the offending trees ie T3, T4, and T5, so as to make the highway safe.
- 1.5 The site has potential for development without impacting significantly on the wider tree population or local landscape. Thus, with suitable mitigation and supervision the scheme is viable.

British Standards Institute: Trees in relation to design, demolition and construction BS 5837: 2012 HMSO, London

2. INTRODUCTION

2.1 Terms of reference

- 2.1.1 Tree Menders were asked by Ludgate Property Development Ltd, to provide a survey and an arboricultural impact assessment of proposals for the site: 37 – 48 Lambs Close, EN6 4HD. The report is to accompany a planning application.
- 2.1.2 This report will assess the impact on the trees and their constraints, identified in our survey. Tree Menders endeavor to survey each site blind, working from a topographical survey, wherever possible, with the constraints plan informing their evolution.
- 2.1.3 I am an arborist with 15 years' experience of prima facie arboriculture and certified with merit by the Royal Forestry Society, with a Degree in Psychology and certified LOLER Health and safety inspector. I promote international standards of valuation in arboriculture.

2.2 Drawings supplied

2.2.1 The drawings supplied by the client and relied upon by Tree Menders in the formulation of our survey plans are:

Existing site survey

Proposals

2.3 Scope of survey

2.3.1 As we surveyed the trees on site on 28st September 2015, recording relevant qualitative data in order to assess both their suitability for retention and their constraints upon the site, in accordance with British Standard 5837:2012 Trees in relation to design, demolition and construction – Recommendations [BS5837:2012].

2.3.2 Our survey of the trees, the soils and any other factors, is of a preliminary nature. The trees were SURVEYED on the basis of the Visual Tree Assessment method expounded by Mattheck and Breloer (The Body Language of Trees, DoE booklet Research for Amenity Trees No. 4, 1994). We have not taken any samples for analysis and the trees were not climbed, but inspected from ground level.

2.3.3 The survey does not cover the arrangements that may be required in connection with the laying or removal of underground services.

2.4 Survey data & report layout

2.4.1 Detailed records of individual trees are given in the survey schedule in Appendix 1 to this report.

2.4.2 A site plan identifying the surveyed trees, based on the client's drawings / topographical survey is provided in Appendix 5.

2.4.3 This plan also serves as the Tree Constraints Plan with the theoretical Recommended Protection Areas (RPA's), tree canopies and shade constraints, (from BS5837: 2012) overlain onto it. These constraints are then overlain in turn onto the client's proposals to create an Arboricultural Impact Assessment Plan in Appendix 6. General observations and discussion follow, below.

3.0 OBSERVATIONS

3.1 Site description

The site comprises an existing car park with garages for storage, located on the south-western side of Lambs Close Cuffley. The whole site is aggregated, being a car park, for cars to drive on.

3.1.2 The site is relatively flat.

3.1.3 In terms of the British Geological Survey, the site overlies the London Clay Formation (see indicated location on Fig.1 plan extract below). The associated soils are generally, highly shrinkable clay; e.g. slowly permeable seasonally waterlogged fine loam over clay. Such highly plastic soils are prone to movement: subsidence and heave. The actual distribution of the soil series are not as clearly defined on the ground as on plan and there may be anomalies in the actual composition of clay, silt and sand content.

3.1.4 Clay soils are prone to compaction during development with damage to soil structure potentially having a serious impact on tree health. The design of foundations near problematic tree species will also need to take into consideration subsidence risk. Further advice from the relevant experts on the specific soil properties can be sought as necessary

3.2 Subject trees

3.2.1 Of the 5 surveyed trees 2 are 'C/b' category *(Low/Moderate Quality), and 3 are 'A' category *(High Quality).

3.2.2 The tree species found adjacent to site comprise of 2 Oak Quercus, 1 Beach Fagus, 1 Hawthorn Cretageous, 1 row of Cupressus.

3.2.3 Full details of the surveyed trees can be found in Appendix 1 of this report. T1 is noted for poor form due to negligence on the owners' behalf; the top of the crown has broken off in a storm some years ago and several dangerous large branches are hanging over public property, it is also suppressed by a neighboring tree.

3.2.4 There are some arboricultural works required within the existing tree population. These are listed in Appendix 2. It is important to note that the Highways act requires trees over a public highway to be raised up to 5.2 metres, in addition to removing dead branches.

3.3 Planning Status

3.3.1 We are aware of the existence of Tree Preservation Orders on the Oaks, and understand the site stands within the Cuffley Conservation Area, which will affect the subject trees: it is a criminal offence to prune, damage or fell such trees without permission from the local authority

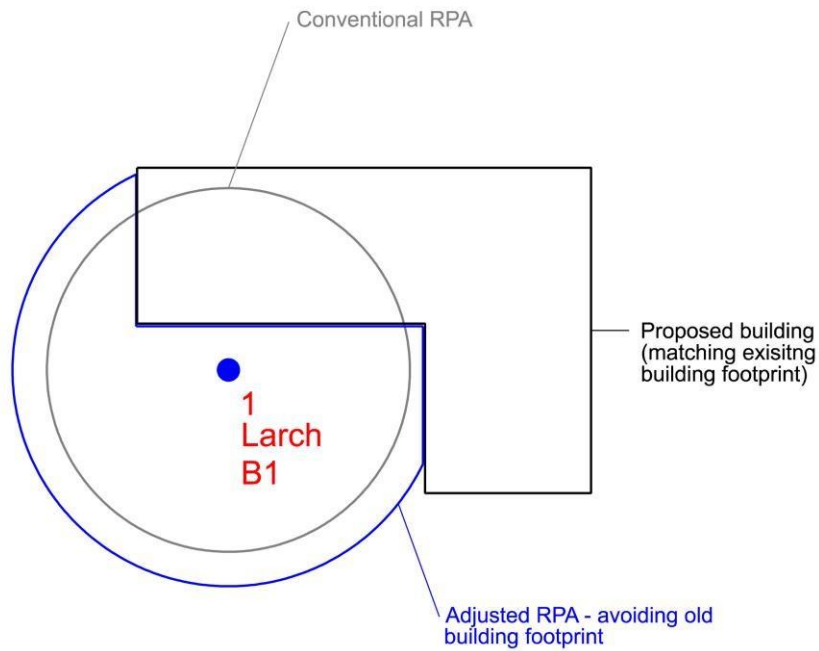
4.0 DEVELOPMENT CONSTRAINTS

4.1 Primary constraints

4.1.1 BS5837: 2012 gives Recommended Protection Areas (RPA's) for any given tree size. The individual RPA's are calculated in the Tree Schedule in Appendix 1 to this report, or rather the notional radius of that RPA, based on a circular protection zone. The prescribed radius is 12-x stem diameter at 1.5m above ground level, except where composite formulae are used in the case of multi-stemmed trees.

4.1.2 Circular RPA's are appropriate for individual specimen trees grown freely, but where there is ground disturbance, the morphology of the RPA can be modified to an alternative polygon, as shown in the diagram below (Figure 2). Alternatively, one need principally remember that RPA's are area-based and not linear – notional rather than fixed entities. **Modifications have been made in this instance to T1 & 2's RPA to reflect the presence of buildings within conventional RPA circles**

Figure 2

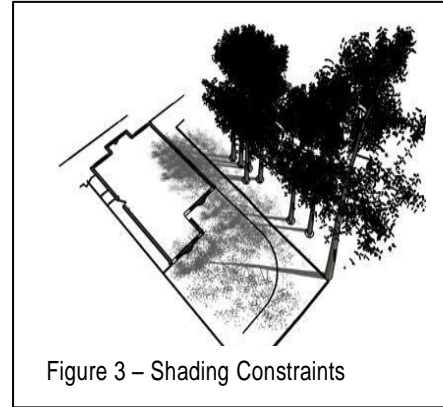


4.1.3 In BS5837, paragraph 4.6.2 states that RPA's should reflect the morphology and disposition of the roots; where pre-existing site conditions or other factors indicate that rooting has occurred asymmetrically, a polygon of equivalent area should be produced. Modifications to the shape of the RPA should reflect a soundly based arboricultural assessment of likely root distribution. Not infrequently, LT are requested by LPA Tree Officers to modify the RPA's to reflect their assumptions that e.g. a road will have drastically limited root growth.

- 4.1.4 Such assumptions cannot be proved without prior site investigations / trial pits. Where it is not always possible to conduct site investigations (e.g. below busy roads), we can always look to the published science. There seems little support for the popular myth that roads and services will curb root growth: research for the International Society of Arboriculture by Kopinga J (ISA 1994), found that “a constant high moisture content of the soil directly underneath the pavement surface can be considered as a major soil factor in attracting the trees’ roots to develop there.” By contrast, grass in lawns may actively antagonise tree roots with natural pathogens. Similarly, Professor F Miller (ISA 1994) found that service trenches at > 3m distances from trees had minimal impact on growth or crown shape.
- 4.1.5 A key misunderstanding, even among professionals, is that we conflate the RPA with the actual root system: RPA’s are *prima facie* a notion / convention / treaty and almost entirely theoretical, but readily calculable. Conversely roots are a “known unknown,” spatial entity that we predict at our folly. Yet, many are quick to do so.
- 4.1.6 We favor the neutrality of a circular RPA, because in a difference of opinion, the tree officer will always have the prerogative to dictate the final modification of shape. With the best will in the world, the free allowance of modifications will tend to lead to inequitable outcomes, prejudicing the applicant and the practice is in our view, best avoided. The neutral circle dispenses with this inequity.
- 4.1.7 The quality of trees will also be a consideration: U Category trees are discounted from the planning process in view of their limited service life. Again, Category-C trees would not normally constrain development individually, unless they provide some external screening function. As discrete, internal trees, their removal will not affect the wooded envelope that encloses much of the site.
- 4.1.8 At paragraph 5.1.1. BS5837: 2012 notes that “Care should be exercised over misplaced tree preservation; attempts to retain too many or unsuitable trees on a site are liable to result in excessive pressure on the trees during demolition or construction work, or post-completion demands on their removal.”
- 4.1.10 In theory, only moderate quality trees and above are significant material constraints on development. However, the low quality trees will comprise a constraint in aggregate, in terms of at least, replacement planting.
- 4.1.11 In this instance, the low/moderate quality trees lie on the site boundaries to the front and rear of the site. Provided it is not necessary to build right up to the boundaries, there are no significant material constraints to development.

4.2 Secondary Constraints

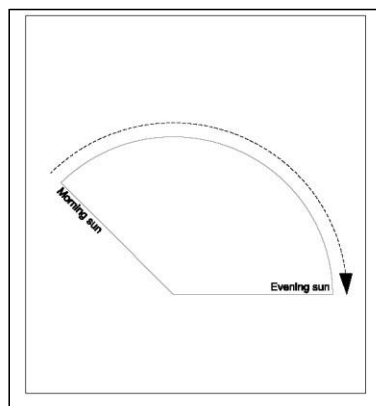
4.2.1 The second type of constraint produced by trees that are to be retained is that the proximity of the proposed development to the trees should not threaten their future with ever increasing demands for tree surgery or felling to remove nuisance shading (Figure 3), honeydew deposition or perceived risk of harm.



4.2.2 The shading constraints are crudely determined from BS5837 by drawing an arc from northwest to east of the stem base at a distance equal to the height of the tree, as shown in the diagram opposite. Shade is less of a constraint on non-residential developments, particularly where rooms are only ever temporarily occupied.

4.2.3 This arc (see Figure 4) represents the effects that a tree will have on layout through shade, based on shadow patterns of 1x tree height for a period May to Sept inclusive 10.00-18.00 hrs daily

4.2.4 All adjacent trees to the site will potentially provide low shading constraints. Elsewhere, shading, leaf deposition and honey-dew is likely to be as it is today



6.0 DISCUSSION

6.1 Rating of Primary Impacts

6.1.1 The principal primary impact in the current proposals is the risk of soil compaction, during the building process. This site has been a car park for a significant period of time. Cars have been parking on top of the root protection zones for many years and the roots are protected by the compacted Mot and tarmac that lies above soil level. Furthermore the TPO'd trees T1 and T2 have had the weight of a full garage complex laying on top of their root systems for the same period of time.

6.1.2 The proposals have no primary impacts, because during the building process there will be no excavation of sub base within the RPAs of the trees in question.

6.1.3 The principal of RPA encroachment is established within BS5837:2012 and supported by the source document, National Joint Utilities Guidelines 10 / Vol. 4 1995 / 2010. NJUG introduced the x12 diameter *Precautionary Zone* for supervised working and *Prohibited Zone* at a universal 1m from the base of the tree. RPA's are frequently confused with the NJUG Prohibited Zone, when they clearly correlate with the NJUG Precautionary Zone.

6.1.4 An RPA encroachment of <20% of RPA may be considered as low impact, given the permissive references to 20% RPA relocation and impermeable paving within BS5837:2012 and other published references to healthy trees tolerating up to 30-50% root severance (Coder, Helliwell and Watson in CEH 2006). The trees in question are healthy specimens of species with a good resistance to development impacts, and quite capable of tolerating these low impacts.

In this case there will be little to no impact on the tree roots because they are already protected by a base of compacted MOT used as the floor of a car park and garage base.

6.1.5 **“In practice 50% of roots can sometimes be removed with little problem**, provided there are vigorous roots elsewhere. Inevitably, this degree of root loss will temporarily slow canopy growth and even lead to some dieback” (Thomas 2000). We do not recommend annexing such high proportions of the root system; rather that within the context of the published science, planning should not be unduly concerned by impacts that are well below the subcritical threshold – *tree health is not at stake*. In this case there will be little to no impact on the tree roots because they are already protected by a base of compacted MOT used as the floor of a car park and as garage base.

6.2 Rating of Secondary impacts

6.2.1 Secondary impacts are to adhere to the Highways Act (1980) and raise all overhanging branches to 5.2 metres over the public highway.

6.3 Mitigation of Impacts

6.3.1 All plant and vehicles engaged in excavation works should either operate outside the RPA, or should run on a temporary surface designed to protect the underlying soil structure. Hard surfacing can be lifted with caution by a skilled machine operator again working away from the tree. In this case surfacing will not be lifted so as to protect the tree roots.

6.3.2 The limits of the LGF foundations within RPA should be manually excavated under arboricultural supervision. Roots smaller than 25mm diameter may be cut cleanly with a sharp pruning saw or secateurs back to a junction. Roots larger than 25mm diameter may only be cut in consultation with the arboriculturalist. The scale of works is unlikely to require large plant and could be manually underpinned to limit further requirements of working space within RPA. Nonetheless, ground clearance is adequate for mini-rigs if required. In this case there is no excavation works or lifting of surfaces, to protect the tree roots.

6.3.3 The landscape impact of the tree loss can be offset by the landscape proposals, ideally involving new planting of ornamental varieties of native species, in this case no trees are being removed.

7.0 Highways Act (1980)

Trees over the public highway

Trees and vegetation that overhang the highway should be crown-lifted to at least 5.2m to allow safe passage of high sided vehicles as well as being cut back sufficiently from the edge of the carriageway to allow clearance for wing mirrors. Trees and vegetation that overhang footways and footpaths should be crown-lifted to at least 2.5m and cut back to ensure the footpath/way is at least 1.2m in width. This is to allow safe passage for all footpath/way users including wheelchairs, mobility scooters, etc.

These heights have been selected as an acceptable standard and any vegetation below this may be deemed to be an obstruction. We may enforce Section 152 of the Highways Act (1980) which allows us to serve notice upon the owner of the trees/ vegetation informing them that they need to clear any obstructions safely.

When considering works to trees close to the highway, it is important to remember that wet, leaf laden branches may droop up to a metre lower than in their leafless, winter state. Additionally, if you have dead trees that are within falling distance of the public highway, it might be advisable to remove them.

8

Conclusion

- 8.1 The RPAs of the trees in question have been used for vehicular storage and also to support the weight of a garage structure for many years. So long as the sub base is not touched during the building process the soil beneath will have less weight on it; post development, thus procuring an invigorated ecotone for the trees in question.
- 8.2 The trees require a crown raise of 5.2 metres in order to adhere to the Highways Act (1980)
- 8.3 The Oak trees T1 and T2 require Dead wooding as soon as possible, because they are unsafe. This is the responsibility of the tree owner(s).

9.0 RECOMMENDATIONS

9.1 Specific Recommendations

- 9.1.1 Current tree works recommendations are found in Appendix 2 of this report, Any tree works recommended within this report should only be carried out with local authority consent.
- 9.1.2 There will be no Excavation and construction impacts within the RPA's of trees identified in Table 1 above.

9.2 General Recommendations

- 9.2.1 Where no existing boundary wall exists, trees which are in close proximity to the construction should be protected with a Tree Protection Barrier (TPB). This TPB should comprise steel, mesh panels 2.4m in height ('Heras') and should be mounted on a scaffolding frame (shown in Fig 2 of BS5837:2012). The position of the TPB can be shown on plan as part of the discharge of conditions, once the lay out is agreed with the planning authority. The TPB should be erected prior to commencement of works, remain in its original form on-site for the duration of works and removed only upon full completion of works.
- 9.2.2 A TPB may no longer be required during soft landscaping work but a full arboricultural assessment must be performed prior to the undertaking of any excavations within the RPA of a tree. This will inform a decision about the requirement of protection measures. It is important that all TPBs have permanent, weatherproof notices denying access to the RPA. In this case there is no excavation works to be carried out.

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- 9.2.3 The use of heavy plant machinery for building excavation, removal of imported materials and grading of surfaces should take place in one operation. The necessary machinery should be located above the existing grade level and work away from any retained trees. This will ensure that any spoil is removed from the RPAs. It is vital that the original soil level is not lowered as this is likely to cause damage to the shallow root systems. In this case the original soil level is protected by the existing car park and compacted MOT.
- 9.2.4 Any pruning works must be in accordance with British Standard 3998:2010 Tree work [BS3998].
- 9.2.5 Where sections of hard surfacing are proposed in close proximity to trees, it is recommended that "No-Dig" surfacing be employed in accordance with BS5837:2012 and 'The Principles of Arboricultural Practice: Note 1, Driveways Close to Trees, AAIS 1996 [APN1]'. In this case there will be no excavating near the trees or within the RPAs.
- 9.2.6 If the RPA of a tree is encroached by underground service routes then BS5837:2012 and NJUG VOLUME 4 provisions should be employed. If it is deemed necessary, further arboricultural advice must be sought.
- 9.2.7 Numerous site activities are potentially damaging to trees e.g. parking, material storage, the use of plant machinery and all other sources of soil compaction. In operating plant, particular care is required to ensure that the operational arcs of excavation and lifting machinery, including their loads, do not physically damage trees when in use. This site has been a car park for many years and has had the weight of vehicles sitting in the root protection zones on the current surface. There will be no excavating of this current surface during building operations.
- 9.2.8 To enable the successful integration of the proposal with the retained trees, the following points will need to be taken into account:
- 1) Plan of underground services.
 - 2) Schedule of tree protection measures, including the management of harmful substances.
 - 3) Method statements for constructional variations regarding tree proximity (e.g. foundations, surfacing and scaffolding).
 - 4) Site logistics plan to include storage, plant parking/stationing and materials handling.
 - 5) Tree works: felling, required pruning and new planting. All works must be carried out by a competent arborist in accordance with BS3998.
 - 6) Site supervision: the Site Agent must be nominated to be responsible for all arboricultural matters on site. This person must:
 - be present on site for the majority of the time;
 - be aware of the arboricultural responsibilities;

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- have the authority to stop work that is causing, or may cause harm to any tree;
- ensure all site operatives are aware of their responsibilities to the trees on site and the consequences of a failure to observe these responsibilities;
- make immediate contact with the local authority and/or a retained arboriculturalist in the event of any tree related problems occurring.

9.2.9 These points can be resolved and approved through consultation with the planning authority via their Arboricultural Officer.

9.2.10 The sequence of works should be as follows:

- i) initial tree works: felling, stump grinding and pruning for working clearances;
- ii) installation of TPB for demolition & construction;
- iii) installation of underground services;
- iv) installation of ground protection;
- v) main construction;
- vi) removal of TPB; vii) soft landscaping.

10.0 REFERENCES

- Barlow JF & Harrison G. 1999. Shade By Trees, Arboricultural Practice Note 5, AAIS, Farnham, Surrey.
- British Standards Institute. 2012. Trees in Relation to Design, Demolition and Construction - Recommendations BS 5837: 2012 HMSO, London.
- Centre for Ecology & Hydrology. 2006. Tree Roots in the Built Environment, HMSO, London.
- Helliwell R (1980) Provision for New Trees; Landscape Design; July/August issue
- International Society of Arboriculture (ISA). 1994. The Landscape Below Ground. ISA, Champaign, Illinois. USA.
- Lonsdale D 1999. Research for Amenity Trees No.7: Principles of Tree Hazard Assessment and Management, HMSO, London.
- Matheny, N; Clark, J. R.1998. Trees and Development: A Technical Guide to Preservation of Trees during Land Development. ISA, Champaign, Illinois. USA.
- Mattheck C. & Breloer H. 1994. Research for Amenity Trees No.2: The Body Language of Trees, HMSO, London.
- Thomas P, 2000. Trees: Their Natural History, Cambridge University Press, Cambridge.

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Appendix 1

TREE SCHEDULE

Notes for Guidance:

1. Height describes the approximate height of the tree measured in metres from ground level.
2. The Crown Spread refers to the crown radius in meters from the stem centre and is expressed as an average of NSEW aspect if symmetrical.
3. Ground Clearance is the height in metres of crown clearance above adjacent ground level.
4. Stem Diameter (Dm) is the diameter of the stem measured in millimetres at 1.5m from ground level for single stemmed trees. BS 5837:2012 formula (Section 4.6) used to calculate diameter of multi-stemmed trees. Stem Diameter may be estimated where access is restricted.
5. Protection Multiplier is 12 and is the number used to calculate the tree's protection radius and area
6. Protection Radius is a radial distance measured from the trunk centre.
7. Growth Vitality - Normal growth, Moderate (below normal), Poor (sparse/weak), Dead (dead or dying tree).
8. Structural Condition - Good (no or only minor defects), Fair (remediable defects), Poor - Major defects present.
9. Landscape Contribution - High (prominent landscape feature), Medium (visible in landscape), Low (secluded/among other trees).
10. B.S. Cat refers to (British Standard 5837:2012 section 4.5) and refers to tree/group quality and value; 'A' – High, 'B' - Moderate, 'C' - Low, 'U' - Unsuitable for retention. The following colouring has been used on the site plans:
 - High Quality (A) (Green),
 - Moderate Quality (B) (Blue),
 - Low Quality (C) (Grey),
 - Unsuitable for Retention (U) (Red)
11. Sub Cat refers to the retention criteria values where 1 is Arboricultural, 2 is Landscape and 3 is Cultural including Conservational, Historic and Commemorative.
12. Useful Life is the tree's estimated remaining contribution in years.

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Appendix 2

RECOMMENDED TREE WORKS

Notes for Guidance:

1, 2, 3 - Urgent (ASAP), Standard (6-12 months), Non-urgent (2-3 years)

- CB - Cut Back to boundary/clear from structure.
- CL# - Crown Lift to given height in meters.
- CT#% - Crown Thinning by identified %.
- CCL - Crown Clean (remove deadwood/crossing and hazardous branches and stubs).
- CR#% - Crown Reduce by given %.
- DDD - Decay Detection Device recommended. Fell
 - Fell to ground level.
- Fell2 - Fell and treat stump to prevent re-growth. Pol
 - Pollard or re-pollard.
- YM - Carry out normal maintenance of a young/newly planted tree.
- RE - Remove Epicormic Growth (specific notes may be made).

Appendix 3

RECOMMENDED TREE WORKS TO FACILITATE DEVELOPMENT (See Table 1)

Notes for Guidance:

1, 2, 3 - Urgent (ASAP), Standard (6-12 months), Non-urgent (2-3 years)

- CB - Cut Back to boundary/clear from structure.
- CL# - Crown Lift to given height in meters.
- CT#% - Crown Thinning by identified %.
- CCL - Crown Clean (remove deadwood/crossing and hazardous branches and stubs). RD
 - Remove deadwood
- CR#% - Crown Reduce by given %.
- DDD - Decay Detection Device recommended. Fell
 - Fell to ground level.
- Fell2 - Fell and treat stump to prevent re-growth. Pol
 - Pollard or re-pollard.
- YM - Carry out normal maintenance of a young/newly planted tree. RE - Remove Epicormic Growth (specific notes may be made)

Appendix 4 TREE CONSTRAINTS PLAN

Appendix 5 ARBORICULTURAL IMPACT ASSESSMENT PLAN