Stanway Railway Sidings
Colchester
BS5837 Tree Survey

This Report has been Prepared under the Framework of BS ISO 9001
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1 Introduction

1.1 RPS were instructed, in January 2010, by BRB (Residuary) to undertake a Tree Survey in relation to a proposed development at the site.

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 Construction- Recommendations 2005.
- Provide a Tree Constraints Plan that identifies any constraints to development presented by the trees to include root protection areas for the trees as described in BS5837 - Trees in Relation to Construction.
- Provide guidance detailing arboricultural constraints to development and factors to be considered during the detailed design of the proposed development. Particularly regarding the trees covered by the Tree Protection Order 23/88 that is relevant to this site.

1.3 The survey was carried out by Brian Wallis, Chartered Forester, Chartered Environmentalist and Fellow of the Arboricultural Association, of the RPS Group PLC.

2 Site Information

2.1 The trees surveyed are located on land at Stanway Railway Sidings, Colchester, Essex.

2.2 The site is approximately 5.8 Ha in size and is centred on Ordnance Survey Grid Reference TL 952254.

2.3 The site is located within a predominately residential area of Colchester, approximately 6.3 Kilometres to the north west of Colchester town centre.

2.4 Vehicular and pedestrian access points into the site are provided from a locked gate to the east side of the site via the railway access road from Halsted Road. Boundaries are formed by Halstead Road to the south and west, the railway line to the north and the railway access track to the east.

2.5 The site was previously railway sidings serving the adjacent railway line, this usage has ceased some time previously and the site is currently derelict. Various amounts of debris associated with its previous usage can be found throughout the site. The whole site has become covered in birch, aspen and willow scrub that has generated in pockets and areas of soil etc. Due to the height and poor rooting positions of some of the trees wind throw and collapsed trees are located throughout this area of scrub. The only areas not to be covered by the tree growth are those that have impeded drainage and at the time of the survey formed large areas of shallow water.

2.6 The mature tree cover on site is predominantly located to the southern boundary with Halstead Road and to the east to the site. An overhead power line is located along this boundary and crown pruning to facilitate line clearance has been carried out recently and in the past.

2.7 A telephone enquiry (01/02/2010) was made to Colchester City Council with regards to the existence of Tree Preservation Orders on the site and whether it fell within a Conservation Area. A reply received on the same day confirmed that some trees on the site are covered by order TPO 23/88 (these have been identified on the constraints plan) and no trees are within a Conservation Area. The Order covers an area of land to the southern boundary and part way northwards on the eastern boundary, it also covers a single tree within the site identified on the Constraints Plan as T74.

3 Tree Quality Assessment

3.1 All trees inspected were categorised using BS5837:2005 and the attached plan (Figure 1) shows tree positions, numbers and retention categories.

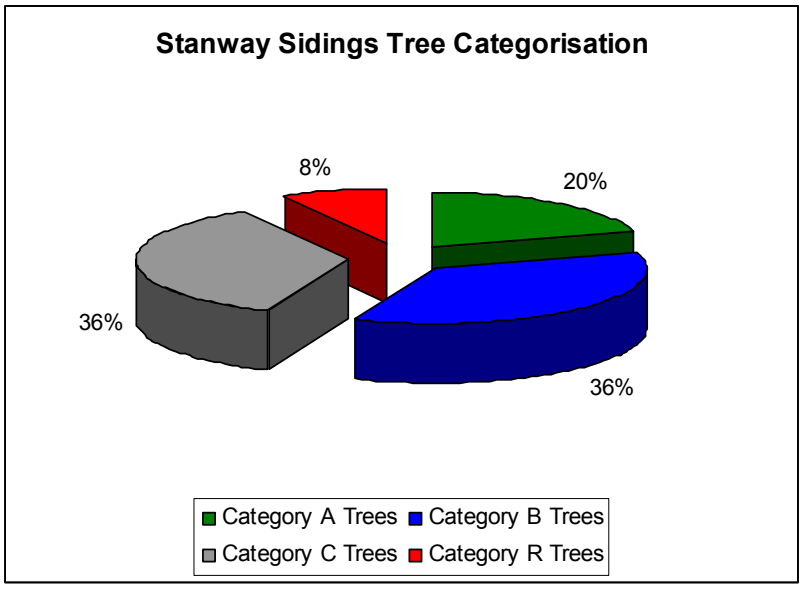
3.2 The initial stage of a tree survey in accordance to BS5837:2005 looks at the trees on the site in terms of life expectancy and condition.

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 R trees are those believed to warrant removal as they are likely to fail or die within 10 years. Please refer to Appendix 2 for more detailed definitions of the categories.

3.4 Category A, B or C trees are those that should be a material consideration in the planning process whilst category R 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.

3.5 It should be noted that while the positions of the trees have been assessed by the partial topographical survey and then plotted on to the Tree Constraints Plan it should be appreciated that some trees may not be accurately positioned and when considering the final/potential access points of Halstead Road further more detailed survey work will need to be undertaken to ensure the full impact on trees is assessed. The accuracy of the tree positions therefore cannot be guaranteed.

3.6 The chart below gives a visual representation of the distribution of individual tree categories of those trees surveyed (not inclusive of groups or scrub area).



3.7 BS5837 Categories

Category A Trees – High Retention Value

3.7.1 Fifteen trees surveyed, representing 20% of the overall number surveyed as individuals, were considered to be of a high retention value when considered in accordance with BS5837:2005.

3.7.2 These trees are considered to be in such a condition that they can make a substantial continued contribution to the landscape character of the site.

3.7.3 The retention of the category A trees within any new development should be seen as a high priority.

3.7.4 Of the fifteen trees, twelve are considered to meet the A1 and A2 sub-categories criteria as their value is primarily due to the fact that they are good examples of their species when considered as individuals or part of a group of trees with considerable future potential. Three trees were considered as A3 due to there potential age and conservation importance.

Category B Trees – Moderate Retention Value

3.7.5 36% of the trees on site were assessed as being of category B value when considered in accordance with BS5837:2005.

3.7.6 These are trees of a moderate quality and value which are in such a condition that they can make a continuing contribution to the landscape character of the site.

3.7.7 Trees within the B category should be retained where possible within any proposed development of the site and their removal will require considered and proportionate justification; for example removal of a category B tree to allow the retention of a better category A specimen may be judged appropriate.

3.7.8 Should it be necessary to remove any category B trees to achieve development of the site mitigation will be required.

Category C Trees – Low Retention Value

3.7.9 36% of the trees on site were considered to be of a low, category C, retention value when considered in accordance with BS5837:2005.

3.7.10 These specimens are of a low quality and value and whilst they may be retainable in the short term they should not necessarily be viewed as a constraint to development. (Ref: BS5837:2005 Table 1)

3.7.11 Trees have been considered to meet the criteria for inclusion within this category for two primary reasons.

3.7.12 Firstly young trees, those with a stem diameter of less than 150mm at 1.5m above ground level are considered to be of category C value as they currently make little contribution to the local landscape and their loss could be mitigated for by appropriate replacement planting following development.

3.7.13 Secondly trees have been included within the C category where due to impaired condition and limited life expectancy they are not considered to meet the criteria for categorisation within either the A or B categories.

3.7.14 Of the 27 trees of Category C trees surveyed none were included as a result of their stem diameter being under 150mm at 1.5m above ground level.

3.7.15 Trees that have been included for the second reason as set out above are of little long term value and whilst their retention in the short term is desirable they should not be considered as a significant constraint to development.

Category R Trees – No Retention Value

3.7.16 Finally six trees, were considered to be of category R value when considered in accordance with BS5837:2005.

3.7.17 Trees assessed as being of category R value are those likely to die or become dangerous within a period of ten years irrespective of any development proposal. As such they are not considered to be a material consideration in the planning process.

3.7.18 Whilst it may, in some cases, be desirable to retain R category trees within a development (e.g. to provide deadwood habitat) they must not be viewed as a constraint to development and if they are to be retained consideration for access, working space etc must be given with respect to the future need to remove such trees.

3.7.19 The trees within this category include those which are in physiological decline to the extent that they are expected to die within a period of 10 years, and those, which due to major structural defects, are expected to collapse within a period of 10 years.

3.8 Tree Groups

3.8.1 In addition to the individual trees 10 groups were considered during the survey.

3.8.2 Trees that have been surveyed in this way can be considered as a group as they form cohesive features either aerodynamically (i.e. they form a discrete group feature providing companion shelter), culturally (i.e. they are composed of trees of a similar size, age and species subject to the same management) or visually (i.e. where the value of the trees within the group is as a whole rather than individually).

3.8.3 Where trees have been surveyed as groups the details recorded intend to represent an average tree within the group; however on occasion it must be noted that there will be exceptions within the group that do not conform to the typical character of trees within the group. Where this occurs a note has been made within the written schedule for the group and, where possible, atypical trees have been shown on the Tree Constraints Plan (Figure 1).

3.8.4 The categories of the groups were three category A good retention value, three category B moderate retention value, three category C low retention value and one category R removal value. The groups were mostly formed by trees of similar type and occupying areas within the site. The most dominant group was that of birch scrub Group 10. This group has a C category valuation due to its size and potential future rooting problem, caused by ground conditions and debris.

3.9 Physiological Condition

3.9.1 The majority of the individual trees surveyed, 58%, were considered to be of a fair physiological condition. Typically these specimens are exhibiting lower shoot extension growth and reduced crown density than would typically be expected.

3.9.2 These specimens typically have a lower life expectancy than those within the good condition class and they will not tolerate significant changes as a result of development as well as those in the good condition class.

3.9.3 Twenty six percent of the trees were considered to be of a poor physiological condition. These trees have limited life expectancy and will not respond well to changes in their growing environment that may arise from development. As such; should the retention of these trees be desirable, as it may be if they have a high ecological value for example, it would be necessary to ensure that they are robustly and substantially protected throughout development.

3.9.4 Sixteen percent of the trees surveyed were assessed as being of a good physiological condition with crown density and shoot extension growth levels within the expected ranges for their age and species.

3.9.5 Trees assessed as being in a good physiological condition are more 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.

3.10 Structural Condition

3.10.1 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. However it should be noted that many of the trees have significant amounts of pruning wounds both on the main stem and in the crowns. This is associated

with formative and containment pruning works carried out over several decades in relation to over head utility cables along Halstead Road.. These types of wounds lead to decay in the cut surfaces of the tree that can eventual result in decay at this point and possible tree failure.

3.10.2 Whilst a range of structural defects were noted across the tree stock on the site in most cases the defects present, such as minor deadwood in tree canopies, were not significant and are unlikely to result in the premature failure of tree stems or primary branches.

3.10.3 Where there are trees with more significant structural defects recommendations have been made to either remove the trees, undertake works to remove hazards or undertake further inspection in order to ascertain what further action should be taken. These recommendations can be found in the Tables section of the report.

3.10.4 The removal of ivy is recommended as this has prevented full inspections of the trees and can hide potential weaknesses within the crown and stems.

3.11 Species and Age Distribution

3.11.1 A schedule of the tree species recorded within the survey is included in this report as Appendix 3.

3.11.2 Of the individual trees on the site, 36%, were considered to be of a mature age class for their species and location. These trees will generally not respond as well to changes in their growing environment that may occur as a result of development as young and middle-aged trees.

3.11.3 As such where mature trees are to be retained it will be essential to ensure that they can be substantially and robustly protected throughout the course of development.

3.11.4 A further 36% of the trees surveyed were considered to be of a maturing (middle aged) age class for their species and location. These specimens are generally in such a condition that they will adapt well to changes in their growing environment that may occur due to development.

3.11.5 A further 8% of the trees surveyed on site were considered to be young in age, again these trees can generally be expected to successfully adapt to changes in their growing environment that may occur as a result of development.

3.11.6 Finally 4% of trees surveyed were seen to be of the over mature age class and one tree considered to be a possible veteran tree. Trees in these age classes generally have a low retention value and useful life expectancy. As such if the retention of these trees is deemed appropriate, such as for ecological value, then adequate and substantial protection will be necessary to ensure they can withstand the changes to the growing environment.

3.12 **Visual Amenity**

3.12.1 Some of the trees located in the site provide considerable amenity for the residents of this area of Colchester. The trees to the southern boundary are very visible and would be considered important in the street scene, other trees on the site are less important.

3.13 **Ecological Value**

3.13.1 Generally speaking it is known that trees are of ecological value and that they fulfil an important role in the urban landscape. In particular it should be noted that trees may provide habitat for protected species, notably for birds and bats.

4 Design Approach to Arboricultural Issues

Tree Retention / Removal

4.1 The prioritisation for tree retention should be based upon the guidance contained within BS5837:2005. Category A trees should be seen as the highest priority for retention and category C the lowest.

4.2 Where a decision is to be made regarding the retention of category B trees it would be appropriate to place greater weight upon the retention of those trees which have the potential to develop into specimens of a high quality and value, than upon the retention of those trees which, due to limited life expectancy, are not going to develop in specimens of a high quality and value.

4.3 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.

4.4 However it should be noted that the majority of the trees within the low retention value category are specimens which are of a poor quality with little future potential and it would not be appropriate to make special provision for the retention of these trees where conflict with the proposed design would occur.

4.5 All trees that have been included within the R category are recommended for removal prior to development due to their poor condition.

Design Considerations

4.6 To ensure that the trees selected for retention can be successfully integrated within the proposed development the following factors should be considered.

Future Tree Growth

4.7 Some of the trees surveyed are not yet mature and they have the potential for future growth. Where these are to be retained consideration to their ultimate crown spread should be given as future branch growth may result in interference with proposed development, damage to branches and the need for a tree pruning regime.

4.8 To facilitate assessment of future tree growth maximum expected canopy spreads have been marked on the Tree Constraints Plan (Figure 1). The area of mature tree spread is estimated by the arboriculturalist and is their best judgement of mature crown spread based on experience and with regard to the current tree growth observed on the site.

4.9 Within the area of maximum branch spread construction activities should be restricted for the long-term health and vigour of the trees.

Root Protection Areas

4.10 Root Protection Areas for each tree and group of trees surveyed have been determined in accordance with BS5837:2005 Table 2, and a schedule of Root Protection Areas is attached to this report as Table 3. Initial Root Protection Areas for the trees have been plotted onto the Tree Constraints Plan as circles, with the tree located centrally, extending to encompass the area of ground, and thus the rootable soil volume, required for protection.

4.11 All development, including new hard landscaping, where possible shall be situated outside of the retained trees designated Root Protection Areas. As the design and layout of the proposed development is progressed and finalised it is recommended that final Root Protection Areas for the trees are considered and a Tree Protection Plan is produced in conjunction with a detailed Arboricultural Implications Assessment and Method Statement to detail the specific measures for protection of retained trees.

4.12 All protective fencing and other measures should be on site and in place (refer to Appendix 4 for fencing details) before site preparation or construction work commences.

Existing Canopy Spreads

4.13 Where the Root Protection Areas for retained trees do not extend to the edge of existing canopy spreads it is possible that those parts of the trees extending beyond the RPA fencing may sustain damage during construction.

4.14 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.

4.15 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 pre-development pruning works to the trees to reduce the potential for branch damage to occur.

Shading

4.16 It should be appreciated during the design of the development that trees can cause shading and obstruction of daylight and sunlight. It should be recognised that the extent of shading likely will vary with tree species, canopy shape and size, foliage density, time of year and sun elevation and that such shading will often be seasonal and diffuse.

Building Foundations

4.17 Any structures built on the site should comply with the foundation depths for buildings near or adjacent to trees and allow for the potential size of the trees at maturity. The soil types throughout the site will need investigating and appropriate measures taken.

4.18 If trees are removed across the site the potential for soil heave should be assessed and foundations designed accordingly. (NHBC Chapter 4.2, 2007)

Service Runs

4.19 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)

Site Compounds and Materials Stores

4.20 Provision for materials storage, site offices, deliveries and other related activities should be made available in areas away from retained trees.

Levels Changes

4.21 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.

Existing Hard Surfaces and Buildings within Root Protection Areas

4.22 There are areas on site where buildings and hard surfaces are present within the initial Root Protection Areas of trees.

4.23 The presence of existing structures and hard surfaces within the initial Root Protection Areas of the trees is of note for two primary reasons.

4.24 Firstly it can be noted that, in some cases, existing construction will have restricted tree root development significantly as a result of reduced nutrient or moisture availability and a lack of provision for gaseous exchange. As a result of this constraint to root development it may be appropriate to modify the shape of the affected tree's Root Protection Areas thus permitting new development or works in closer proximity to the trees than indicated by the initial RPA's shown on the Tree Constraints Plan (Figure 1).

4.25 The second reason that the presence of existing construction within the trees initial RPA's is of note is that the removal of such construction, should it be required, has a greater potential to cause harm to the trees due to the need for works in close proximity to them.

Removal of Existing Hard Surfaces and Buildings

4.26 Where existing hard surfaces are located within the Root Protection Areas of retained trees care should be taken in their removal and such works should be completed by hand and supervised by an Arboricultural Consultant.

4.27 Where existing buildings are located within the Root Protection Areas of retained trees care shall be taken in their demolition and works should be completed from outside the RPA with buildings being pulled back away from the trees. Again it is recommended that such works are supervised by an Arboricultural Consultant.

4.28 If the area of land within the Root Protection Area of a tree is to be left for a period of time following removal of hard surfacing or demolition of a building the line of the protective fencing must be correctly re-established following the initial works.

New Hard Surfaces and Buildings within Root Protection Areas

4.29 The construction of new hard surfaces and buildings around trees has the potential to cause soil compaction, to cause root damage and to reduce nutrient and moisture availability to tree roots to the detriment of tree health and vitality.

4.30 To minimise harm occurring as a result of such works where installation of new hard surfacing is proposed within the Root Protection Areas of retained trees it must be installed in accordance with no-dig principles. A methodology for new hard surface construction in proximity to trees is attached to this report as Appendix 6

4.31 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. In this respect the guidance contained within BS5837:2005 at paragraph 11.1.2 should be considered. This states “Where it is intended to undertake demolition or construction operations within the root protection area, 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).”

4.32 To achieve the above criteria a number of solutions can be considered as set out below.

Prevention of physical damage to roots

4.33 To prevent physical damage occurring to roots as a result of severance buildings could be built using a pile and **above** ground beam foundation; thus preventing significant root severance as would occur should trench fill foundations be used.

4.34 Pile locations will have to be selected to minimise the potential for root damage to occur during their installation and exploratory investigation into root location using hand dug trial pits will be required to assist this.

4.35 Alternatively a pile and raft foundation structure could be considered. This again will negate the need for extensive ground works likely to result in root severance. A commercially available solution called Housedeck, which is based upon this principle, is marketed by Abbey Pynford.

4.36 To prevent physical damage of roots occurring as a result of soil compaction it will be necessary to protect the ground within the Root Protection Area during the installation of any foundation and throughout the course of development following this.

4.37 Methods for ground protection are identified within BS5837:2005 and where vehicle movements are required it will be necessary for ground protection measures to be designed by an engineer. Typically it would be appropriate to follow the guidance set out in the enclosed Hard Surface Installation Methodology (Appendix 6) excluding the final surfacing of the construction.

4.38 To minimise the extent of ground protection necessary it will be necessary to plan the operations involving the foundation installation to minimise vehicle movements.

Provision for water and oxygen to reach roots

4.39 The use of a Housedeck or pile and **above** ground beam foundation will allow a void to be left beneath any building constructed thus providing for gaseous circulation and exchange.

4.40 The presence of a void also means that rain water from guttering could be ducted beneath the building; thus allowing water to reach roots.

4.41 To control the extent and location of rain water discharge beneath the property a system of ducting similar in nature to that commonly used in street tree planting could be used.

Allowance for future root growth

4.42 By constructing any building within a trees RPA in such a way as to prevent root severance and soil compaction and by allowing for continued gaseous and moisture exchange provision will be made for future root growth.

Preserve the soil structure at a suitable bulk density for root growth and function

4.43 This can be achieved by ensuring ground protection measures are implemented on site and that vehicle movements within the trees Root Protection Area are minimised.

5 Conclusions

5.1 The retention of the category A and B trees on site should be seen as a priority as these specimens are those most likely to make a continued contribution to the character and appearance of new development.

5.2 Where tree removal is required to achieve the proposed development it should be mitigated for by undertaking replacement tree planting.

5.3 To achieve a satisfactory juxtaposition between new development and those trees selected for retention the guidance contained within this report should be considered during the detailed design of the site.

5.4 Because of the general nature of the survey a detailed Arboricultural survey report will be required if trees are to be retained in areas of new development. Not all tree positions can be considered as exact, thus additional survey work with regards tree positions and the impact of development on these trees will be required. This Arboricultural Method Statement should be undertaken once a clear brief to site layout and development has been finalised.

5.5 The proposed development of the site should take into account the presence of retained trees and should ensure that where possible all buildings and new surfaces are located outside of their Root Protection Areas.

5.6 New development should not only take account of current tree sizes and positions, but also of mature tree size. Estimated mature canopy spreads have been marked on the accompanying Tree Constraints Plan.

5.7 Tree protection areas should be established and appropriate protection measures implemented prior to construction. Specifications for erecting protective fencing can be found within Appendix 4.

5.8 Guidelines contained within BS 5837:2005 Trees in Relation to Construction should be followed when dealing with trees. Working methods and specifications should be followed to limit potential damage to trees throughout the construction period.

Tables

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 below 1.5m the diameter is taken as that just above the root flare
Spread (m)	Canopy height estimated in metres above ground level
Canopy height (m)	Crown Spread, radius estimated in metres
Physiological Condition	Good, Fair, Poor, Dead
Age Class	Y – Young MA – Maturing (Middle Aged) M – Mature OM - Overmature V – Veteran
Useful Life Expectancy (years)	10, 10-20, 20-40, 40+
BS Categorization	See Cascade Appendices 2

Tree Survey Data - Stanway Sidings, Colchester

February 2010

Tree Number	Species	Diameter at 1.5m (cms) *	Height (m)	Crown Spread (m)				Canopy Height Above Ground Level (m)	Age Class	Physiological Condition	Structural Condition	Estimated Remaining Contribution (years)	BS Category Grading	Comments
				North	South	East	West							
1	Quercus robur	37	7	4	2	2	5	0	Y	Poor	Heavily pruned in the crown, Pruning stubs, Minor Deadwood in crown	10-20	C2	Adjacent to power line
2	Quercus robur	60	11	5	7	7	7	0	MA	Poor	Bifurcated at base, Deadwood in the crown, Pruning stubs, Upper crown dying back	10-20	C2	Double stem
3	Quercus robur	28	6	1	3	3	2	0	Y	Poor	Pruning wounds with decay on main stem, Heavily pruned in the crown	10-20	C2	Adjacent to Powerline
4	Quercus robur	30	13	4	3	4	5	0	MA	Fair	Bifurcated at 2m, Pruning wounds in crown	20-40	B2	
5	Quercus robur	38	13	6	4	6	4	0	MA	Good	Minor Deadwood in crown	40+	A1	

* Where the tree is multi stemmed below 1.5m the diameter is the girth above the root flare, measured or estimated

Tree Number	Species	Diameter at 1.5m (cms) *	Height (m)	Crown Spread (m)				Canopy Height Above Ground Level (m)	Age Class	Physiological Condition	Structural Condition	Estimated Remaining Contribution (years)	BS Category Grading	Comments
				North	South	East	West							
6	Quercus robur	35	14	7	3	4	5	0	MA	Fair	Twisted upper crown, Minor Deadwood in crown	20-40	B1	
7	Quercus robur	24	9	1	3	0	4	4	Y	Fair	Suppressed crown	10-20	C2	Leaning west
8	Quercus robur	44	16	4	7	8	4	3	MA	Good	Minor Deadwood in crown	40+	A2	
9	Quercus robur	50	13	6	3	8	8	0	M	Fair	Pruning to crown, Inspection restricted due to ivy	20-40	B2	Ivy on main stem and in crown, Adjacent to Powerline
10	Quercus robur	90+	10	0	0	0	0	0	OM	Poor	Collapsed tree, part dead, some phoenix growth from crown	<10	R	Windthrow
11	Quercus robur	45	15	6	4	6	6	0	M	Poor	Twisted main stem, Pruning wounds in crown	10-20	C2	Adjacent to Powerline, Recent crown pruning

* Where the tree is multi stemmed below 1.5m the diameter is the girth above the root flare, measured or estimated

Tree Number	Species	Diameter at 1.5m (cms) *	Height (m)	Crown Spread (m)				Canopy Height Above Ground Level (m)	Age Class	Physiological Condition	Structural Condition	Estimated Remaining Contribution (years)	BS Category Grading	Comments
				North	South	East	West							
12	Quercus robur	45	14	6	1	4	4	0	M	Poor	Ivy suppressing crown development	20-40	B2	Ivy on main stem and in crown, Recent crown pruning
13	Quercus robur	80+	10	0	0	0	0	0	M	Poor	Collapsed tree	<10	R	
14	Quercus robur	48	23	8	6	5	5	2	M	Fair	Deadwood in crown, Inspection restricted due to ivy	20-40	B2	Ivy on main stem and in crown,
15	Quercus robur	36	22	3	3	3	3	4	MA	Poor	Very small crown, Inspection restricted due to ivy	10-20	C2	Ivy on main stem and in crown
16	Quercus robur	60	23	9	3	6	6	1	M	Fair	Deadwood in crown, Pruning stubs, Inspection restricted due to ivy	20-40	B2	Ivy on main stem and in crown
17	Quercus robur	90	19	7	6	9	9	2	V	Fair	Deadwood in crown, Pruning stubs	40+	A3	Veteran tree, Recent crown pruning, Adjacent to Powerline

* Where the tree is multi stemmed below 1.5m the diameter is the girth above the root flare, measured or estimated

Tree Number	Species	Diameter at 1.5m (cms) *	Height (m)	Crown Spread (m)				Canopy Height Above Ground Level (m)	Age Class	Physiological Condition	Structural Condition	Estimated Remaining Contribution (years)	BS Category Grading	Comments
				North	South	East	West							
18	Quercus robur	85	21	9	8	10	4	1	M	Fair	Collapsed hanging section of upper crown	20-40	B2	Ivy on main stem and in crown
19	Quercus robur	40	11	10	0	4	4	1	MA	Poor	Suppressed crown development	10-20	C2	Ivy on main stem and in crown
20	Quercus robur	38	20	6	3	3	3	0	MA	Fair		20-40	B2	Ivy on main stem and in crown
21	Quercus robur	39	18	6	3	3	2	0	MA	Poor	Deadwood in crown, Poor crown, Pruning stubs	10-20	C2	Ivy on main stem and in crown
22	Quercus robur	48	19	8	6	6	5	0	MA	Good	Deadwood in crown	40+	A2	Ivy on main stem and in crown
23	Quercus robur	38	12	5	1	1	3	0	MA	Poor	Poor crown development, Ivy suppressing crown development	10-20	C2	Ivy on main stem and in crown

* Where the tree is multi stemmed below 1.5m the diameter is the girth above the root flare, measured or estimated

Tree Number	Species	Diameter at 1.5m (cms) *	Height (m)	Crown Spread (m)				Canopy Height Above Ground Level (m)	Age Class	Physiological Condition	Structural Condition	Estimated Remaining Contribution (years)	BS Category Grading	Comments
				North	South	East	West							
24	Quercus robur	28	17	6	2	2	4	4	M	Fair	Suppressed form	10-20	C2	Ivy on main stem and in crown
25	Quercus robur	45	20	3	5	2	6	4	M	Good		20-40	B2	Ivy on main stem, Recent crown pruning
26	Quercus robur	45	18	8	5	5	5	2	M	Good	Deadwood in crown	40+	A2	Lean SW, Ivy on main stem and in crown
27	Quercus robur	40	16	4	4	4	2	3	MA	Fair	Poor upper crown	10-20	C2	Ivy on main stem and in crown
28	Quercus robur	48	17	3	3	6	4	3	M	Fair	Minor Deadwood in crown, Multi stemmed, Grown from part of old laid hedge	20-40	B2	Secondary growth at base
29	Quercus robur	28	13	5	3	4	3	1	Y	Fair	Occulded union in crown	20-40	B2	

* Where the tree is multi stemmed below 1.5m the diameter is the girth above the root flare, measured or estimated

Tree Number	Species	Diameter at 1.5m (cms) *	Height (m)	Crown Spread (m)				Canopy Height Above Ground Level (m)	Age Class	Physiological Condition	Structural Condition	Estimated Remaining Contribution (years)	BS Category Grading	Comments
				North	South	East	West							
30	Quercus robur	52	18	8	6	6	5	2	MA	Fair	Deadwood in crown, Pruning stubs	20-40	B2	Ivy on main stem and in crown
31	Quercus robur	30	13	3	3	1	6	0	MA	Fair	Twisted upper crown, Poor form	10-20	C2	Ivy on main stem and in crown
32	Quercus robur	18	14	2	2	0	3	0	Y	Poor	Very thin and poor crown	10-20	C2	Ivy on main stem and in crown
33	Quercus robur	100	18	10	7	6	8	0	M	Good	Bifurcated at 1m, Epicormic growth in crown	40+	A3	Ivy on main stem and in crown, Bank slippage noted at base
34	Quercus robur	38	18	6	7	5	3	0	M	Fair	Pruning stubs, Inspection restricted due to ivy	20-40	B2	Ivy on main stem and in crown
35	Populus tremula	26	14	6	4	4	4	4	MA	Good		20-40	B1	

* Where the tree is multi stemmed below 1.5m the diameter is the girth above the root flare, measured or estimated

Tree Number	Species	Diameter at 1.5m (cms) *	Height (m)	Crown Spread (m)				Canopy Height Above Ground Level (m)	Age Class	Physiological Condition	Structural Condition	Estimated Remaining Contribution (years)	BS Category Grading	Comments
				North	South	East	West							
36	Quercus robur	36	16	6	5	5	4	1	MA	Good	Minor Deadwood in crown	40+	A1	
37	Quercus robur	30	16	3	3	1	2	0	MA	Fair	Narrow crown	20-40	B1	
38	Quercus robur	16	9	3	3	2	3	0	Y	Fair	Small twisted form grown off old stump	10-20	C2	Ivy on main stem and in crown
39	Quercus robur	28	14	5	2	3	4	2	MA	Poor	Twisted poor sparse crown	10-20	C2	Ivy on main stem and in crown
40	Quercus robur	41	16	7	6	7	7	2	MA	Good	Pruning wounds in crown and main stem	40+	A2	Recent crown pruning, Ivy on main stem, Adjacent to Powerline
41	Quercus robur	26	10	4	3	1	1	0	MA	Poor	Very small Twisted upper crown	10-20	C2	

* Where the tree is multi stemmed below 1.5m the diameter is the girth above the root flare, measured or estimated

Tree Number	Species	Diameter at 1.5m (cms) *	Height (m)	Crown Spread (m)				Canopy Height Above Ground Level (m)	Age Class	Physiological Condition	Structural Condition	Estimated Remaining Contribution (years)	BS Category Grading	Comments
				North	South	East	West							
42	Quercus robur	33	16	5	5	1	3	0	MA	Fair	Deadwood in crown, Pruning stubs	20-40	B2	Ivy on main stem, Recent crown pruning, Adjacent to Powerline
43	Quercus robur	27	16	6	0	3	3	3	MA	Fair	Deadwood in crown, Swept upper crown	10-20	C2	Ivy on main stem
44	Quercus robur	100	16	4	4	4	4	0	M	Poor	Growing off old coppiced stump, 4 main limbs, Deadwood in crown	10-20	C2	Recent crown pruning, Ivy on main stem
45	Quercus robur	40	14	5	0	5	2	0	M	Poor	Poor form twisted upper crown, Decay in the base	<10	R	Recent crown pruning, Adjacent to Powerline
46	Quercus robur	32	16	4	3	3	4	1	MA	Fair	Deadwood in crown, Pruning stubs	20-40	B2	Ivy on main stem and in crown
47	Quercus robur	50	16	4	7	4	7	2	M	Fair	Part of upper crown failed now hanging	10-20	C2	Ivy on main stem and in crown

* Where the tree is multi stemmed below 1.5m the diameter is the girth above the root flare, measured or estimated

Tree Number	Species	Diameter at 1.5m (cms) *	Height (m)	Crown Spread (m)				Canopy Height Above Ground Level (m)	Age Class	Physiological Condition	Structural Condition	Estimated Remaining Contribution (years)	BS Category Grading	Comments
				North	South	East	West							
48	Quercus robur	55	18	6	6	2	10	2	M	Fair	Hanging deadwood in crown, Pruning stubs	20-40	B2	Ivy on main stem and in crown
49	Quercus robur	60	17	3	5	2	8	2	M	Fair	Bifurcated at 1.3m, Suppressed crown	20-40	B2	Ivy on main stem and in crown
50	Quercus robur	85	21	7	7	3	10	1	M	Good	Deadwood in crown, Splits and stubs in crown	40+	A2	Ivy on main stem and in crown
51	Quercus robur	29	14	2	3	3	10	0	MA	Fair	Bifurcated at 5m, Poor upper crown development	10-20	C2	
52	Quercus robur	44	16	3	6	2	4	0	M	Fair	Occluded wound at base	10-20	C2	Ivy on main stem and in crown
53	Quercus robur	42	18	6	4	3	10	0	MA	Fair	Occluded wounds on main stem	20-40	B2	

* Where the tree is multi stemmed below 1.5m the diameter is the girth above the root flare, measured or estimated

Tree Number	Species	Diameter at 1.5m (cms) *	Height (m)	Crown Spread (m)				Canopy Height Above Ground Level (m)	Age Class	Physiological Condition	Structural Condition	Estimated Remaining Contribution (years)	BS Category Grading	Comments
				North	South	East	West							
54	Quercus robur	31	17	3	4	3	4	0	MA	Fair	Minor Deadwood in crown	40+	A2	
55	Quercus robur	50	19	8	3	3	10	0	M	Good	Deadwood in crown, Pruning stubs	40+	A2	Leaning west, Ivy on main stem and in crown
56	Quercus robur	26	16	5	1	4	5	1	MA	Fair	Minor Deadwood in crown	40+	A2	
57	Quercus robur	57	21	8	8	8	8	1	M	Good	Deadwood in crown	40+	A2	
58	Quercus robur	41	17	0	8	1	7	0	M	Fair	Suppressed upper crown, Deadwood in crown	10-20	C2	Ivy on main stem and in crown
59	Quercus robur	56	20	10	4	10	8	4	M	Fair	Deadwood in crown, Pruning stubs, Twisted crown	20-40	B2	Concrete wall at base of tree

* Where the tree is multi stemmed below 1.5m the diameter is the girth above the root flare, measured or estimated

Tree Number	Species	Diameter at 1.5m (cms) *	Height (m)	Crown Spread (m)				Canopy Height Above Ground Level (m)	Age Class	Physiological Condition	Structural Condition	Estimated Remaining Contribution (years)	BS Category Grading	Comments
				North	South	East	West							
60	Quercus robur	50	17	4	4	4	4	0	M	Poor	NE section of main stem dead and decayed, Upper crown dead	<10	R	
61	Quercus robur	50	16	4	6	5	7	0	M	Poor	NE section of main stem dead and decayed, Upper crown dead	<10	R	
62	Quercus robur	48	18	6	6	4	8	0	M	Fair	Split branches with attachment to main stem, now callusing over	40+	A2	Possible bat habitat
63	Quercus robur	32	16	3	3	2	3	1	MA	Fair	Deadwood in crown, Narrow crown development	10-20	C2	
64	Quercus robur	31	16	2	3	0	3	1	MA	Fair	Deadwood in crown, Narrow crown development, swept upper crown	10-20	C2	
65	Quercus robur	74	18	6	6	7	6	1	OM	Fair	Deadwood in crown, Pruning stubs	40+	A3	

* Where the tree is multi stemmed below 1.5m the diameter is the girth above the root flare, measured or estimated

Tree Number	Species	Diameter at 1.5m (cms) *	Height (m)	Crown Spread (m)				Canopy Height Above Ground Level (m)	Age Class	Physiological Condition	Structural Condition	Estimated Remaining Contribution (years)	BS Category Grading	Comments
				North	South	East	West							
66	Quercus robur	60	17	2	4	4	6	0	M	Fair	Pruning stubs, Deadwood in crown	20-40	B2	Ivy on main stem and in crown
67	Quercus robur	60	15	8	3	3	4	0	M	Fair	Pruning stubs, Deadwood in crown	20-40	B2	Ivy on main stem and in crown
68	Quercus robur	50	12	3	4	3	2	0	M	Fair	Deadwood in crown, Small remnant crown	10-20	C2	
69	Quercus robur	38	17	0	8	7	4	0	MA	Fair	Minor Deadwood in crown, Grown off old coppice stump	20-40	B2	Leaning to SE
70	Quercus robur	36	17	3	3	4	6	0	MA	Fair	Minor Deadwood in crown, Grown off old coppice stump	20-40	B2	Leaning to SE
71	Quercus robur	58	17	4	7	3	5	0	M	Fair	Lost limbs , Callusing wounds on main stem, Pruning stubs, Decay in branch wounds	10-20	C2	

* Where the tree is multi stemmed below 1.5m the diameter is the girth above the root flare, measured or estimated

Tree Number	Species	Diameter at 1.5m (cms) *	Height (m)	Crown Spread (m)				Canopy Height Above Ground Level (m)	Age Class	Physiological Condition	Structural Condition	Estimated Remaining Contribution (years)	BS Category Grading	Comments
				North	South	East	West							
72	Quercus robur	30	13	1	1	1	1	0	MA	Poor	Completely clothed in ivy	<10	R	
73	Quercus robur	52	16	6	6	3	5	0	M	Fair	Growing off old stump	10-20	C2	Ivy on main stem and in crown
74	Quercus robur	113	23	9	10	10	10	0	OM	Fair	Callused wounds on main stem, Deadwood in crown, Pruning stubs	20-40	B1	

* Where the tree is multi stemmed below 1.5m the diameter is the girth above the root flare, measured or estimated

Group Data - Stanway Sidings, Colchester

Group Number	Dominant Species	Lesser / Individual Species	Diameter at 1.5m (cms)	Ave Height (m)	Age	Average Spread (m)	Physiological Condition	Structural Condition	Condition/Comments	ULE (years)	BS Category
1	Quercus robur		30	16	MA	4	Fair	Tight grown group	Recent heavy crown pruning for powerline clearance	10-20	C2
2	Quercus robur		40+	17	M/MA	6	Good	Minor Deadwood in crown, Pruning	Bank slipping on siding side	40+	A2
3	Populus tremula		<20	15	Y	4	Fair	Group of 4		20-40	B2
4	Prunus avium		15	13	M	3	Poor			10-20	C2
5	Quercus robur		35	17	m	4	Fair	16+ trees Small crowns with Deadwood	Ivy on main stem and in crown	20-40	B2

Group Number	Dominant Species	Lesser / Individual Species	Diameter at 1.5m (cms)	Ave Height (m)	Age	Average Spread (m)	Physiological Condition	Structural Condition	Condition/Comments	ULE (years)	BS Category
6	Quercus robur		45	17	M	4	Poor	Fire damage to main stems, all with dead	7 Trees	<10	R
7	Quercus robur		25	14	MA	4	Good			40+	A2
8	Quercus robur		70	16	M	7	Fair	Various amounts of deadwood in		20-40	A/B2
9	Quercus robur		80+	18	M	8	Fair	Line of mature oaks various deadwood		40+	A3
10	Betula pendula	Populus tremula Salix alba	<15	10	Y	2	Fair	Variable condition some with	Natural regeneration	20-40	C2

Table 2

Preliminary Management Recommendations

Preliminary Management Recommendations

Tree Number	Species	Structural Condition	Preliminary Management Recommendations
9	Quercus robur	Pruning to crown, Inspection restricted due to ivy	Sever Ivy, reinspect tree
10	Quercus robur	Collapsed tree, part dead, some phoenix growth from crown	Remove
11	Quercus robur	Twisted main stem, Pruning wounds in crown	Sever Ivy
12	Quercus robur	Ivy suppressing crown development	Sever Ivy
13	Quercus robur	Collapsed tree	Remove
14	Quercus robur	Deadwood in crown, Inspection restricted due to ivy	Sever Ivy, reinspect tree
16	Quercus robur	Deadwood in crown, Pruning stubs, Inspection restricted due to ivy	Deadwood, Sever Ivy, reinspect tree
18	Quercus robur	Collapsed hanging section of upper crown	Sever Ivy, reinspect tree, remove failed section of upper canopy
19	Quercus robur	Suppressed crown development	Sever Ivy, reinspect tree
20	Quercus robur		Sever Ivy, reinspect tree
21	Quercus robur	Deadwood in crown, Poor crown, Pruning stubs	Sever Ivy and deadwood

Tree Number	Species	Structural Condition	Preliminary Management Recommendations
22	Quercus robur	Deadwood in crown	Sever Ivy
26	Quercus robur	Deadwood in crown	Sever Ivy, reinspect tree
27	Quercus robur	Poor upper crown	Sever Ivy, reinspect tree
30	Quercus robur	Deadwood in crown, Pruning stubs	Sever Ivy
33	Quercus robur	Bifurcated at 1m, Epicormic growth in crown	Sever Ivy, reinspect tree
34	Quercus robur	Pruning stubs, Inspection restricted due to ivy	Sever Ivy, reinspect tree
47	Quercus robur	Part of upper crown failed now hanging	Remove hung up branches and sever ivy
48	Quercus robur	Hanging deadwood in crown, Pruning stubs	Sever Ivy
50	Quercus robur	Deadwood in crown, Splits and stubs in crown	Sever Ivy
52	Quercus robur	Occluded wound at base	Sever Ivy, reinspect tree
55	Quercus robur	Deadwood in crown, Pruning stubs	Sever Ivy
65	Quercus robur	Deadwood in crown, Pruning stubs	Deadwood crown

Tree Number	Species	Structural Condition	Preliminary Management Recommendations
66	Quercus robur	Pruning stubs, Deadwood in crown	Sever Ivy, reinspect tree
67	Quercus robur	Pruning stubs, Deadwood in crown	Sever Ivy, reinspect tree
71	Quercus robur	Lost limbs , Callusing wounds on main stem, Pruning stubs, Decay in branch wounds	Deadwood crown
74	Quercus robur	Callused wounds on main stem, Deadwood in crown, Pruning stubs	Deadwood crown

Group Number	Preliminary Management Recommendations
5	Sever Ivy, reinspect tree
8	Deadwood crowns
9	Deadwood crowns

Table 3

Root Protection Areas

Root Protection Area - Stanway Sidings, Colchester

Tree Number	Species	BS5837:2006 Category	Root Protection Area (Radius m)	Root Protection Area (m2)
1	Quercus robur	C2	4.44	61.9
2	Quercus robur	C2	6	113.1
3	Quercus robur	C2	3.36	35.5
4	Quercus robur	B2	3.6	40.7
5	Quercus robur	A1	4.56	65.3
6	Quercus robur	B1	4.2	55.4
7	Quercus robur	C2	2.88	26.1
8	Quercus robur	A2	5.28	87.6
9	Quercus robur	B2	6	113.1
11	Quercus robur	C2	5.4	91.6
12	Quercus robur	B2	5.4	91.6
14	Quercus robur	B2	5.76	104.2
15	Quercus robur	C2	4.32	58.6
16	Quercus robur	B2	7.2	162.9
17	Quercus robur	A3	10.8	366.4
18	Quercus robur	B2	10.2	326.9
19	Quercus robur	C2	4.8	72.4
20	Quercus robur	B2	4.56	65.3
21	Quercus robur	C2	4.68	68.8
22	Quercus robur	A2	5.76	104.2

Tree Number	Species	BS5837:2006 Category	Root Protection Area (Radius m)	Root Protection Area (m2)
23	Quercus robur	C2	4.56	65.3
24	Quercus robur	C2	3.36	35.5
25	Quercus robur	B2	5.4	91.6
26	Quercus robur	A2	5.4	91.6
27	Quercus robur	C2	4.8	72.4
28	Quercus robur	B2	5.76	104.2
29	Quercus robur	B2	3.36	35.5
30	Quercus robur	B2	6.24	122.3
31	Quercus robur	C2	3.6	40.7
32	Quercus robur	C2	2.16	14.7
33	Quercus robur	A3	10	314.2
34	Quercus robur	B2	4.56	65.3
35	Populus tremula	B1	3.12	30.6
36	Quercus robur	A1	4.32	58.6
37	Quercus robur	B1	3	28.3
38	Quercus robur	C2	1.92	11.6
39	Quercus robur	C2	3.36	35.5
40	Quercus robur	A2	4.92	76
41	Quercus robur	C2	3.12	30.6
42	Quercus robur	B2	3.96	49.3
43	Quercus robur	C2	3.24	33
44	Quercus robur	C2	10	314.2

Tree Number	Species	BS5837:2006 Category	Root Protection Area (Radius m)	Root Protection Area (m2)
46	Quercus robur	B2	3.84	46.3
47	Quercus robur	C2	6	113.1
48	Quercus robur	B2	6.6	136.8
49	Quercus robur	B2	6	113.1
50	Quercus robur	A2	10.2	326.9
51	Quercus robur	C2	3.48	38
52	Quercus robur	C2	5.28	87.6
53	Quercus robur	B2	5.04	79.8
54	Quercus robur	A2	3.72	43.5
55	Quercus robur	A2	6	113.1
56	Quercus robur	A2	3.12	30.6
57	Quercus robur	A2	6.84	147
58	Quercus robur	C2	4.92	76
59	Quercus robur	B2	6.72	141.9
62	Quercus robur	A2	5.76	104.2
63	Quercus robur	C2	3.84	46.3
64	Quercus robur	C2	3.72	43.5
65	Quercus robur	A3	8.88	247.7
66	Quercus robur	B2	7.2	162.9
67	Quercus robur	B2	7.2	162.9
68	Quercus robur	C2	6	113.1
69	Quercus robur	B2	4.56	65.3

Tree Number	Species	BS5837:2006 Category	Root Protection Area (Radius m)	Root Protection Area (m2)
70	Quercus robur	B2	4.32	58.6
71	Quercus robur	C2	6.96	152.2
73	Quercus robur	C2	6.24	122.3
74	Quercus robur	B1	13.56	577.7

Figures

Figure 1

Tree Constraints Plan

Appendices

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. Colour coded versions of the drawings form part of this report. (Figure 1).

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 below 1.5m the measurement was take as the point immediately above the root flare. 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 1)
- 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
MA – Middle Aged / Maturing:	Trees older than 10 years but less 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.

Preliminary 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 Construction 2005. 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 R category tree. R 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

BS5837 Table 1 – Cascade Chart for Tree Quality Assessment

TREES FOR REMOVAL

Category and definition	Criteria	Identification on plan
Category R **Those in such a condition that any existing value would be lost within 10 years and which should, in the current context, be removed for reasons of sound arboricultural management**	• 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 R category trees (i.e. 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 (e.g. Dutch elm disease), or very low quality trees suppressing adjacent trees of better quality NOTE Habitat reinstatement may be appropriate (e.g. R category tree used as a bat roost: installation of bat box in nearby tree).	DARK RED

TREES TO BE CONSIDERED FOR RETENTION

Category and definition	Criteria — Subcategories			Identification on plan
	1 Mainly arboricultural values	**2 Mainly landscape values**	**3 Mainly cultural values, including conservation**	
Category A **Those of high quality and value:** in such a condition as to be able to make a substantial contribution (a minimum of 40 years is suggested)	Trees that are particularly good examples of their species, especially if rare or unusual, or essential components of groups, or of formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue)	Trees, groups or woodlands which provide a definite screening or softening effect to the locality in relation to views into or out of the site, or those of particular visual importance (e.g. avenues or other arboricultural features assessed as groups)	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture)	LIGHT GREEN
Category B **Those of moderate quality and value:** those in such a condition as to make a significant contribution (a minimum of 20 years is suggested)	Trees that might be included in the high category, but are downgraded because of impaired condition (e.g. presence of remediable defects including unsympathetic past management and minor storm damage)	Trees present in numbers, usually as groups or woodlands, such that they form distinct landscape features, thereby attracting a higher collective rating than they might as individuals but which are not, individually, essential components of formal or semi-formal arboricultural features (e.g. trees of moderate quality within an avenue that includes better, A category specimens), or trees situated mainly internally to the site, therefore individually having little visual impact on the wider locality	Trees with clearly identifiable conservation or other cultural benefits	MID BLUE
Category C **Those of low quality and value:** currently in adequate condition to remain until new planting could be established (a minimum of 10 years is suggested), or young trees with a stem diameter below 150 mm	Trees not qualifying in higher categories	Trees present in groups or woodlands, but without this conferring on them significantly greater landscape value, and/or trees offering low or only temporary screening benefit	Trees with very limited conservation or other cultural benefits	GREY
	NOTE Whilst C category trees will usually not be retained where they would impose a significant constraint on development, young trees with a stem diameter of less than 150 mm should be considered for relocation.			

Appendix 3

Botanical and Common Names of Tree Species on the Site

BOTANICAL NAME	*COMMON NAME*
Betula pendula	*Birch*
Populus tremula	*Aspen*
Prunus avium	*Wild Cherry*
Quercus robur	*English Oak*
Salix alba	*White Willow*

Appendix 4

Root Protection Area Fencing Details

Protective Fencing 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.

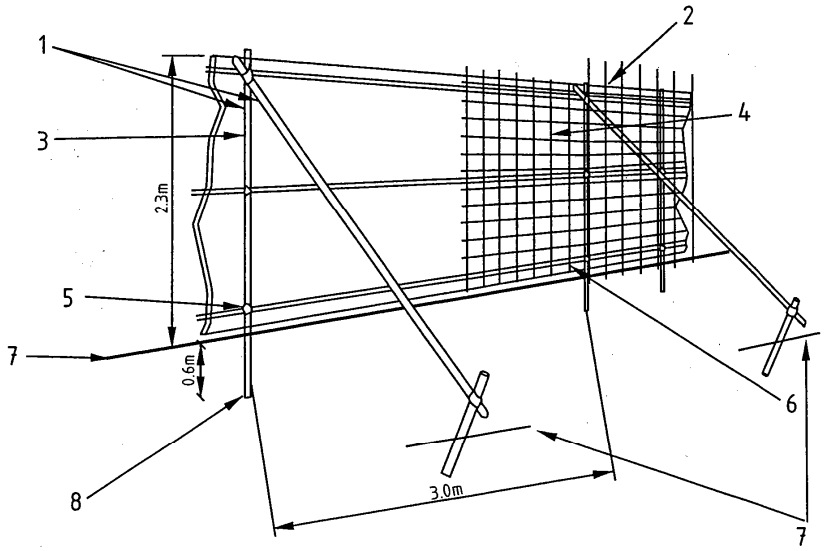
The most effective way of offering protection is by erecting protective barriers set at a distance from the tree stem using the methods given within BS 5837: 2005 Trees in Relation to Construction. Barriers should be braced and constructed to resist impacts; see figures 1 & 2 below for barrier specifications.

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: 2005)

Figure 1



1 Standard scaffold poles

2 Uprights to be driven into the ground

3 Panels secured to uprights with wire ties and where necessary standard scaffold clamps

4 Weldmesh wired to the uprights and horizontals

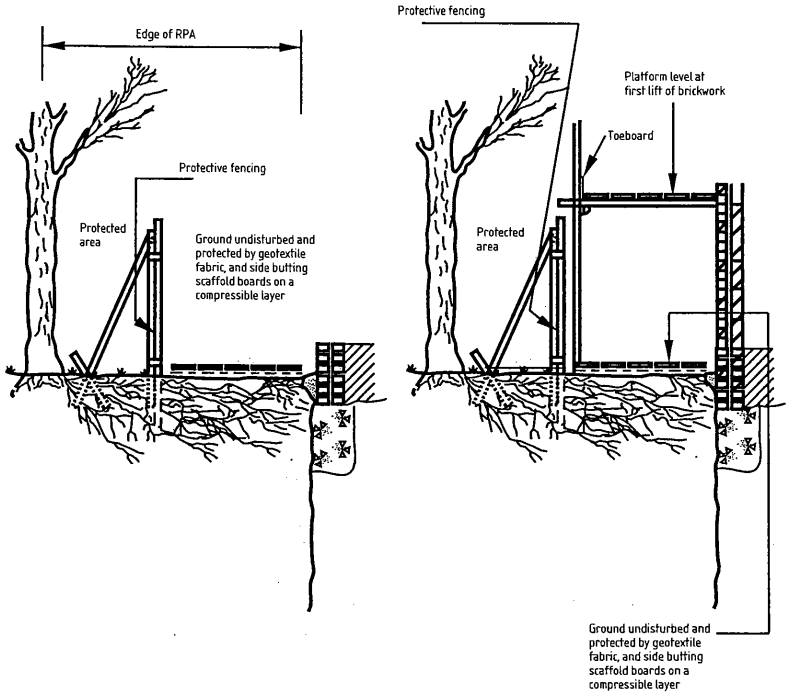
5 Standard clamps

6 Wire twisted and secured on inside face of fencing to avoid easy dismantling

7 Ground level

8 Approx. 0.6 m driven into the ground

Figure 2



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 6

Hard Surface Installation Methodology

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

1.2 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.

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

1.4 **Arboricultural Requirements**

1.4.1 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.

1.4.2 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.

1.5 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.

1.6 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.

1.7 One such product is CellWeb produced by Geosynthetics and a product brochure and sample construction detail are included within this Appendix.

1.8 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.

1.9 **Methodology for Surface Installation**

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

1.9.2 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.

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

1.9.4 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.

1.9.5 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.

1.9.6 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.

1.9.7 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.

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

1.9.9 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.

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

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

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

1.9.13 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. On the site in question this is the most appropriate final surface for the car parking spaces.
- Tarmacadam – This shall not be used where it will cover over 20% of a trees Root Protection Area, but on the site in question may be used for the vehicle circulation areas as these are to the periphery of tree RPA's.

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