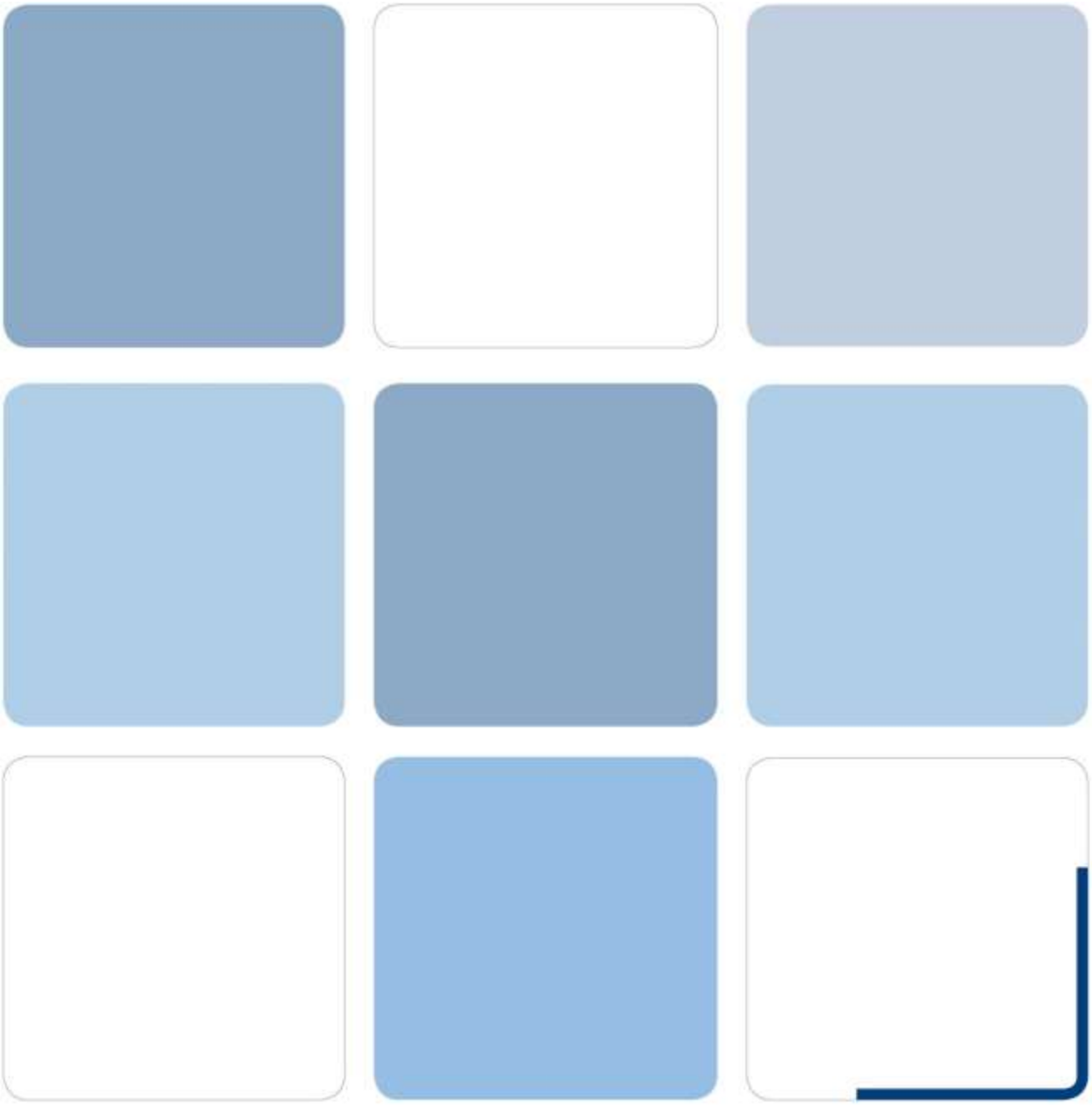
CHARLTON RIVERSIDE PHASE 1

TREE SURVEY/ARBORICULTURAL STATEMENT

Rockwell

Charlton Riverside, Anchor & Hope Lane, London

Arboricultural Impact Assessment



CHARLTON RIVERSIDE, ANCHOR & HOPE LANE, LONDON

ARBORICULTURAL IMPACT ASSESSMENT

29 November 2016

Our Ref: JMK9275 Rev B

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QUALITY MANAGEMENT

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Date:	**4th November 2016**
Project Number/Document Reference:	**JMK9275 - Charlton Riverside – AIA – Rev.B**

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TABLES, FIGURES AND APPENDICES:

1 INTRODUCTION

1.1 RPS were instructed in July 2016, by Rockwell Residential Limited, to undertake a Tree Survey and prepare an Arboricultural Impact Assessment in relation to the proposed redevelopment of a commercial site on land off Anchor & Hope Lane, Charlton, London.

1.2 The purpose of the report is to:

- Record the current condition of the trees found on the site and categorise them using criteria outlined in BS5837 - Trees in Relation to Design, Demolition and Construction-Recommendations 2012.
- Provide a Tree Constraints Plan (Figures 01.01 to 01.03) that identifies any constraints to works presented by the trees to include root protection areas for the trees as described in BS5837 - Trees in Relation to Design, Demolition and Construction.
- Provide guidance detailing arboricultural constraints to works and factors to be considered during the proposed works to the redevelopment of the site.
- Specify measures for the protection of trees throughout the works and identify any necessary tree removals and additional tree works required to implement the proposals.
- Identify any trees requiring removal and provide additional arboricultural information and advice in relation to the protection of trees throughout the works on the site, including a proposed Tree Protection Plan (Figures 02.01 to 02.03).

1.3 The assessment was prepared by Tom Flood BSc (Hons), Professional Member of the Arboricultural Association, of RPS Group PLC.

2 SITE INFORMATION

2.1 The site under consideration is an irregularly shaped area of land to the south of the River Thames which is currently an occupied and active industrial park comprising a variety of businesses.

2.2 The site includes a rectangular plot of land with an entrance off Anchor and Hope Lane (Plot B) (see Figure 01.01) which joins to another rectangular plot to the north-east (Plot A) (see Figure 01.02). The site also includes a narrow northward strip of land that comprises an old service railway which extend to the River Thames to the north .

2.3 Site topography is generally level at approximately 3.5m above ordnance datum but slopes from 3m at the south west corner to 3.9m at north east corner. The adjacent retaining wall, towards the east boundary edge is at 4.5m and the highest point is at the river front, at approximately 5.5m.

2.4 The total area of the site is 2.52ha and it is located at Ordnance Survey Grid Reference 541110E, 178940N.

2.5 The most significant trees within the site are a line of mature London plane (*Platanus* x *hispanica*) which grow within a narrow planting strip between the pavement on Anchor and Hope Lane and the site. The canopies of these large trees extend out over Anchor and Hope Lane as well as the site itself.

2.6 A check with the local authority, London Borough of Royal Greenwich, revealed that a Tree Preservation Order (TPO.253) exists on site and this relates to the London plane trees T1 – T13, T15 and T18. The site is not located within a Conservation Area.

2.7 Only off-site trees that could possibly have root protection areas (RPA) extending into the works area were considered within the survey.

3 TREE QUALITY ASSESSMENT

3.1 All trees inspected were categorised using BS5837:2012 and the attached plan (Figure 01.01) shows tree positions, numbers and retention categories. The tree positions are based on a topographical survey supplied by the client.

3.2 The initial stage of a tree survey in accordance to BS5837:2012 looks at the trees on the site in terms of life expectancy and condition.

3.3 Trees are then categorised according to their retention value; Category A trees have a high retention value, Category B trees have a moderate retention value, Category C trees are those of a low retention value which can be retained in the short term and Category U trees are those believed to warrant removal as they are likely to fail or die within 10 years. Please refer to Appendix 4 for more detailed definitions of the categories.

3.4 Category A trees are those that have been assessed as being of a high quality and value; significant amendments to the proposed scheme should be considered in preference to their removal.

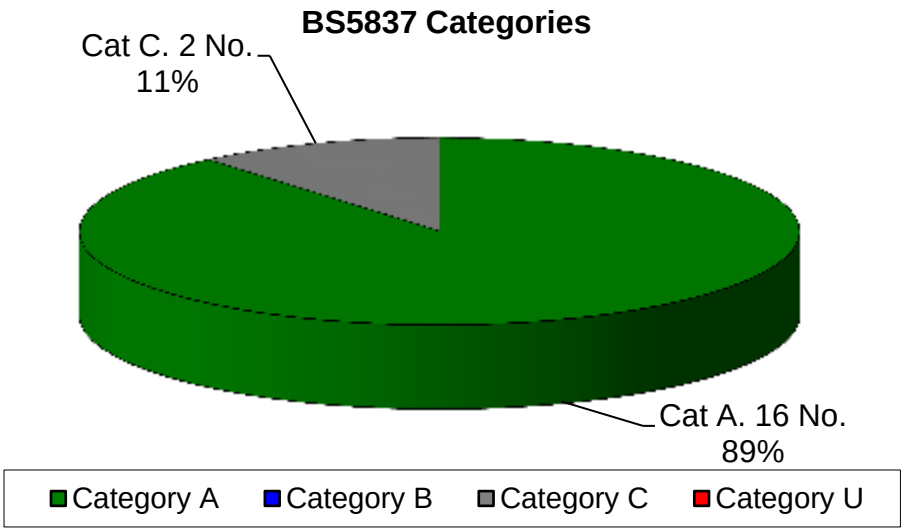
3.5 Category B trees are those that have been assessed as being of a moderate quality and value; amendments to the proposed scheme should be considered in preference to their removal.

3.6 Category C trees are those that have been assessed as being of a low quality and value; the loss of these specimens should not be considered as a constraint to development.

3.7 Category U trees are those that have been assessed as having no retention value; these trees should not be a material consideration in the planning process.

3.8 Category A, B or C trees are those that should be a material consideration in the planning process whilst category U trees are those which would be lost in the short term for reasons connected to their physiological or structural condition and hence they should not be a consideration in the planning process.

3.9 The chart below gives a visual representation of the overall distribution of retention value of the eighteen individual trees surveyed.



3.10 It should also be noted that two small groups of trees were recorded during the survey and these were both considered to be of low quality and therefore Category C.

Physiological Condition

3.11 Trees considered to be in a good physiological condition are those with crown density and shoot extension growth levels within the expected ranges for their age and species. Generally these trees, subject to being of a suitable structural condition, can be expected to make a lasting contribution to the site. Additionally trees within the good condition class are likely to tolerate changes within their growing environment that occur as a result of development; as such their successful retention will be easier to achieve.

3.12 Trees considered to be in a fair physiological condition are those specimens exhibiting lower shoot extension growth and reduced crown density than would typically be expected. These specimens have a lower life expectancy than those within the good condition class and will not tolerate significant changes as a result of development as well as those in the good condition class.

3.13 Trees considered to be in a poor physiological condition are those exhibiting crown and shoot dieback and significantly reduced crown density. Trees of a poor physiological condition are not likely to make a lasting contribution to the site and whilst their retention in the short term may be beneficial such retention will only be achievable if the trees are fully protected throughout development as they will not tolerate changes in their growing environment.

3.14 All eighteen individual trees and one of the two groups surveyed were deemed to be in good physiological condition, with the remaining group being noted as fair.

Structural Condition

3.15 There are variations in the structural condition of the trees surveyed however individual tree condition is largely consistent with expectations for the age, management and species of the tree.

3.16 The majority of structural defects that were noted across most of the tree stock on the site, such as minor deadwood in tree crowns, were not considered significant and are unlikely to result in the premature failure of the trees' main stem.

Species and Age Distribution

3.17 Trees assessed as being young (Y) in age are those considered to be less than 10 years old. These trees can generally be considered to have the potential for rapid and significant future growth. Whilst these specimens are not likely to make a substantial contribution to the landscape character of the site at present they will, if retained, provide succession for the eventual removal of mature or over-mature trees as a result of declining physiological or structural condition.

3.18 Trees assessed as being semi-mature (SM) are those of more than 10 years old but having attained less than 40% of the maximum lifespan expected for the species. These trees will generally make some contribution to the current landscape character and appearance of the site and their retention will provide a more immediate succession of mature trees. As with young trees these specimens will have the potential for rapid and significant future growth.

3.19 Early-mature trees (EM) are those considered to have reached between 40% and 70% of their ultimate life expectancy. These trees are generally not considered to have a significant potential for future growth though they will increase in size at a slower rate than young and semi-mature trees.

3.20 Mature trees (M) are those considered to have reached between 70% and 100% of their species life expectancy. These trees will have little future growth potential and they have generally reached their maximum expected size for the location. These trees will generally make the highest contribution to the landscape character of the site at this time; however a tree stock over dominated by mature trees will require careful management to ensure that a continuation of canopy cover can be achieved.

3.21 Over-mature trees (OM) are those considered to have existed for longer than typical of their species. They do not have the potential to increase in size and may in fact reduce in size as their crowns begin to break up. These trees will often make a significant contribution to the landscape character of the site and are likely to have ecological value. However the retention of these trees within new development must be carefully planned as they are approaching the end of their useful life expectancy and they will often have structural defects. Where over-mature trees are to be retained in new development it is essential that access is available for their eventual removal.

3.22 Veteran trees (V) are those that show features of biological, cultural or aesthetic value that are characteristic of an individual surviving beyond the typical age range for the species. These trees

have negligible potential to increase in size. Veteran trees are usually of a high ecological value and they will require sensitive management where they are to be retained in new development. As such it is again essential that they are located in areas where access is available to undertake management operations and where there is a reduced risk of harm occurring from failure of the trees.

3.23 A total of fifteen of the individual specimens were considered to be of mature life stage with the remaining three being semi mature whereas the two groups were either young or semi mature.

Visual Amenity

3.24 The high visual amenity of the sixteen London plane trees that are growing in a linear fashion along Anchor and Hope Lane is clear and this is a significant factor in their being subject to the existing TPO. They are prominent trees within the local landscape, due largely to their size and the lack of other significant trees within the surrounding area.

4 DEMOLITION / CONSTRUCTION REQUIREMENTS

4.1 The proposals for the site will require the demolition of the existing commercial units in order to make way for the mixed use development.

4.2 It is intended to carry out development within the majority of the site, providing new residential accommodation, commercial buildings, a revised road layout, improved infrastructure and areas of public open space.

4.3 Access will be required for equipment to:

- Demolish current buildings and structures;
- Remove areas of existing hardstanding;
- Install services and utilities;
- Construct foundations;
- Erect scaffolding;
- Install boundary structures;
- Install footpaths and access points; and
- Develop new landscape features.

4.4 The demolition and construction process will need to be monitored during its progress in regard to the tree protection and this report should provide the basis for future method statements in relation to works adjacent to the trees. Any changes which arise during the planning process will need to be assessed for further arboricultural impacts.

4.5 The following sections detail the below and above ground constraints concerning trees that will be encountered during the development.

5 BELOW GROUND CONSTRAINTS

5.1 Tree roots require moisture and nutrients to grow successfully; if these are not available then they will not be able to colonise the area surrounding the main stem. The tree will form a root system and exploit any water and nutrient resources that are available to it. Roots do not form in hostile environments and the tree will adapt its size and shape if any of these items are in limited supply.

5.2 Trees in many urban areas are limited by the harsh conditions that the tree finds itself in. They are woodland species that find themselves severely limited in some urban situations. The older trees within the site have been able to establish themselves and have achieved what should be considered a maximum size for their species and location.

5.3 Sealed surfaces and good urban drainage are bad for root and tree growth. The soil becomes desiccated in these situations and available moisture is greatly reduced. This along with the high levels of compaction found associated with hard surfaces restrict rooting.

5.4 The majority of the trees on site are located within a narrow planting strip and it would be safe to assume that the root protection areas ("RPAs") of the trees extend into hard surfaces and under built structures within the site. It is unclear as to how much of the root mass that is needed to sustain the trees is located in these areas. The majority of roots are generally found in soft surfaces adjacent to the trees and the adoption of sensible and considerate construction techniques should be used to minimise any root damage and loss of available rooting area through the development process.

5.5 All activities that could directly affect the roots to the trees within the site have been considered and the works to achieve the current proposed development considered. Construction method statements should be fully specified before any works adjacent to a tree is carried out. Where the works are likely to be adjacent to the rootable area, supervision by a qualified Arboriculturist should be considered. The specifications should be a combination of current best practice and relevant British Standards relating to demolition and construction adjacent to trees.

5.6 The proposed service drawings were not available and will need to be considered as this may have some impact on retained trees. Due to the position of the trees currently found on the site, as well as the high probability that existing services could be utilised for much of this development, it is clear that the service provision could be designed away from retained trees.

6 ABOVE GROUND CONSTRAINTS

6.1 The above ground constraints that trees provide are largely concerned with their mass (crown and main stem) and these constraints are usually abated by pruning or removal. Pruning is used to allow access and prevent damage to the tree in a site development.

6.2 Removal is considered when the tree is in a poor condition and would fail in a reasonable time scale or the development could not be achieved with the tree in its current position and its removal is agreed as part of the planning application. The trees assessed as part of this application will be discussed below and their above ground constraints identified.

6.3 The trees material to the planning application are located largely to the roadside boundary of Plot B of the site. The current development design indicates that in order to achieve the improved vision for the site there will be instances where trees will require pruning to accommodate the provision of a new service road.

6.4 The pruning requirement may also assist in allowing access for site vehicles and works equipment to be used adjacent to tree protection fencing/site hoarding and ensure no physical damage to the crowns of each tree occurs whilst the construction works are being carried out.

6.5 All crown pruning works should be carried out to the specifications contained within BS3998:2010 'Tree Work – Recommendations' and the guidance below. They should be carried out sensitively and maintain or improve the crown balance and form for each individual tree.

Tree Access Pruning Specification (see BS3998:2010 Tree Work - Recommendations)

- All works shall be carried out by suitably qualified and professional contractors who are clear in the understanding of the specification below and their requirements.
- All works shall be carried out using suitable handsaws and these saws should be sharp and in a serviceable condition. The use of chainsaws shall only be used with the agreement of the supervising officer (SO).
- All risk assessments shall be carried out by the contractor prior to works commencing and they should be fully satisfied as to the conditions and any hazards within the working area. Any concerns should be reported to the SO.
- The clearance height should be agreed and included in the schedule of works.
- Works beyond this dimension are not to be part of the works unless it involves additional health and safety works to the tree.

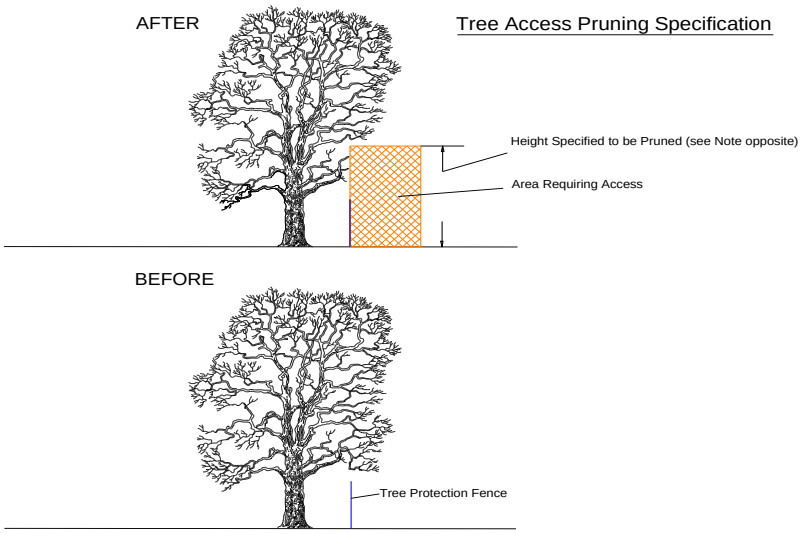
- The works should be designed to provide access to the working area during the construction period and if the access is to be required beyond this period then a tree management programme with the provision for cyclical pruning should be agreed.

- The guidance and main document providing the recommended guidance is BS3998:2010 'Tree Work – Recommendations' and this should be followed if any doubt exists with the requirements of the work. Section 7 Pruning and related work is particularly relevant and most notably within that section paras 7.2 Minimizing the potentially undesirable effects of pruning, 7.6 Crown lifting, 7.8 Selective pruning and 7.9 Pruning for infrastructure. This is not an exclusive list.

- The aim of the pruning should be to provide a natural appearance within the crown and not to leave an acute side to the crown of the tree. Final pruning cuts should be considered and where possible made to natural target pruning points such as branch unions where branch bark ridges can be used to guide the pruning cuts. Where these points are not available the exposed stub should be as small as possible and an assessment made of each individual branch taken by the operative before making the cut.

- All cuts should be made so that they do not provide future structural issues such as weak forks and loss of structural integrity. If there are any concerns regarding the above then they should be raised prior to works commencing. Branch reductions should be used to eliminate bark rips and tears; they will not be accepted by the client.

- All debris should be removed form site and disposed of in an environmentally sensitive way agreed with the SO.



7 ANALYSIS OF CONSTRAINTS

7.1 The constraints that have been identified above are the ones that apply to the trees found at the site at Anchor and Hope Lane, Charlton, London.

7.2 The above ground constraints will require professional arboricultural management and specification. It is considered likely that crown lifting pruning will be required to accommodate larger vehicles on the proposed service road.

7.3 Beyond the construction period a programme of regular tree work to reduce the deadwood and control the crown extents will provide adequate management in the future. It would also allow the trees to have their crowns and main stems inspected by the arborist, which would identify structural issues early and reduce the likelihood of major crown failures.

7.4 The below ground constraints will be offset by the use of specially engineered construction methods which will remove the need to excavate within the RPAs. Respect to the current RPAs within the designed layout and supervision through the construction periods will enable all arboricultural impacts to be fully considered.

7.5 The arboricultural impacts are detailed below and considered specifically for the site and the proposed development.

8 ARBORICULTURAL IMPACT GUIDANCE

Tree Retention / Removal

8.1 The prioritisation for tree retention should be based upon the guidance contained within BS5837:2012. Category A trees should be seen as the highest priority for retention and Category C the lowest.

8.2 Category U trees have no retention value and in most circumstances such specimens will not be considered for retention within new development.

8.3 When considering the extent of tree retention on site with respect to Category C trees priority should be given to the trees that have been included within this category due to their having stem diameters of less than 150mm at 1.5m above ground level, as these specimens are relatively young trees with future potential.

Considerations for Demolition

8.4 On this site demolition will be required to remove the existing structures and areas of hard surfacing and the following factors require consideration prior to demolition if damage to retained trees is to be prevented.

Removal of Existing Buildings

8.5 The presence of existing buildings or built structures in close proximity to trees requires consideration as in such areas access to undertake demolition may be restricted by the trees.

8.6 Additionally there may be a higher potential for damage to occur to tree branches where they are in close proximity to a building to be demolished.

8.7 Where access to demolish the building is restricted due to the spread of a tree’s crown it may be possible to undertake access facilitation pruning to prevent injurious contact between demolition plant and the tree(s).

8.8 Alternatively it may be possible to provide working space by temporarily tying back tree branches in accordance with a specification prepared by an arboriculturist.

8.9 In all cases to minimise the potential for damage to occur to aerial parts of a tree during demolition all works in proximity to trees should be undertaken from within the footprint of the existing building with walls being pulled back away from the trees.

8.10 Where access to demolish a building is restricted due to the presence of a tree's RPA it may be possible to install ground protection to allow temporary access.

8.11 The buildings associated with the site can be accessed from multiple existing access points, and as such machinery should be able to enter the site while avoiding any requirement to enter the rooting zones.

8.12 Where the removal of underground structures in proximity to trees is required the advice of an arboriculturist should be sought. In general it is preferable, where possible, to leave redundant underground structures in situ as their removal could damage tree roots.

Removal of Existing Hard Surfaces

8.13 As with the demolition of existing buildings, care must be taken in the removal of areas of hard surfaces which are present within the RPA of trees.

8.14 Where existing hard surfaces are located within the RPA of retained trees care should be taken to prevent disruption to tree roots that may be growing beneath it.

8.15 In this respect their removal should generally be undertaken using hand held tools though, under arboricultural supervision, appropriate heavier machinery could be used.

8.16 Where machinery is used to remove a hard surface in close proximity to a retained tree works should progress away from the tree so that at no time the machine moves over newly exposed ground. Ground protection should be put in place where new areas of exposed ground exist or alternatively the area should be isolated through the installation of tree protection fencing until the replacement surface is to be constructed.

8.17 If a new hard surface is to be constructed it may be preferable to leave any existing sub-base in situ, augmenting it where required, so as to minimise impacts to underlying roots.

Factors to Consider during the Construction of New Buildings

Working Within or Near the RPA of Retained Trees

8.18 Where possible all construction shall be situated outside of the retained trees' designated RPA as the installation has the potential to cause soil compaction, root damage and to reduce nutrient and moisture availability to tree roots to the detriment of tree health and vitality.

8.19 However, where there is an overriding justification for working within the RPA of a retained tree, technical solutions might be available that prevent damage to the tree.

8.20 In this respect it can be noted that the use of traditional trenching methods within the RPA could result in extensive root loss and should be avoided.

8.21 In order to arrive at a suitable solution site specific advice should be sought from the project arboriculturist and an engineer.

8.22 Generally speaking should new buildings be proposed within the RPA of an existing tree it will be necessary to take steps to minimise the potential impact to the tree to allow construction.

8.23 In this respect where it is intended to undertake construction operations within the RPA, precautions should be taken to maintain the condition and health of the root system and in particular to:

a) Prevent physical damage to the roots during demolition or construction (such as by soil compaction or severing);

b) Make provision for water and oxygen to reach the roots;

c) Allow for the future growth of the root system;

d) Preserve the soil structure at a suitable bulk density for root growth and function (in particular for soils of a high fines content).

New Hard Surfaces within RPA

8.24 If there is a requirement for new hard surfacing to be located inside of the RPA of any retained tree the construction of these surfaces should be designed using the principles set out within BS5837:2012 regarding 'no dig' surfacing. Site specific and specialist arboricultural and construction design advice should be sought to determine if it is achievable without significant adverse impact upon trees to be retained.

Proximity of Structures to Trees

8.25 Where new structures are proposed which are to be located in proximity to existing trees the need for working space to construct the proposed development should be considered.

8.26 The construction of new structures in close proximity to trees can result in damage to trees and structures by the continuous whipping of branches against the fabric of a building. Therefore structures should usually be located with due consideration to a trees ultimate growth so as to reduce the need for frequent pruning or other maintenance.

8.27 Where large old trees are to be retained it is important that adequate space is allowed for their long term physical retention and for future maintenance.

Service Installation

8.28 All service runs, utilities and similar infrastructure should take note of trees and allow for working methods that will minimise damage to trees by referring to documents such as NJUG Volume 4 - Guidelines for the planning, installation and maintenance of utility services in proximity to trees. (National Joint Utilities Group 2007). Existing service/utility routes should be considered as the default for the proposed building.

New Tree Planting

8.29 Where tree planting is proposed, size and position should be considered, along with suitability of the species for the site. New tree planting should be measured and provide greater species diversity where possible so as to promote resilience and sustainability going forward. Consideration for initial maintenance through establishment should form part of the mitigation specification.

8.30 The new guidance provided in BS8545:2014 ‘Trees: from nursery to independence in the landscape’ should also be considered and its recommendations followed.

9 ARBORICULTURAL IMPACT ASSESSMENT

Introduction

9.1 Trees have finite energy reserves, developed each year throughout the growing season, which are utilised for biological processes such as growth and defence against pests or diseases throughout the following year.

9.2 Any development in proximity to trees has the potential to cause harm to those trees unless control measures are identified and acted upon; as such it is essential to consider the relationship between the proposed works and the retained trees to identify what precautions are necessary, proportionate and appropriate.

9.3 Any works adjacent to trees have the potential to impact upon the above ground and below ground parts of trees.

9.4 Whilst some damage that occurs, such as physical damage to the trees' stems and branches from machinery movements can be clearly visible the impact from other aspects of work common on development sites which can have a significant effect upon the continued health of trees is not always immediately evident.

9.5 Damage that is not immediately evident but which can cause long term harm to retained trees include damage to the soil structure by compaction which can cause root damage and changes in site levels can alter the water table and affect moisture availability.

9.6 To minimise the potential for harm to occur to retained trees all works should be carried out with regard to the Tree Protection Measures detailed within this report.

9.7 In general it can be seen that, by adopting appropriate methods of working, precautionary and protective measures, significant harm to retained trees can be avoided.

9.8 In particular the establishment of a Construction Exclusion Zone (CEZ) by the erection of Tree Protection Fencing will minimise the potential for harm to occur to retained trees.

Brief Description of Proposed Works

9.9 The proposed development is a mixed-use scheme comprising 975 residential units provided within 11 buildings ranging in height from 2 to 28 storeys, including private gardens and roof terraces. Leisure facilities such as a swimming pool and gym will be provided as well as retail units which will include restaurants and cafés. A total of 1,528m² of office space will also be provided.

Tree Retention / Removal

9.10 No individual trees within or adjacent to the site will require removal in order to facilitate the construction of the development proposals.

9.11 It will be necessary to remove one group of trees comprising self-seeded sycamore (*Acer pseudoplatanus*), G2, which are growing at the northern end of the old service railway. The removal of these trees will have a negligible impact on the site's arboricultural value due to their low quality.

9.12 While not a constraint to development, it will be necessary to remove all clumps of woody scrub within the site. These comprise predominantly butterfly bush (*Buddleia davidii*), a non native pioneer shrub synonymous with early colonisation of derelict ground.

Work Considerations

9.13 To ensure that the trees that are to be retained do not suffer harm during the proposed works the following factors have been considered.

Root Protection Areas

9.14 The existing on-site trees to be retained as part of the new development have grown within a planting strip and this will contain much of the root mass. It should, however, be assumed that roots will have utilised any opportunity for extension out of the confines of the planting strip and therefore the RPAs for each tree have been determined in accordance with BS5837:2012 Section 4.6 (this information will provide the rootable soil volume, required for protection). The RPAs for each tree can be seen on the Tree Constraints Plans (Figures 01.01 to 01.03) and in the attached tables.

9.15 All works, where possible, shall be situated outside of the retained trees' designated RPAs.

9.16 In the event that any substantial roots are found during any of the works on site then these should be reported immediately to the site manager and advice sought from an Arboricultural Consultant.

New Hard Surfacing

9.17 It will be necessary to remove areas of the existing hard surfacing within RPAs of retained trees T1 -13 in order to construct the service road and a new footpath leading from the service road onto Anchor and Hope Lane and to allow for proposed landscaping enhancements.

9.18 The removal of existing hard surfacing should improve the rooting environment for these trees through improved water filtration and better gaseous exchange within underlying soils. However, the works will need to be undertaken to an approved method statement to ensure that roots and subsoils which may be present are not subject to issues such as compaction.

9.19 In order to construct the proposed service road and footpath through the default circular RPAs of T1 – T13 it will be necessary to use a no-dig design solution which prevents excavation into

rootable soil volumes. The service road is to be in private ownership and therefore does not need to conform to adoptable standards of construction, allowing the use of an engineered no-dig design solution. There are numerous examples of this system which could be used, such as Geosynthetics – CellWeb and further information regarding hard surface installation can be found at Appendix 5.

9.20 Wherever possible, the retention of any in situ sub-base present beneath the paving should be considered so as to further reduce the likelihood of root damage.

9.21 Temporary ground protection should be put in place to afford protection to the RPAs that are located outside the CEZ during construction.

9.22 All protective fencing and other measures should be on site and in place before ANY site preparation or work commences.

Building Foundations

9.23 The development layout indicates that the majority of structures proposed are located outside of the RPAs of the retained trees within the site. However, it is the case that the footprints for two proposed structures within south-west corner of the development are located within the RPAs of T12 and T13 (see Figure 02.01).

9.24 Give the suboptimal rooting environment in this location due to the covering of hard surfacing, it is considered unlikely that roots from T12 and T13 have extended to this area. Given the protected status afforded to these trees it is recommended that an engineered solution to this issue be incorporated into the construction method for these units as a precautionary measure.

9.25 So as to avoid traditional trenching associated with the construction of building footings, the use of piled foundations should be used to reduce disturbance of the underlying soils which may contain roots.

Existing Canopy Spreads

9.26 Where the RPAs for retained trees do not extend to the edge of existing canopy spreads it is possible that those parts of the trees which extend beyond the RPA fencing may sustain damage during construction.

9.27 Where this occurs there are two primary options available to manage and minimise the potential for damage to tree canopies to occur during development and these may be used singularly or in combination.

9.28 The first option is to create a Construction Exclusion Zone (CEZ), by the erection of protective fencing, around the full extent of the trees. The second is to undertake pruning works to the trees to reduce the potential for branch damage to occur. The first option will be adopted if at all possible.

Site Compound and Material Stores

9.29 Provision for materials storage, site offices, deliveries and other related activities should be made available in areas away from trees. Materials should be brought on site as required and any material generated as part of the works that requires removal from site should be stacked either off site or away from trees.

Levels Changes

9.30 Any level changes adjacent to trees should be assessed for their impact. Particular care should be taken with respect to mature trees, as these cannot respond to changes as rapidly as younger trees.

10 RECOMMENDED WORKS SPECIFICATION

Tree Felling Works

10.1 One Category C group, G2, will require removal in order to implement the development proposals.

10.2 These works should be carried out using guidance found within BS3998:2010 Tree Work – Recommendations and the removals are shown on the Tree Protection Plan (Figure 02.01 to 02.03).

Tree Pruning Works

10.3 In order to accommodate the service road, where it runs north to south within close proximity to the western boundary of Plot B, it will be necessary to undertake light crown lifting to the canopies of trees T1 – 13 on their eastern side. It is considered that these works would be required to provide between 1 to 1.5m of additional ground clearance so as to allow for occasional high sided vehicles.

10.4 It will also be necessary to laterally prune the canopies of T12 and T13 by 1 to 1.5m in order to provide a suitable clearance from the proposed buildings in the adjacent area.

10.5 It is not considered that these works would significantly impact the trees in question. These works would need to be professionally assessed closer the time of the development being implemented on a tree-by-tree basis with all works undertaken using guidance found within BS3998:2010 Tree Work – Recommendations.

Tree Protection

10.6 There is a requirement for protective fencing to be erected and this should be completed in accordance with the guidance contained within BS5837:20012 Trees in Relation to Design, Demolition and Construction – Recommendations. The position of the protective fencing is shown on the Tree Protection Plan (Figure 02.01 to 02.03).

10.7 The use of a fixed line of Tree Protection Fencing, around the tree adjacent to the works should be used to provide adequate protection during the works. Once the fixed line of protective fencing is in place it must remain in situ throughout the course of the works until all operations are complete. The fixed line will form the outline of the Construction Exclusion Zone (CEZ).

10.8 Copies of the Tree Protection Plan (Figure 02.01 to 02.03).should be placed in the site office for reference by all site staff.

10.9 The protective fencing barrier is to be constructed in accordance with the specification detailed at Appendix 4.

10.10 Signs detailing the purpose of the protective fencing shall be attached to the fencing at 10m intervals. Such signs should be weatherproof and shall be substantially in the form of the specimen provided at Appendix 7. Signs must be replaced as necessary should they be removed or become illegible.

10.11 Following erection of the protective fencing and prior to commencement of the woks it is recommended that an inspection of the site, by either the Council's Tree Officer or the Arboricultural Consultant, be arranged to confirm fencing has been installed in accordance with the Tree Protection Plan (Figures 02.01 to 02.03).

10.12 Following removal of existing hard surfacing it will be necessary to install a proprietary ground protection where areas of RPAs are exposed. These areas are indicated on the Tree Protection Plan (Figure 02.01).

Construction Exclusion Zone

10.13 The Construction Exclusion Zone (CEZ), as defined by the fixed protective fence line, shall be regarded as sacrosanct and the protective fencing shall not be moved or taken down at any time.

10.14 Within the Construction Exclusion Zone there must be no mechanical digging or scraping, no alteration to existing ground levels including soil stripping, no earthworks and no handling or discharge of any chemical substance, concrete washings or any fuels.

10.15 Furthermore vehicular or pedestrian access along with the storage of any materials will be prohibited within the Construction Exclusion Zone.

10.16 Additionally no materials that may contaminate the soil such as concrete mixings, diesel oil and vehicle washings shall be discharged within 10m of the stem of any tree and no fires shall be lit within 10m of the maximum extent of a tree's crown.

Site Access Point

10.17 An agreed access point into the working area should be agreed. If the access point could have any possible impacts on existing tree roots, ground protection must be used and specified to ensure any root damage is avoided as far as possible.

10.18 It is envisaged that the existing site entrance off Anchor and Hope Lane will be the means of accessing the site.

Site Compounds and Materials Stores

10.19 Activities related to the establishment of a temporary site compound have the potential to impact upon the retained trees by various means. In particular the storage and mixing of chemicals and materials such as concrete can have a damaging effect on tree health if precautions are not taken.

10.20 To prevent harm occurring to trees, provision for materials storage, site offices, deliveries and other related activities should be made available in areas away from trees.

10.21 Due to the size of the development and the site it is envisaged that there should be space to accommodate a compound without impacting on trees but this may require a phased approach to development implementation.

Monitoring

10.22 Following erection of the protective fencing and prior to commencement of the works an inspection of the site, by either the Council's Tree Officer or the Arboricultural Consultant, should be arranged to confirm fencing has been installed in accordance with the Tree Protection Plan (see Figure 02.01 to 02.03) and any relevant conditions that may be attached to a grant of planning consent for the development.

Reporting

10.23 Should any arboricultural issues become apparent during the works the site manager should immediately contact the Council's Tree Officer or the Arboricultural Consultant for advice upon how to proceed.

11 CONCLUSIONS

11.1 A tree survey and arboricultural assessment has been carried out at the site off Anchor and Hope Lane, Charlton, London to consider the impacts of the proposed redevelopment of the existing industrial estate.

11.2 The assessment of the trees on site revealed a number of high quality specimens (Category A), and these are all London plane trees which line the western border of Plot B, adjacent Anchor and Hope Lane. The remainder of the trees were deemed to be of low quality (Category C) and therefore not a constraint to development.

11.3 The implementation of the proposed development will require the removal of one Category C group, G2. This is a group of young self-seeded sycamore and their removal will not impact the arboricultural value of the site.

11.4 A Tree Preservation Order (TPO) exists on site and covers the mature London plane trees (T1 – 13, T15 and T18) which line the area between the Anchor and Hope Lane and the industrial estate.

11.5 The use of tree protection and fencing and ground protection acting as a construction exclusion zone will ensure that the retained trees located within the site are protected during the works.

11.6 It will be necessary to construct the service road where it passes through the RPA of T1 – T13 using a 'No-Dig' method of construction such as Geosynthetics - Cellweb or Wreckin – ProtectaWeb. It is understood that the service road will not be adopted and can therefore be constructed to this standard.

11.7 In order to reduce the likelihood of unnecessary root damage, it is recommended that the construction of the two units at the south-west corner of the site be constructed using piled foundations so as to remove the need to excavate trenches within the RPAs of T12 and T13.

11.8 Guidelines contained within BS5837:2012 Trees in Relation to Design, Demolition and Construction should be followed when dealing with trees in these situations. Working methods and specifications should be followed to limit potential damage to trees throughout the works proposed.

11.9 The importance of supervision during the works should not be underestimated. If any arboricultural issues relating from works being carried out occurs, then they should be reported to the main contractor immediately.

11.10 It is considered that, provided the mitigation within this report is adhered to, there should be no significant impacts on the trees to be retained.

TABLES

TABLE 1

Table 1 - Tree Survey Data

Key to Inspection Report Form

Species	Genus and variety
Height	Measured Clinometer Reading or Estimated Height in Metres
Girth (dbh @ 1.5m)	Diameter measured in cms, or estimated, Where multi stemmed conventions within BS5837:2012 have been applied.
Spread (m)	Canopy height estimated in metres above ground level, Height of first branch and direction has been noted.
Canopy height (m)	Crown Spread, radius estimated in metres
Physiological Condition	Good, Fair, Poor, Dead
Age Class	Y – Young SM – Maturing (Young to Middle Aged) EM – Early Mature (Middle to mature aged) M – Mature OM – Over mature, V – Veteran
Useful Life Expectancy (years)	10, 10-20, 20-40, 40+
BS Categorization	See Cascade Appendices 2

Table 1: Tree Data Schedule

Tree No.	Species	Diameter (mm)*	Height	Crown Spread N	S	E	W	Crown Height above Ground	First Major Branch Direction	Branch Height above Ground	Age Class	Vigour	Life Expectancy	Structural Condition/Comments	BS5837 Category
1	Platanus x hispanica	900	17	7.0	3.0	7.0	7.0	3.0	NE	3.0	M	Good	40+	Tree is leaning at a 10angle in a NEdirection.Pruning wounds to Stem and Crown.Trifurcated stem formed at 3.0 metres.Hard surface located in RPA.Building/structure located in RPA.	A2
2	Platanus x hispanica	740	17	3.5	3.5	8.0	7.5	4.0	North	3.0	M	Good	40+	Pruning wounds to Stem and Crown.Trifurcated stem formed at 3.0 metres.Hard surface located in RPA.Building/structure located in RPA.	A2
3	Platanus x hispanica	660	16	2.5	2.0	7.0	5.5	3.0	East	2.0	M	Good	40+	Tree is leaning at a 10angle in a NEdirection.Pruning wounds to Crown.Heavily suppressed crown.Bifurcated stem formed at 2.0metres.Hard surface located in RPA.Building/structure located in RPA.	A2
4	Platanus x hispanica	660	16	3.5	4.5	7.0	6.5	3.0	NE	2.5	M	Good	40+	Pruning wounds to Crown.Trifurcated stem formed at 2.5 metres.Hard surface located in RPA.Building/structure located in RPA.	A2
5	Platanus x hispanica	870	17	5.0	4.0	8.0	8.0	3.0	NW	2.0	M	Good	40+	Pruning wounds to Crown.Bifurcated stem formed at 2.0metres.Hard surface located in RPA.Building/structure located in RPA.	A2
6	Platanus x hispanica	880	17	4.0	5.0	9.0	8.0	3.0	SW	2.0	M	Good	40+	Pruning wounds to Crown.Trifurcated stem formed at 2.5 metres.Deadwood in the crown of Minor extent.Hard surface located in RPA.Building/structure located in RPA.	A2

* Where the tree is multi-stemmed the conventions within BS5837:2012 are applied

Tree No.	Species	Diameter (mm)*	Height	Crown Spread N	S	E	W	Crown Height above Ground	First Major Branch Direction	Branch Height above Ground	Age Class	Vigour	Life Expectancy	Structural Condition/Comments	BS5837 Category
7	Platanus x hispanica	730	17	4.0	3.5	5.0	8.0	3.0	East	3.0	M	Good	40+	Tree is leaning at a 5angle in a Eastdirection.Pruning wounds to Crown.Bifurcated stem formed at 3.0metres.Crown cavity formed at 4.0metres.Hard surface located in RPA.Building/structure located in RPA.	A2
8	Platanus x hispanica	850	17	5.0	4.0	8.0	7.0	3.5	NE	3.0	M	Good	40+	Pruning wounds to Crown.Bifurcated stem formed at 3.0metres.Restricted inspection due to access.Hard surface located in RPA.Building/structure located in RPA. Located within strip of land between roadside hording and scaffolder yard palisade fence, no clear view of lower half of stem and base.	A2
9	Platanus x hispanica	600	17	3.0	2.0	7.0	6.0	4.0	NE	2.5	M	Good	40+	Pruning wounds to Crown.Trifurcated stem formed at 3.0 metres.Restricted inspection due to access.Hard surface located in RPA.Building/structure located in RPA. Located within strip of land between roadside hording and scaffolder yard palisade fence, no clear view of lower half of stem and base.	A2
10	Platanus x hispanica	750	16	4.0	3.0	7.0	7.0	4.0	North	2.5	M	Good	40+	Pruning wounds to Crown.Multi stemmed stem formed at 3.0 metres.Restricted inspection due to access.Hard surface located in RPA.Building/structure located in RPA. Located within strip of land between roadside hording and scaffolder yard palisade fence, no clear view of lower half of stem and base.	A2
11	Platanus x hispanica	780	17	4.0	2.5	7.0	8.0	4.0	South	3.0	M	Good	40+	Pruning wounds to Crown.Bifurcated stem formed at 1.0metres.Restricted inspection due to access.Hard surface located in RPA.Building/structure located in RPA. Located within strip of land between roadside hording and scaffolder yard palisade fence, no clear view of lower half of stem and base.	A2

* Where the tree is multi-stemmed the conventions within BS5837:2012 are applied

Tree No.	Species	Diameter (mm)*	Height	Crown Spread N	S	E	W	Crown Height above Ground	First Major Branch Direction	Branch Height above Ground	Age Class	Vigour	Life Expectancy	Structural Condition/Comments	BS5837 Category
12	Platanus x hispanica	850	17	3.5	4.0	8.0	6.5	3.5	East	2.0	M	Good	40+	Pruning wounds to Crown.Bifurcated stem formed at 2.0metres.Restricted inspection due to access.Hard surface located in RPA.Building/structure located in RPA. Located within strip of land between roadside hording and scaffolder yard palisade fence, no clear view of lower half of stem and base.	A2
13	Platanus x hispanica	900	17	3.5	8.0	8.0	6.5	3.5	SE	3.0	M	Good	40+	Pruning wounds to Stem and Crown.Bifurcated stem formed at 3.0metres.Crossing branches in crown.Fused limb/branches.Restricted inspection due to access.Hard surface located in RPA.Building/structure located in RPA. Located within strip of land between roadside hording and scaffolder yard palisade fence, no clear view of lower half of stem and base.	A2
14	Platanus x hispanica	220	10	3	2.5	2.5	3	2.0	NW	2.5	SM	Good	40+	Restricted inspection due to access.Hard surface located in RPA.Located off site. Located within shrub bed, no clear view of lower half of stem and base.	A2
15	Platanus x hispanica	850	19	3.5	5.0	6.0	4.5	4.5	SE	4.5	M	Good	40+	Pruning wounds to Crown.Trifurcated stem formed at 4.5 metres.Previous crown reduction.Restricted inspection due to vegetation.Hard surface located in RPA.Located off site.Not plotted on land survey plan.	A2
16	Prunus avium	150	6	2	2	2	2	3.0	South	2.5	SM	Good	20-40	Restricted inspection due to off site.Hard surface located in RPA.Building/structure located in RPA.Not plotted on land survey plan. Canopy overhanging boundary wall.	C1
17	Chamaecyparis lawsoniana	150	8	1.0	1	1	1	0.5	South	0.5	SM	Good	20-40	Restricted inspection due to off site.Hard surface located in RPA.Not plotted on land survey plan. Canopy overhanging boundary fence.	C1

* Where the tree is multi-stemmed the conventions within BS5837:2012 are applied

Tree No.	Species	Diameter (mm)*	Height	Crown Spread N	S	E	W	Crown Height above Ground	First Major Branch Direction	Branch Height above Ground	Age Class	Vigour	Life Expectancy	Structural Condition/Comments	BS5837 Category
18	Platanus x hispanica	900	19	7.0	2.5	7.0	6.0	2.0	SE	3.0	M	Good	40+	Pruning wounds to Crown.Bifurcated stem formed at 3.0metres.Previous crown reduction.Restricted inspection due to access.Hard surface located in RPA.Building/structure located in RPA.Not plotted on land survey plan.	A2

* Where the tree is multi-stemmed the conventions within BS5837:2012 are applied

Table 1: Group Data Schedule

Group No.	Species	Min/Max Diameter (cm)*		Average Height (m)	Average Crown Spread	Ave. Crown Height	Age Class	Vigour	Life Expectancy	Structural Condition/Comments	BS5837 Category
G1	Chamaecyparis lawsoniana	10	15	6	1.5	1	SM	Fair	10-20	Previously topped, Restricted inspection due to off site.	C2
G2	Acer pseudoplatanus	5	10	6	1.5	0.5	Y	Good	10-20	Hard surfaces within root area. Restricted inspection due to no access. Self seeded trees.	C2

* Where the tree is multi-stemmed the conventions within BS5837:2012 are applied

Table 1: Woody Scrub / Individual / Hedge Areas

Section No.	Species	Height (m)	Comments
S1	Buddleia davidii	3	Small area of butterfly bush.
S2	Buddleia davidii	2	Small area of butterfly bush.
S3	Buddleia davidii	2	Small area of butterfly bush.
S4	Buddleia davidii	2	Small area of butterfly bush.
S5	Buddleia davidii	2	Small area of butterfly bush.
S6	Buddleia davidii Acer pseudoplatanus Betula pendula	4	Area of predominantly butterfly bush.
S7	Buddleia davidii	3	Small area of butterfly bush.

Section No.	Species	Height (m)	Comments
S8	Buddleia davidii	3	Small area of butterfly bush.
S9	Buddleia davidii	3	Small area of butterfly bush.
S10	Buddleia davidii	3	Area of butterfly bush.
S11	Buddleia davidii	3	Area of butterfly bush.
S12	Buddleia davidii	3	No access due to padlocked gate. From distance appears track is lined with butterfly bush.
S13	Buddleia davidii Passiflora caerulea	4	Off-site shrub mass overhanging boundary.
S14	Yucca filamentosa Lonicera nitida	1	Raised brick planter with shrubs.

TABLE 2

Table 2 - Root Protection Areas

Table 3: Tree Root Protection Areas

Tree No.	Species	BS5837 Category	RPA Radius (m)	RPA Area (m2)	RPA Square Side Length (m)
1	Platanus x hispanica	A2	10.8	366.4	19.1
2	Platanus x hispanica	A2	8.88	247.7	15.7
3	Platanus x hispanica	A2	7.92	197.1	14
4	Platanus x hispanica	A2	7.92	197.1	14
5	Platanus x hispanica	A2	10.44	342.4	18.5
6	Platanus x hispanica	A2	10.56	350.3	18.7
7	Platanus x hispanica	A2	8.76	241.1	15.5
8	Platanus x hispanica	A2	10.2	326.9	18.1
9	Platanus x hispanica	A2	7.2	162.9	12.8
10	Platanus x hispanica	A2	9	254.5	16
11	Platanus x hispanica	A2	7.8	191.1	13.8
12	Platanus x hispanica	A2	10.2	326.9	18.1
13	Platanus x hispanica	A2	10.8	366.4	19.1
14	Platanus x hispanica	A2	2.64	21.9	4.7
15	Platanus x hispanica	A2	10.2	326.9	18.1

Tree No.	Species	BS5837 Category	RPA Radius (m)	RPA Area (m2)	RPA Square Side Length (m)
16	Prunus avium	C1	1.8	10.2	3.2
17	Chamaecyparis lawsoniana	C1	1.8	10.2	3.2
18	Platanus x hispanica	A2	10.8	366.4	19.1

Table 3: Tree Root Protection Areas - Groups

Tree No.	Species	BS5837 Category	RPA Radius (m)
G1	Chamaecyparis lawsoniana	C2	1.8
G2	Acer pseudoplatanus	C2	1.2

FIGURE

Figure 1: Tree Constraints Plan

FIGURE

Figure 2: Tree Protection Plan

APPENDIX 1

Appendix 1 - Methodology

General

On site data was recorded onto site copies of forms.

The site data was transposed in the office into an MS Access database. Individual tree numbers and locations were plotted by eye on to a drawing at the time of the survey. Tree positions were then related to a Topographical survey of the site provided, where not shown on the topographical survey tree positions have been plotted by eye only and require confirmation. Colour coded versions of the drawings form part of this report. (Figure 01.01).

The data recorded includes:

- Height - data gathered using a Suunto optical clinometer PM - 5/1520. Where access to the tree was not possible the Heights were estimated.
- Diameter - measurements taken at 1.5 metres above ground level (complying with requirements for BS5837). Where multiple stems occurred conventions contained within BS5837:2012 were followed. Girth data was gathered using a metric diameter tape, callipers or estimated when no access.
- Tree crown spread – estimated measurement of the four cardinal points to provide information to be used with the arboricultural constraints plan
- Tree Crown Clearance – crown height above ground level
- Tree condition - judged visually using the guidelines produced in the report. The condition is indicated with the appropriate colour on the map found in the report. (see Figure 01.01)
- Age class - estimated from an examination of the tree in question.

Age Classification

The following classification is employed:

Y - Young:	Saplings and young trees under 10 years of age
SM – Semi Mature	Tree great than 10 years old below one third of there life expectancy
EM – Early Mature:	Trees older than one third of the life expectancy of their species, normally making substantial extension growth.
M - Mature:	Trees between one third and two thirds of the life expectancy of their species. More or less full height and large girth, increasing only slowly.
OM- Overmature:	Trees beyond two thirds of the life expectancy of their species. No significant extension growth. Crown starting to break up and decrease in size.
V – Veteran:	tree that shows features of biological, cultural or aesthetic value that are characteristic of an individual surviving beyond the typical age range for the species.

Estimated Remaining Contribution in Years

The estimated remaining contribution in years is an estimate based on currently known factors of the possible remaining life of the tree as an asset. Clearly, it is impossible to predict changes in condition which may occur in the future and this reflects what is considered reasonable under existing circumstances, The following classification is employed:

Death or removal is likely within less than 10 years

Death or removal is likely within 10-20 years.

Death or removal is likely within 20-40 years.

Death or removal is likely beyond 40 years

The estimated remaining contribution in years will be dependent on the interaction of the typical longevity of the species, its current age and condition with prevailing environmental factors. The estimated remaining contribution in years also dependent on future tree management that can extend useful life in some instances.

Tree Condition.

The tree survey assessed the individual condition of all trees identified on the site. The assessment of condition is based on a visual and professional view.

The categories considered for Physiological Condition are good, fair, poor and dead.

Structural Condition is also commented on and this will include such items of presence of decay and physical defects.

Trees are living organisms and their condition can change rapidly in response to environmental variables. Condition remarks refer to the date of survey and cannot be assumed to remain unchanged. While there is no such thing as a safe tree, regular inspection of trees is recommended to reduce the foreseeable risks associated with trees. There is currently no published guidance from the UK insurance industry on the frequency of tree inspections. In the German courts a bi-annual routine inspection is normally expected for older street trees, giving an indication of the rapidity of change in condition that can occur.

Management Recommendations

Recommendations are given where it is felt by the arborist that further investigations are required due to suspected defects and work recommendations for pre construction tree work.

Tree Categorisation Using BS 5837 Methodology

The trees surveyed were categorised using the method explained in BS5837 Trees in Relation to Design=, Demolition and Construction 2012. This method categorizes individual trees, groups and woodlands in a systematic way. Each tree, group or woodland is identified on an attached plan.

Groups are identified as those trees forming a single arboricultural feature with trees that provide companion shelter, are avenues or screens or cultural.

Initially the surveyor will determine if the tree should be regarded as an U category tree. U category trees are those that are low value trees that have little future due to physiological and structural condition.

Other trees are graded A, B or C. The initial category should reflex the trees value in making an important contribution to the amenity of the site over a period of time. The higher the category the longer the perceived time period.

A sub category is included 1, 2 or 3. This sub category reflects the type of value the surveyor feels the tree presents in regards its value to 1 – arboricultural, 2 – landscape, 3 – cultural or conservation.

The cascade chart used is included as Appendix 2 of this report.

APPENDIX 2

Appendix 2 - BS5837 Table 1 – Cascade Chart for Tree Quality Assessment

Table 1 Cascade chart for tree quality assessment

Category and definition	Criteria (including subcategories where appropriate)			Identification on plan
Trees unsuitable for retention (see Note)				
Category U **Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years**	**□□Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees (e.g. where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning)** **□□Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline** **□□Trees infected with pathogens of significance to the health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality** **NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve; see 4.5.7.**			**Dark Red**
	1 Mainly arboricultural qualities	**2 Mainly landscape qualities**	**3 Mainly cultural values, including conservation**	
Trees to be considered for retention				
Category A Trees of high quality with an estimated remaining life expectancy of at least 40 years	Trees that are particularly good examples of their species, especially if rare or unusual; or those that are essential components of groups or formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue)	Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture)	Light Green
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
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**

APPENDIX 3

Appendix 3 - Botanical and Common Names of Trees on Site

BOTANICAL NAME	***COMMON NAME***
Acer pseudoplatanus	Sycamore
Chamaecyparis lawsoniana	Lawsons cypress
Platanus x *hispanica*	London plane
Prunus avium	Wild cherry

APPENDIX 4

Appendix 4 - Root Protection Area Barrier Details

Protective Barrier Specifications

Since trees are living organisms which interact with their immediate environment any changes made to their surroundings may have a bearing on that trees future. Developing a site will undoubtedly place any trees within close proximity under some level of stress, which could predispose them to infection. The aim of this method statement is to limit the amount of stress induced by introducing protection measures.

The most effective way of offering protection is by erecting protective barriers set at a distance from the tree stem using the methods given within BS 5837: 2012 Trees in Relation to Design, Demolition and Construction. Barriers should be braced and constructed to resist impacts; see figures 1 & 2 below for barrier specifications. Barriers can be of an alternative specification to that within the BS5837:2012 provided it is approved by the Local Planning Authority Tree Officer.

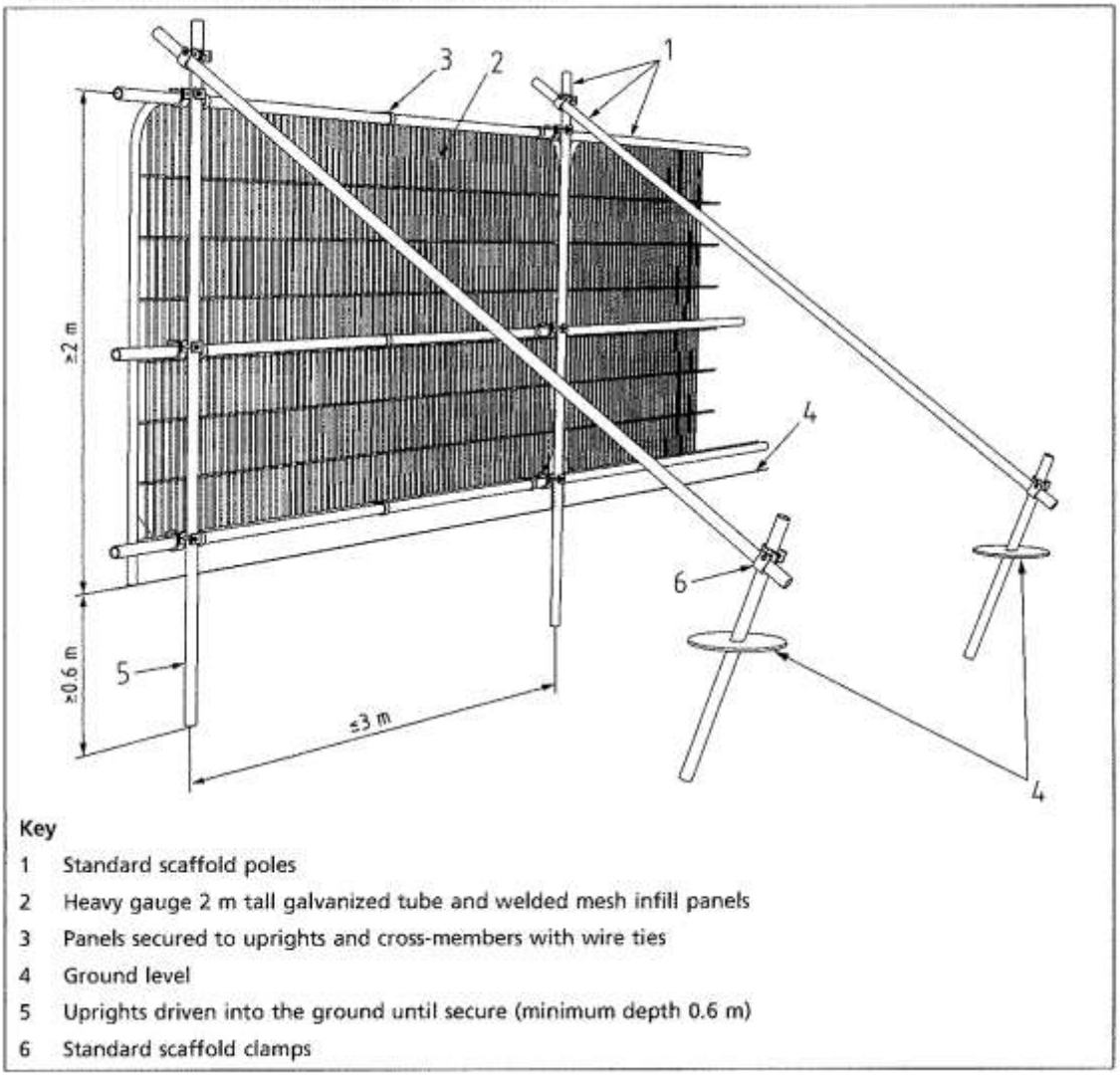
Barriers should be erected before any works commence on site with the exception of recommended tree work. Areas of retained and future structure planting should be similarly protected.

All personnel should be made aware of the protected areas and instructed to keep them free of materials, waste and excess soil. Soil disturbance should be prohibited and travel of any kind, including foot traffic should also be excluded within the root protection area (RPA) unless previously agreed and adequate ground protection has been installed. Where foot traffic is agreed within the RPA, single thickness scaffold boards laid over a compressible material on a geotextile, or supported by scaffold should suffice. Where vehicular access through the RPA is agreed an engineer should be consulted to design adequate ground protection methods.

Suggested Barrier Specification (as per BS5837: 2012)

Figure 1

Figure 2 **Default specification for protective barrier**

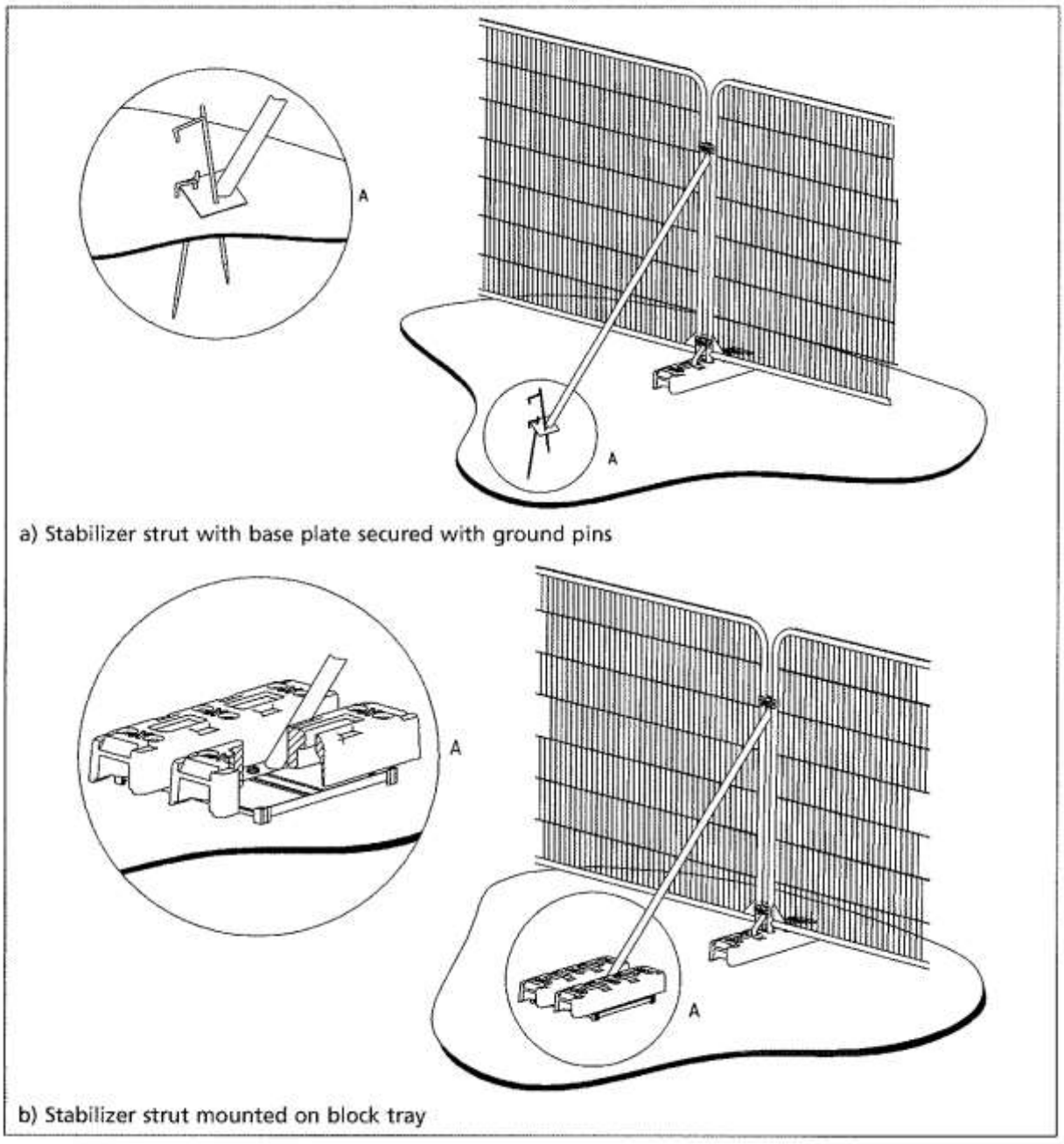


Key

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 2

Figure 3 **Examples of above-ground stabilizing systems**



APPENDIX 5

Hard Surface Installation Methodology

The following methodology sets out the requirements and stages in construction of new hard surfaces in relation to existing trees.

This methodology is not meant to be considered as a specification and whilst examples of products that meet the arboricultural requirements for the installation of hard surfacing adjacent to trees are given the final construction detail must be designed by a suitably qualified and experienced engineer, whilst ensuring the arboricultural requirements are met, to ensure that the finished surface is fit for purpose.

In this respect it should be noted that Geosynthetics Limited, who supply cellular confinement systems, offer a design service to develop site specific solutions.

Arboricultural Requirements

Wherever it is intended to undertake demolition or construction operations within the Root Protection Areas of trees precautions must be taken to maintain the condition and health of trees root systems.

In particular:

- Works shall be conducted in such a manner as to prevent physical damage to roots during demolition or construction, such as soil compaction or root severance.
- Provision for water and oxygen to reach the roots must be made and the soil structure must not be disturbed.
- Provision must be made for future root growth and precautions taken to ensure that such root growth does not cause unacceptable levels of damage to the finished construction.
- The soil must not be compacted and soil bulk density must be maintained at suitable levels for tree root growth and function. In this respect a soil bulk density of over 1.8g/cm^3 will impede root growth and function.

To achieve the above requirements for tree root growth and function the surface shall be designed so that:

- No excavation is required for their installation; to ensure that physical root damage does not occur.
- The surface can be installed without compaction of the existing soils; thus ensuring damage to the soil structure does not occur.
- The surface is permeable; thus ensuring that oxygen and water can reach the root system and that CO_2 can diffuse vertically out of the soil as high concentrations can cause root suffocation.

There are various methods of creating such a surface however one that is commonly in use and is therefore recommended here is the use of a three dimensional cellular confinement system to provide for load suspension above the existing soil grade and reducing vertical loads on the underlying soils. One such product is CellWeb produced by Geosynthetics.

Prior to installation of any new surfacing the following factors shall be considered:

- The exact location of the area to receive the special surfacing shall be determined.
- The area should be investigated to identify any existing services.
- The area shall be fenced off with tree protection fencing until installation of the special surfacing is to take place. Such installation should generally be phased to occur following substantial completion of the development.
- The final surface shall be decided upon, the surface must be permeable and several options for final surfacing are considered in the following section.

Methodology for Surface Installation

Prior to the installation of the new surface, existing ground cover and surface vegetation should be killed using an appropriate herbicide.

Specialist advice should be sought in order to determine the most appropriate herbicide to use due to the potential for leaching through soils and the potential impacts that this will have on retained vegetation.

As an alternative or addition to herbicide treatment the existing surface vegetation may be carefully removed by using hand tools.

All dead organic matter is to be removed by hand following herbicide treatment to prevent anaerobic conditions, as a result of the decomposition of dead vegetation, occurring.

All major protrusions such as rocks shall be removed by hand and all tree or shrub stumps from removed vegetation shall be ground out to minimise ground disturbance.

The soil surface **must not** be skimmed or stripped to achieve a level surface and where necessary major hollows shall be filled using a granular fill, such as no-fines gravel, washed aggregate or cobbles, to achieve a level surface.

In some cases it may be appropriate to consider the removal of the top layers of soil by non mechanical means to achieve desired levels, establish rooting patterns and potentially provide for some embedding of the new surface into the existing ground level. Such works shall be completed using pneumatic soil excavation techniques and the works must be supervised by an Arboricultural consultant. The need for such works to occur shall be considered during the detailed design of the surface.

Following surface preparation the soil shall be covered by a permeable geotextile to prevent the cellular confinement fill from migrating into the existing soils.

The geotextile layer shall be laid with overlaps of 300mm beyond the edge of the proposed construction and shall be temporarily retained with pins, stakes or weights.

The cellular confinement system shall then be installed and fixed in position in accordance with the manufacturer's recommendations – Appendix 5.

The cellular confinement system shall then be filled with the specified aggregate in accordance with the manufacturer's recommendations – Appendix 5. All works involved in the filling of the system with aggregate must be completed by hand and be supervised by the site supervisor.

The infill aggregate shall then be rolled or whacked to ensure cohesion of the granular fill with the cellular confinement system.

The desired finished surface shall then be installed. This shall be permeable and gas porous. Options for the type of finished surface are:

- Washed gravel – This retains porosity unless excessively consolidated and will be particularly useful where the final surface is not level. However it may not be suitable in areas with high pedestrian and vehicular passage. If gravel is used, this shall be distributed in a 75mm layer over the exposed infill aggregate.
- Paving slabs / brick paviours – These shall be laid dry jointed on a bed of sharp sand to allow air and moisture to permeate. Specialist slabs and paviours with inbuilt infiltration holes may be used.
- Tarmacadam – This shall not be used where it will cover over 20% of a trees Root Protection Area.

Following completion of the hard surface protective fencing shall be erected around the trees until the completion of development.

APPENDIX 6

Appendix 5 - Arboricultural Glossary

Abiotic Factors - Nonliving factors of the environment, including temperature & wind.

Age-class - A general classification of the tree into either - young, semi-mature/maturing, mature, over-mature, or senescent.

Apical Bud/Shoot – The apical bud, also known as the leading shoot, is responsible for shoot extension and is dominant.

Apical Dominance – A singular, leading shoot remains dominant.

Arboreal - In connection with, or in relation to, trees.

Arboriculturalist – Person who has, through relevant education, training and experience, gained recognised qualifications and expertise in the field of trees in relation to construction.

Arboricultural Implications Assessment (AIA) – Study, undertaken by an arboriculturalist, to identify, evaluate and possibly mitigate the extent of direct and indirect impacts on existing trees that may arise as a result of the implementation of any site layout proposal.

Arboricultural Method Statement (AMS) – Methodology for the implementation of any aspect of development that has the potential to result in the loss of or damage to a tree. Note The AMS is likely to include details of an on-site tree protection monitoring regime.

Biotic factors - Living factors. For example, animals and pathogens.

Bottle Butt – Term used to describe shape of stem base, usually associated with an internal defect – refer to 'Reaction Wood' below.

Branch union/junction - The point at which a branch joins a larger stem. Can be a point of weakness, especially in certain species.

Cambium - A lateral meristem (see below) in vascular plants located just beneath the bark responsible for secondary growth, e.g. production of annual growth rings.

Canker – A clearly defined area of dead and sunken or malformed bark, caused by bacteria or fungi. Can have a bearing on structural integrity of infected limb(s) depending on size and location.

Chlorosis/Chlorotic – Abnormal yellow or yellow-green coloration of usually green leaves. Essentially a reduction of chlorophyll levels often as a result disease or nutrient deficiency.

Co-dominant stems - A growth characteristic, where two or more stems of similar size grow from the same point. Can create an inherent weakness.

Compaction - The compressing & hardening of soil around tree root systems, due to vehicular/pedestrian use etc. Loss of pore space between soil granules limits water movement and gaseous exchange, and inhibits root growth.

Competent person – Person who has training and experience relevant to the matter being addressed and an understanding of the requirements of the particular task being approached

Note 1 A competent person understands the hazards and the methods to be implemented to eliminate or reduce the risks that can arise. For example, when on site, a competent person is able to recognise at all times whether it is safe to proceed.

Note 2 A competent person is able to advise on the best means by which the recommendations of this British Standard may be implemented.

Condition – Assessment based on a visual and professional view giving consideration to many factors such as tree health, structural integrity and suitability of its position.

Construction Exclusion Zone – Area based on the RPA (in m^2), identified by an arboriculturalist, to be protected by 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.

Coppice - The method of managing trees by cutting the stems at between 1.0 inch and 1.0 foot from the ground level on a regular cycle, the cut stumps of the trees or shrubs are allowed to re-grow many new stems.

Crown spread - Gives distances between extreme limits of the crown and the stem, usually along the four compass points. Helps to show crown symmetry.

Crown Reduction – The removal of branch ends to reduce the extreme limits of a trees branch spread and height.

Crown Thin – The removal of selected branches within the crown to thin the internal branch structure.

D.B.H. - 'Diameter at Breast Height', an industry standard to gauge tree stem size and development. Within arboriculture, breast height is taken to be 1.5m above ground level.

Dieback - The reduction in crown vigour and extension growth progressing to death of distal parts; often associated with decline.

Epicormic/adventitious growth - New growth from dormant buds that can often form tenuous attachments. Although some species readily form such shoots, it can be an indication of stress.

Feathered Whip – Size of tree for planting, usually ranging from 1.25m to 2.5m in height.

Form - A general assessment of the shape and position of the tree within its' environment.

Frass – Debris such as bore dust left by wood boring insects.

Hanger – Term used to describe a branch that has become detached and is being supported by other branches. Can be a hazard to persons and property below.

Hazard Beam – After the loss of a distal part, a limb concentrates growth upwards creating adverse end weights that can render the limb susceptible to failure.

Heavy Standard – Size of tree for planting, usually above 3.5m in height.

Included bark – Growth characteristic usually caused when two or more stems/branches growing in close proximity 'fuse' together entrapping the bark from when the parts were separate in the middle, creating a structural weakness.

Meristem - The undifferentiated plant tissue from which new cells are formed, such as that at the tip of a stem or root.

Meristematic Disorder – A growth disorder caused by a disruption of the meristem (see above) from any of a number of biotic factors (see above). Manifests as growths such as 'Witches Brooms' & 'Galls'.

Necrosis/Necrotic – Death of tissues usually characterised by a blackening in colour.

Occlusion/Occluded – Normally used to describe the overgrowth of a wound. Also, immoveable foreign objects in contact with a tree part can become encased or 'occluded' by the tree as it grows incrementally.

Pathogen - An agent that causes disease, especially a living microorganism such as a bacterium or fungus.

Plasticity index - The table used to calibrate the shrinkability of a clay soil.

Pollard – The removal and subsequent regular re-removal of the crown of a tree above animal browsing height. Can be an effective method of controlling the size of trees in urban areas. This is ideally begun in the trees early stages and maintained throughout its life.

Reaction wood - Essentially additional wood laid down by the tree to compensate for structural defects such as cavities.

Ring barking/Girdling – the removal of bark around the entire circumference of a stem or branch, causing the death of all distal parts.

Root Protection Area (RPA) – Layout design tool indicating the area surrounding a tree that contains sufficient rooting volume to ensure the survival of the tree, shown in plan form in m^2.

Saprophyte – An organism which exists on dead plant material.

Scaffold branches - The main structural branches within the crown.

Services – Any above ground and piped and/or ducted underground infrastructure including water main, electricity supply, gas supply, fibre optic utilities, telecommunications cabling, storm and foul water drainage, including temporary storage for run-off, pumping stations, interceptors and other allied buried structures.

Shrinkable clay – Clay soil which alters in volume depending on moisture content. Property sited on shrinkable clay can suffer subsidence damage due to soil desiccation; this can be due to the water uptake of nearby vegetation, including trees.

Special engineering – design of a structure with the physiological requirements of trees as the priority.

Standard – Size of tree for planting, usually ranging from 2m to 3.5m in height.

Structure – Man-made object, such as a building, carriageway, path, wall, services, and built and excavated earthworks.

Transplant – (1) size of tree for planting, usually ranges from 0.2m to 0.9m in height (2) the relocation of a tree or shrub including a given portion of the root system.

Tree Constraints Plan (TCP) – Plan prepared by an arboriculturalist for the purposes of layout design showing the RPA and representing the effect that the mature height and spread of retained trees will have on layouts through shade, dominance, etc.

Tree protection plan – scale drawing prepared by an arboriculturalist showing the finalised layout proposals, tree retention and tree and landscape protection measures detailed within the arboricultural method statement (AMS), which can be shown graphically.

U.L.E – 'Useful Life Expectancy' is an estimate based on currently known factors of the possible remaining life of the tree as an asset.

Veteran tree – Tree that, by recognised criteria, shows features of biological, cultural or aesthetic value that are characteristic of, but not exclusive to, individuals surviving beyond the typical age range for the species concerned.

Vigour - A general classification, as to the present and future potential growth and development of a tree. A comment regarding the health status of the tree specific to its species.

Water Demand - A generic classification of the water demand of specific species as outlined by the NHBC (National House Building Council).

Whip – Size of tree for planting, usually ranging from 1m to 1.75m in height.

APPENDIX 7

Appendix 6 - Construction Exclusion Zone Sign

PROTECTIVE FENCING. THIS FENCING MUST BE MAINTAINED IN ACCORDANCE WITH THE APPROVED PLANS AND DRAWINGS FOR THIS DEVELOPMENT.

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 LOCAL PLANNING AUTHORITY