



Oxford University Development Ltd

Begbroke Science Park – Car Park Application

Arboricultural Assessment

September 2021

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1.0 INTRODUCTION

- 1.1 This report has been prepared by FPCR Environment and Design Limited on behalf of Oxford University Development Ltd, the applicant, to present the findings of an Arboricultural Assessment and survey of trees to accompany a full planning application for the creation of a new surface car park and services building at Begbroke Science Park (hereafter referred to as the site), OS Grid Ref SP 478 135.
- 1.2 A survey of the site was carried out on 2nd August.
- 1.3 The tree survey and assessment of existing trees has been carried out in accordance with guidance contained within British Standard 5837:2012 '*Trees in Relation to Design, Demolition and Construction - Recommendations*' (hereafter referred to as BS5837). The guidelines set out a structured assessment methodology to assist in determining which trees would be deemed either as being suitable or unsuitable for retention.
- 1.4 The guidance also provides recommendations for considering the relationship between existing trees and how those trees may integrate into designs for development; demolition operations and future construction processes so that a harmonious and sustainable relationship between any retained trees and built structures can be achieved.
- 1.5 The purpose of the report is therefore to firstly, present the results of an assessment of the existing trees' arboricultural value, based on their current condition and quality and to secondly, provide an assessment of impact arising from the proposed development of the site.
- 1.6 The survey has therefore focused on any trees present within or bordering the site that may potentially be affected by the future proposals or will pose a constraint to any proposed development and has included an assessment of any impact to the tree cover.

Site description

- 1.7 The site comprises an area semi natural open space, and unused land in the northern portion of the Begbroke Science Park site, north of an existing car park and the Centre for Innovation & Enterprise. Overall, the site contained a moderate amount of tree cover, the majority of which was of immature proportions, planted as part of the creation of the semi natural open space and landscape buffer around the Begbroke Science Park site.

Statutory Considerations

- 1.8 Local authorities have a Duty under the Town and Country Planning Act to create Tree Preservation Orders (TPO) in order to protect and preserve specific trees and woodlands that bring significant amenity benefit to a particular site or location. Under a TPO it is a criminal offence to cut down, top, lop, uproot or willfully destroy a tree protected by that Order, or to cause or permit such actions, if carried out without the prior written consent of the acting LPA. Anyone found guilty of such an offence is liable and in serious cases, may result in prosecution and incur an unlimited fine.

- 1.9 No direct consultation with the Local Planning Authority has taken place, however, it is understood having used the online search facility on the website for the Local Planning Authority, Cherwell District Council, that there are no Tree Preservation Orders and Conservation Areas that would apply to any trees present on, or in proximity to the assessment site and therefore no statutory constraints would apply to the development in respect of trees. Before any tree works are undertaken confirmation of the online information should be sought from the Local Authority.
- 1.10 Information provided on Tree Preservation Orders and Conservation Areas is accurate to the date of this assessment and cannot be assumed to remain unchanged. The last check was carried out on 20th August 2021.

2.0 METHODOLOGY

- 2.1 The survey of trees has been carried out in accordance with the criteria set out in Chapter 4 of BS5837. The survey has been undertaken by a suitably qualified and experienced arboriculturist and has recorded information relating to all those trees within the site area and those adjacent to the site which may be of influence to any proposals. Trees were assessed for their arboricultural quality and benefits within the context of the proposed development in a transparent, understandable and systematic way.
- 2.2 Trees have been assessed as groups and hedgerows where it has been determined appropriate.
- The term group has been applied where trees form cohesive arboricultural features either aerodynamically, visually or culturally including biodiversity or habitat potential for example parkland or wood pasture.
 - For the purposes of this assessment, a hedgerow is described as any boundary line of trees or shrubs less than 5m wide at the base and are managed under a regular pruning regime.
- 2.3 An assessment of individual trees within groups and hedgerows has been made where a clear need to differentiate between them, for example, in order to highlight significant variation between attributes including physiological or structural condition or where a potential conflict may arise.

BS5837 Categories

- 2.4 Trees have been divided into one of four categories based on Table 1 of BS5837, '*Cascade chart for tree quality assessment*'. For a tree to qualify under any given category it should fall within the scope of that category's definition (see below).
- 2.5 Category U trees are those which would be lost in the short term for reasons connected with their physiology or structural condition. They are, for this reason not considered in the planning process on arboricultural grounds. Categories A, B and C are applied to trees that should be material considerations in the development process. Each category also having one of three further sub-categories (i, ii, iii) which are intended to reflect arboricultural, landscape and cultural or conservation values accordingly.
- 2.6 **Category (U) – (Red):** Trees which are unsuitable for retention and are 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 within this category are:

- Trees that have a serious irremediable structural defect such that their early loss is expected due to collapse and includes trees that will become unviable after removal of other category U trees.
- Trees that are dead or are showing signs of significant, immediate or irreversible overall decline.
- Trees that are infected with pathogens of significance to the health and/ or safety of other nearby trees or are very low quality trees suppressing adjacent trees of better quality.
- Certain category U trees can have existing or potential conservation value which may make it desirable to preserve.

2.7 **Category (A) – (Green):** Trees that are considered for retention and are of high quality with an estimated remaining life expectancy of at least 40 years with potential to make a lasting contribution. Such trees may comprise:

- Sub category (i) trees that are particularly good examples of their species, especially if rare or unusual, or are essential components of groups such as formal or semi-formal arboricultural features for example the dominant and/or principal trees within an avenue.
- Sub category (ii) trees, groups or woodlands of particular visual importance as arboricultural and / or landscape features.
- Sub category (iii) trees, groups or woodlands of significant conservation, historical, commemorative, or other value, for example veteran or wood pasture.

2.8 **Category (B) – (Blue):** Trees that are considered for retention and are of moderate quality with an estimated remaining life expectancy of at least 20 years with potential to make a significant contribution. Such trees may comprise:

- Sub category (i) trees that might be included in category A but are downgraded because of impaired condition for example the presence of significant though remediable defects, including unsympathetic past management and storm damage.
- Sub category (ii) 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.
- Sub category (iii) trees with material conservation or other cultural value.

2.9 **Category (C) – (Grey):** Trees that are considered for retention and are of low quality with an estimated remaining life expectancy of at least 10 years or young trees with a stem diameter below 150mm. Such trees may comprise:

- Sub category (i) unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories.
- Sub category (ii) trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value or trees offering low or only temporary / transient screening benefits.
- Sub category (iii) trees with no material conservation or other cultural value.

Site Plans

- 2.10 The individual positions of trees, groups and hedgerows have been shown on the Tree Survey Plan. The positions of trees are based on a topographical / land survey, as far as possible, supplied by the client. Where topographical information has not identified the position of trees these have been plotted using a global positioning system and aerial photography to provide approximate locations. The crown spread, root protection area and shade pattern (where appropriate) are also indicated on this plan.
- 2.11 As part of this assessment, a Tree Retention Plan has been prepared to show the proposed layout in relation to the existing tree cover allowing an assessment of any potential conflicts. The plan also identifies which trees would be required to be removed or retained as part of the proposed development.

Tree Constraints and Root Protection Areas

- 2.12 Below ground constraints to future development are represented by tree roots and the soil environment in which they grow which needs to be protected if the tree is to be retained. Tree rooting systems are essential for the uptake of water and nutrients, serving the storage of carbohydrates for the future growth and function of the tree, and form structural anchorage and support for the stem and crown. The perceived rooting area of the tree; referred to as the root protection area (RPA) needs to be protected if the tree is to be retained.
- 2.13 The RPA is a notional area considered to be the minimum zone that must be protected to avoid any adverse impacts on retained trees. The RPA has been calculated in accordance with Annex C, D and Section 4.6 of BS5837:2012 and requires suitable protection in order for the tree to be successfully incorporated into any future scheme. As such, the RPA of existing trees is an important material consideration when considering site constraints and planning development activities.
- 2.14 Where groups of trees have been assessed, the Root Protection Area has been shown based on the maximum sized tree in any one group and so may exceed the Root Protection Area required for some of the individual specimens within the group. Further detailed inspection of the individual trees forming a group may be required where development impacts upon the group.
- 2.15 Whilst it is generally accepted that tree roots may extend far greater distances than the notional RPA, with the distribution of the root system relating directly to the availability of suitable conditions for growth (namely oxygen, water and nutrients), with roots predominantly located in the upper 1,000 mm of the soil horizon; the RPA offers an accepted protective buffer from development.
- 2.16 Above ground constraints such as the current crown spread of the trees and an illustration of the shade pattern (where appropriate) have been considered and identified within the Tree Survey Plan and Tree Retention Plan indicates their potential area of shading influence.

Considerations and Limitations of the Tree Survey

- 2.17 The survey was completed from ground level only and from within the boundary of the site. Aerial tree inspections or an assessment of the internal condition of the stem/s or branches were not undertaken at this stage as this level of survey is beyond the scope of the initial assessment.

- 2.18 The statements made in this report regarding the assessed trees does not take into account the effects of extreme / adverse weather conditions, changes in land use prior to the site’s development, unforeseen accidents or anti-social behaviors, such as vandalism, which occur since the date of the survey. As such, the assessment of tree condition given within applies to the date of survey and cannot be assumed to remain unchanged.
- 2.19 It will be necessary to review all comments and observations made within this report, in accordance with sound arboricultural practice, within two years of the date of survey (unless explicitly stated elsewhere within this report). Further review may also be necessary where site conditions change or works to trees are carried out which have not been specified in detail within this report.
- 2.20 Hedgerows are identified as a Habitat of Principal Importance (HPI) as listed within Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. The tree survey conducted, in accordance with BS5837, does not assess hedgerows against the Hedgerow Regulations 1997 or specifically from an ecological perspective, and is outside the scope of this assessment.
- 2.21 It may be necessary during detailed design to undertake further assessment and accurate positioning of woody species within tree groups and hedgerows to assist structural calculations for foundation design of structures in accordance with current building regulations. The exact position of individual trees or species included as part of a tree group should be checked and verified on site prior to any decisions for foundation design, tree operations or construction activity being undertaken. Further survey work would be required for calculating foundation depths in accordance with NHBC Chapter 4.2 Building near Trees.

3.0 RESULTS

- 3.1 A total of 25 individual trees, three groups of trees and a hedgerow were surveyed as part of this Arboricultural Assessment. Trees were surveyed as individual trees and groups of trees where examples are clearly present as per the description. Refer to the Tree Survey Plan and Appendix A – Tree Schedule for full details of the trees included in this assessment.
- 3.2 The table below summarises the trees assessed. Several of the trees have been discussed in more detail following the table, owing to their physical condition or arboricultural significance.

Results Summary

Table 1: Summary of Trees by Retention Category

	Individual Trees	Total	Groups of Trees	Total
Category U - Unsuitable		0		0
Category A (High Quality / Value)		0		0
Category B (Moderate Quality / Value)	T29, T30, T31, T32, T33, T34, T45, T46, T49, T50	10	G4, G12, G22, H3	4

	Individual Trees	Total	Groups of Trees	Total
Category C (Low Quality / Value)	T7, T8, T35, T36, T37, T38, T39, T40, T41, T42, T43, T44, T47, T48, T51	15	G11	1

- 3.3 A significant proportion of the assessed tree cover was categorised as being of a moderate arboricultural quality (Category B). In the most part, this was represented by collections of specimen trees within an area of green space alongside existing car parking to the south of the proposed development plot boundary.
- 3.4 Buffer planting recorded along the northern and western boundaries, was also regarded as being of moderate quality, for its collective landscape value, forming an effective screen from the site to the surrounding area.
- 3.5 A total of 15 individual trees were categorised as offering low arboricultural quality (Category C). Generally, these were young trees within the area of semi natural open space which had been planted in the last circa. 20 years and as such had little arboricultural value. Tree cover within this area did however provide some arboricultural interest.
- 3.6 The single recorded hedgerow, to the east of the proposed development plot boundary, comprised of beech *Fagus sylvatica* which had been maintained at a height of 2.5m. Climbing plants had established within the hedgerow suppressing sections however it was categorised as being of a moderate arboricultural quality (Category B).

4.0 ARBORICULTURAL IMPACT ASSESSMENT

- 4.1 The following paragraphs present a summary of the tree survey and discussion of particular trees and groups recorded in the context of the proposed development in the form of an Arboricultural Impact Assessment in accordance with section 5.4 of BS5837. Any final tree retentions will need to be reconciled with the advice contained within this report.
- 4.2 The AIA has been based upon the Car Park Landscape General Arrangement (LP2264-FIR-00-ZZ-DR-L-0002) and seeks to outline the relationship between the proposals and the existing trees and hedgerows. The drawing shows the proposals for a new surface car park and services building.
- 4.3 An overlay of the above layout has been incorporated in the Tree Retention Plan to assist in identifying the relationship and any potential conflicts between the proposals and the existing trees and hedgerows. The below table summarises the proposed tree removal and the arboricultural impacts have been discussed further following the table.

Table 2: Summary of Impact on Tree Stock

	Trees to be Retained	Total	Trees to be Removed in full or part	Total
Category U - Unsuitable				
Category A (High Quality / Value)				

	Trees to be Retained	Total	Trees to be Removed in full or part	Total
Category B (Moderate Quality / Value)	T29, T30, T31, T32, T33, T34 G4, G12, G22	9	T45, T46, T49, T50 H3 (Part removal)	5
Category C (Low Quality / Value)	T7, T8, T35	3	T36, T37, T38, T39, T40, T41, T42, T43, T44, T47, T48, T51 G11	13

- 4.4 To facilitate development would require several of the assessed individual trees be removed, namely individual trees T36 – T51. This tree removal is necessary to provide a developable area which could house the car park and service building.
- 4.5 In the context of BS5837 classification, most of the tree cover shown to be removed are considered of low quality, with the majority having been planted recently within an area of semi natural open space in the last circa. 20 years.
- 4.6 A small number of trees considered of moderate quality, in the context of BS5837, are also shown to be removed. This tree cover although of higher quality by virtue of their condition and proportions still compromised of immature specimens within the area of semi natural open space and offered limited value visually in the wider landscape context beyond the site curtilage.
- 4.7 It is considered feasible that the removal of this tree cover, could be mitigated for through new tree planting, providing a new generation of tree cover, which would attain similar proportions within a relatively short time frame and continue the landscape character of the site.
- 4.8 The remainder of the assessed tree cover, including the boundary tree groups, are to be retained and this will maintain the effective screen they provide from the site to the surrounding area.

5.0 TREE MANAGEMENT

- 5.1 All retained trees should be subjected to sound arboricultural management as recommended within section 8.8.3 of BS5837 *Post Development Management of Existing Trees*, where there is a potential for public access to satisfy the landowner's duty of care.
- 5.2 Upon completion of the development, a review of the relationship between the layout and the retained trees should be undertaken by a qualified arboriculturalist to identify any potential public safety risks and to agree remedial works as required.
- 5.3 All proposed tree works should comply with British Standard 3998:2010 and should be carried out by skilled tree surgeons. It would be recommended that quotations for such work be obtained from Arboricultural Association Approved Contractors as this is the recognised authority for certification of tree work contractors.

- 5.4 All vegetation and, particularly, woody vegetation proposed for clearance should be removed outside of the bird-breeding season (March - September inclusive) as all birds are protected under the Wildlife and Countryside Act, 1981 (as amended) whilst on the nest. Where this is not possible, vegetation should be checked for the presence of nesting birds prior to removal by an experienced ecologist.

6.0 NEW TREE PLANTING

- 6.1 The success of any landscaping scheme relies on an adequate provision of a high-quality rooting environment within which trees can thrive and reach their full potential. Planting trees with due care and consideration can, in the long term, provide a greater return on a scheme's green investment and ensure trees remain healthy and grow to mature proportions.
- 6.2 The planting of trees within confined urban environments should consider the use of appropriately designed planting pits specifically engineered to promote tree health and longevity. The rooting environment will need to provide an adequate volume of quality soil for roots to suitably develop by calculating the amount of available soil volumes needed and selecting species whose mature size is compatible with the site. This is an integral component of the planning stage (Lindsey & Bassuk, 1991).
- 6.3 The landscaping scheme should consider the use of both native tree species (for their low maintenance requirements and nature conservation value) and ornamental species (for their contribution to urban design and amenity value). Species choices should be selected on the basis of their suitability for the final site use. Furthermore, during the design process consultation should be made with the Local Planning Authority to obtain information on their tree strategy and integrate the planting proposals with any local policies and initiatives and/or Biodiversity Action Plans (BAP).
- 6.4 Careful consideration would need to be given to the following: ultimate height and canopy spread, form, habit, density of crown, potential shading effect, colour, water demand, soil type and maintenance requirements in relation to both the built form of the new and existing development.
- 6.5 Tree planting should be avoided where they may obstruct overhead power lines or cables and wherever possible, common service trenches should be specified to minimise land take associated with underground service provision and facilitation access for future maintenance. Any underground apparatus should also be ducted or otherwise protected at the time of construction to enable trees to be planted without resulting in future conflicts.

7.0 TREE PROTECTION MEASURES

- 7.1 Retained trees will be adequately protected during works ensuring that the calculated root protection area for all retained trees can be appropriately protected through the erection of the requisite tree protection barriers. Measures to protect trees should follow the guidance in BS5837 and will be applied where necessary for the purpose of protecting trees within the site whilst allowing sufficient access for the implementation of the proposed layout. These have been broadly summarised below.

General Information and Recommendations

- 7.2 All trees retained on site will be protected by suitable barriers or ground protection measures around the calculated RPA, crown spread of the tree or other defined constraints of this assessment as detailed by section 6 and 7 of BS5837.
- 7.3 Barriers will be erected prior to commencement of any construction work and before demolition including erection of any temporary structures. Once installed, the area protected by fencing or other barriers will be regarded as a construction exclusion zone. Fencing and barriers will not be removed or altered without prior consultation with the Project Arboriculturalist.
- 7.4 Any trees that are not to be retained as part of the proposals should be felled prior to the erection of protective barriers. Particular attention needs to be given by site contractors to minimise damage or disturbance to retained specimens.
- 7.5 Where it has been agreed, construction access may take place within the root protection area if suitable ground protection measures are in place. This may comprise single scaffold boards over a compressible layer laid onto a geo-textile membrane for pedestrian movements. Vehicular movements over the root protection area will require the calculation of expected loading and the use of proprietary protection systems.
- 7.6 Confirmation that tree protective fencing or other barriers have been set out correctly should be gained prior to the commencement of site activity.

Tree Protection Barriers

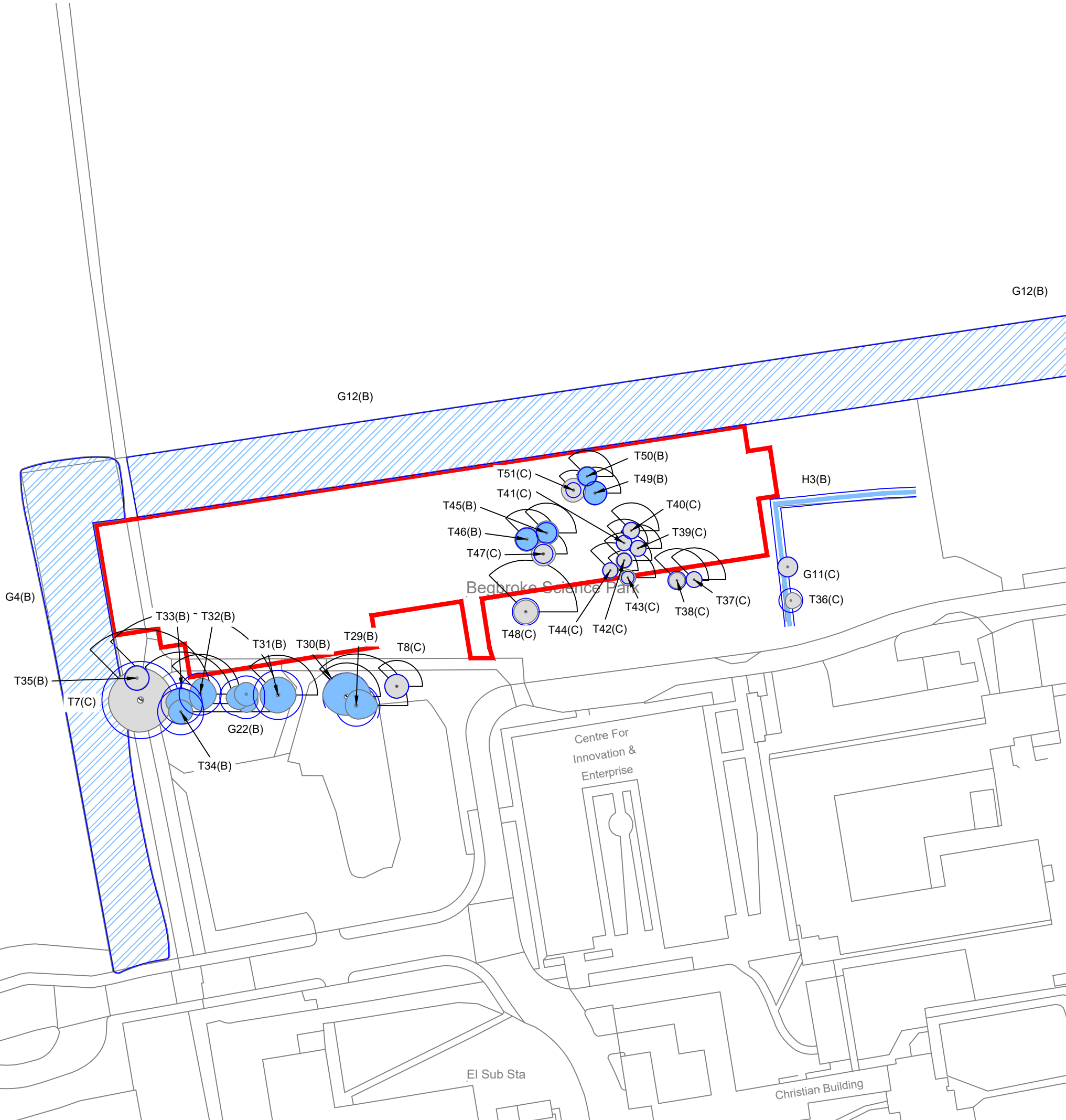
- 7.7 Tree protection fencing should be fit for the purpose of excluding any type of construction activity and suitable for the degree and proximity of works to retained trees. Barriers must be maintained to ensure that they remain rigid and complete for the duration of construction activities on site.
- 7.8 In most situations, fencing should comprise typical construction fencing panels attached to scaffold poles driven vertically into the ground. For particular areas where construction activity is anticipated to be of a more intense nature, supporting struts, acting as a brace should be added and fixed into position through the application of metal pins driven into the ground to offer additional resistance against impacts.
- 7.9 Where site circumstances and the risk to retained trees do not necessitate the default level of protection an alternative will be specified appropriate to the level / nature of anticipated construction activity. The recommended methods of fencing specifications for this site have been illustrated in Appendix B.
- 7.10 It may be appropriate on some sites to use temporary site offices, hoardings and lower-level barrier protection as components of the tree protection barriers.
- 7.11 Details of the specific protection barriers for the site can be provided should the application be approved, as part of a site specific Arboricultural Method Statement in accordance with the guidance contained within BS5837.

Protection outside the exclusion zone








- 7.12 Once the areas around trees have been protected by the barriers, any works on the remaining site area may be commenced providing activities do not impinge on protected areas.
- 7.13 All weather notices should be attached to the protective fencing to indicate that construction activities are not permitted within the fenced area. The area within the protective barriers will then remain a construction exclusion zone throughout the duration of the construction phase of the proposed development. Protection fencing signs can be provided upon request.
- 7.14 Wide or tall loads etc should not come into contact with retained trees. Banksman should supervise transit of vehicles where they are in close proximity to retained trees.
- 7.15 Oil, bitumen, cement or other material that is potentially injurious to trees should not be stacked or discharged within 10m of a tree stem. No concrete should be mixed within 10m of a tree. Allowance should be made for the slope of ground to prevent materials running towards the tree.
- 7.16 No fires will be lit where flames are anticipated to extend to within 5m of tree foliage, branches or trunk, taking into consideration wind direction and size of fire.
- 7.17 Notice boards, telephone cables or other services should not be attached to any part of a retained tree.
- 7.18 Any trees which need to be felled adjacent to or are present within a continuous canopy of retained trees, must be removed with due care (it may be necessary to remove such trees in sections).

Protection for Aerial Parts of Retained Trees

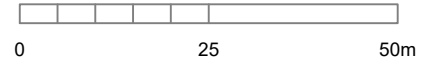
- 7.19 Where it is deemed necessary to operate a wide or tall load, plant bearing booms, jibs and counterweights or other such equipment as part of the construction works it is best advised that appropriate, but limited tree surgery, be carried out beforehand to remove any obstructive branches.
- 7.20 Any such equipment would have potential to cause damage to parts of the crown material, i.e. low branches and limbs, of retained trees within the protective barriers. This is termed as 'access facilitation pruning' within BS5837. Any such pruning should be undertaken in accordance with a specification prepared by an arboriculturalist.
- 7.21 A pre-commencement site meeting with contractors who are responsible for operating machinery will be required, as described above, to firstly highlight the potential for damage occurring to tree crowns and to ensure that extra care is applied when manoeuvring machinery during such operations in proximity to retained trees, to avoid any contact.



KEY

-  Category B - Trees / Groups of Moderate Quality (BS 5837:2012)
-  Category C - Trees / Groups of Low Quality (BS 5837:2012)
-  Hedgerow (Colour indicates BS5837:2012 Category)
-  Root Protection Area (The RPA has been altered where appropriate to reflect underground constraints)
-  T1 (A)
G1 (A) Individual / Group Number and BS5837:2012 Category
-  Indicative Shade Pattern (in accordance with BS5837:2012 where appropriate)
-  Proposed Development Plot Boundary

Scale 1:1000 @ A3



NOTES

All dimensions to be verified on site. Do not scale this drawing, use figured dimensions only. All discrepancies to be clarified with project Arboriculturalist. Drawing to be read in conjunction with Arboricultural Assessment and Appendix A - Tree Schedule.

Drawing has been produced in colour and is based on digital information in .dwg format, aerial images and/or GPS location where appropriate. A monochrome copy should not be relied upon. The exact position of individual trees or species included as part of a tree group, woodland or hedgerow should be checked and verified on site prior to any decisions for foundation design, tree operations or construction activity being undertaken. Further survey work would be required for calculating foundation depths.

Trees are living organisms that change over time, the condition of all trees illustrated herein, are to be checked by the project Arboriculturalist should works commence 12 months after the date of this survey.

SOME TREES MAY BE SUBJECT TO STATUTORY CONSTRAINTS. IT IS THEREFORE ADVISED THAT NO WORKS SHOULD BE UNDERTAKEN TO ANY TREES ILLUSTRATED HEREIN WITHOUT FIRST OBTAINING THE RELEVANT AUTHORISATION TO DO SO UNLESS AGREED AS PER THE APPROVED PLANS THROUGH PLANNING CONSENT.

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project
**New Surface Car Park and Services Building
Begbroke Science Park**

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TREE SURVEY PLAN

scale
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8296-T-04

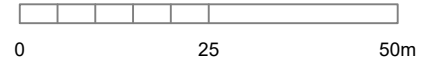
rev
A



KEY

-  Tree/Group to be Retained
-  Tree/Group Proposed to be Removed to Facilitate the Development upon Approval of the Application
-  Hedgerow Proposed to be Retained
-  Hedgerow Proposed to be Removed to Facilitate the Development upon Approval of the Application
-  Root Protection Area (Shown for retained trees only)
-  T1 (A)
G1 (A) Individual / Group Number and BS5837:2012 Category
-  T1 (A)
G1 (A) Individual / Group Number to be Removed
-  Proposed Development Plot Boundary

Scale 1:1000 @ A3



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project
**New Surface Car Park and Services Building
Begbroke Science Park**

drawing title
TREE RETENTION PLAN

scale
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A

Appendix A - Tree Schedule

Measurements	Age Class	Overall Condition	Root Protection Area (RPA)
Height - Measured using a digital laser clinometer (m)	YNG: Young trees up to ten years of age	G - Good: Trees with only a few minor defects and in good overall health needing little, if any attention	<ul style="list-style-type: none"> The RPA Radius column provides the extent of an equivalent circle from the centre of the stem (m). The RPA is calculated using the formulae described in paragraph 4.6.1 of British Standard 5837: 2012 and is indicative of the rooting area required for a tree to be successfully retained. Tree roots extend beyond the calculated RPA in many cases and where possible a greater distance should be protected. Where veteran trees have been identified the RPA has been calculated in accordance with Natural England guidance i.e. 15x the stem diameter, uncapped.
Stem Dia. - Diameter measured (mm) in accordance with Annex C of the BS5837	SM: Semi-mature trees less than 1/3 life expectancy	F - Fair: Trees with minor rectifiable defects or in the early stages of stress from which it may recover	
Crown Radius - Measured using a digital laser clinometer radially from the main stem (m)	EM: Early mature trees 1/3 – 2/3 life expectancy	P - Poor: Trees with major structural and/or physiological defects such that it is unlikely the tree will recover in the long term	
Abbreviations est - Estimated stem diameter avg - Average stem diameter for multiple stems upto - Maximum stem diameter of a group	M: Mature trees over 2/3 life expectancy	D - Dead: This could also apply to trees in an advanced state of decline and unlikely to recover	
	OM: Over mature declining or moribund trees of low vigour	The BS category particular consideration has been given to the following <ul style="list-style-type: none"> The health, vigour and condition of each tree The presence of any structural defects in each tree/group and its future life expectancy The size and form of each tree/group and its suitability within the context of a proposed development The location of each tree relative to existing site features e.g. its screening value or landscape features Age class and life expectancy 	
	V: Veteran tree possessing certain attributes relating to veteran trees		

Structural Condition
The following is an example of considerations when inspecting structural condition: <ul style="list-style-type: none"> The presence of fungal fruiting bodies around the base of the tree or on the stem, as they could possibly indicate the presence of possible internal decay Soil cracks and any heaving of the soil around the base Any abrupt bends in branches and limbs resulting from past pruning Tight or weak 'V' shaped forks and co-dominant stems Hazard beam formations and other such biomechanical related defects (as described by Claus Mattheck, Body Language of Trees HMSO Research for Amenity Trees No. 4 1994) Cavities as a result of limb losses or past pruning Broken branches or storm damage Damage to roots Basal, stem or branch / limb cavities Crown die-back or abnormal foliage size and colour

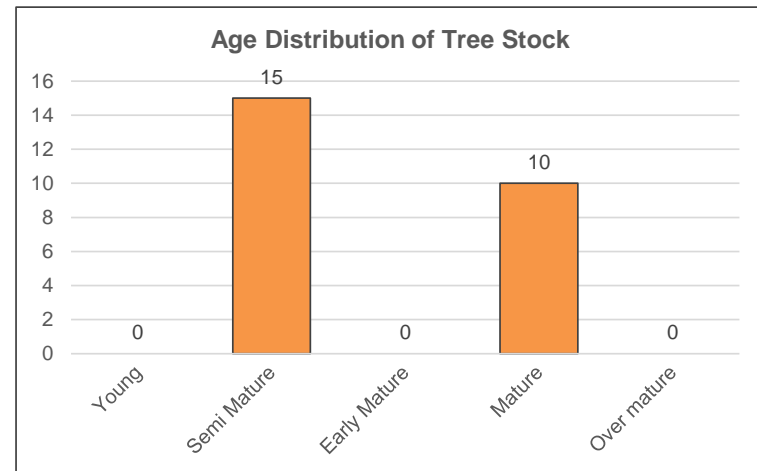
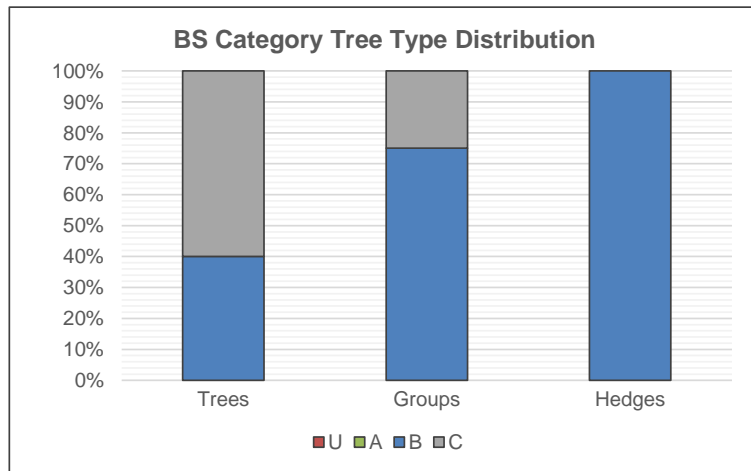
Quality Assessment of BS Category
Category U - Trees in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years.
Category A - Trees of high quality with an estimated remaining life expectancy of at least 40 years.
Category B - Trees of moderate quality with an estimated remaining life expectancy of at least 20 years.
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 150mm.
Sub-categories: (i) - Mainly arboricultural value (ii) - Mainly landscape value (iii) - Mainly cultural or conservation value

Appendix Summary

	Individual Trees	Totals	Tree Groups and Hedgerows	Totals
Category U		0		0
Category A		0		0
Category B	T29, T30, T31, T32, T33, T34, T45, T46, T49, T50	10	G4, G12, G22, H3	4
Category C	T7, T8, T35, T36, T37, T38, T39, T40, T41, T42, T43, T44, T47, T48, T51	15	G11	1
	Total	25	Total	5

BS Category Tree Type Distribution displays the proportion of trees assessed in each type to enable a better understanding of the category distribution.

Age Distribution of Tree Stock shows the number of trees in each age category across the tree stock allowing assessment of their longevity to be made.



Tree No	Species	Height	Stem Dia.	Crown Radius	Age Class	Overall Condition	Structural Condition	RPA	RPA Radius	BS5837 Cat
INDIVIDUAL TREES										
T7	Ash <i>Fraxinus excelsior</i>	18	660 510	8	M	F	Situated within grassed area west of footpath hardstanding within 1.5m of base to east exposed roots to east with mower damage twin stemmed from 0.5m past pruning to raise crown nesting box attached to stem at 5m Eastern aspect sparse crown likely Ash die back class 2	315	10.0	C (i)
T8	Rowan <i>Sorbus aucuparia</i>	6.5	240 120 80	3	M	G	Planted specimen within grassed area between car park and footpath twin stemmed from 0.5m low crown to 1m above ground level underground services within 2.5m of base to North east	35	3.4	C (i)
T29	Italian Alder <i>Alnus cordata</i>	13	430	N - 4 S - 3 E - 6 W - 2	M	G	Planted specimen within grassed area between car park and footpath twin stemmed from 0.5m uneven crown due to suppression from adjacent trees lateral branch develops to east over car parking space hardstanding within 5m to east	84	5.2	B (i)
T30	Apple <i>Malus domestica</i>	8.5	320 280 210 200 170	N - 6 S - 2 E - 6 W - 6	M	G	Planted specimen within grassed area between car park and footpath twin stemmed from 0.5m low crown to 1.5m above ground level uneven crown due to suppression from adjacent tree	133	6.5	B (i)
T31	Field Maple <i>Acer campestre</i>	10	10x 180	4.5	M	G	Planted specimen within grassed area between car park and footpath low crown to 1.5m above ground level past pruning to raise crown multi stemmed from base	147	6.8	B (i)
T32	Field Maple <i>Acer campestre</i>	10	6x 180	N - 4 S - 4 E - 4 W - 2	M	G	Planted specimen within grassed area between car park and footpath low crown to 1.5m above ground level multi stemmed from base tree appears to have been previously topped at 3m single dead stem	88	5.3	B (i)
T33	Field Maple <i>Acer campestre</i>	13	430	N - 4 S - 2 E - 2 W - 4	M	G	Planted specimen within grassed area between car park and footpath low crown to 1.5m above ground level appears to have been previously topped at 3m	84	5.2	B (i)

Tree No	Species	Height	Stem Dia.	Crown Radius	Age Class	Overall Condition	Structural Condition	RPA	RPA Radius	BS5837 Cat
T34	Lombardy Poplar <i>Populus nigra 'Italica'</i>	25	480	3	M	G	Planted specimen within grassed area between car park and footpath end tree within a group closest to site characteristic of species	104	5.8	B (i)
T35	Crab Apple <i>Malus sylvestris</i>	6.5	260	3	M	F	Situated within grassed area west of footpath hardstanding within 3m of base to east recent excavation for services within 2m of base to South East suppressed by larger adjacent tree	31	3.1	C (i)
T36	Laburnum <i>Laburnum anagyroides</i>	5	est 200 150	N - 2 S - 2 E - 3 W - 1	M	F	Situated within 1m of hedgerow unable to access base due to dense undergrowth twin stemmed from 1m with included bark union noted between stems multi leaded crown develops at 2m crown is suppressed by adjacent hedgerow	28	3.0	C (i)
T37	Manna Ash <i>Fraxinus ornus</i>	8	165	2	SM	G	Recently planted specimen within area of naturalised green space forms part of a group of two trees crown to 1m above ground level	12	2.0	C (i)
T38	Manna Ash <i>Fraxinus ornus</i>	8	195	2	SM	G	Recently planted specimen within area of naturalised green space forms part of a group of two trees crown to 1m above ground level	17	2.3	C (i)
T39	Manna Ash <i>Fraxinus ornus</i>	6	165	2	SM	G	Recently planted specimen within area of naturalised green space forms part of a group of three trees crown to 1m above ground level strimmer damage to main stem at base	12	2.0	C (i)
T40	Manna Ash <i>Fraxinus ornus</i>	7	175	2	SM	G	Recently planted specimen within area of naturalised green space forms part of a group of three trees crown to 1m above ground level strimmer damage to main stem at base	14	2.1	C (i)
T41	Manna Ash <i>Fraxinus ornus</i>	6	155	2	SM	G	Recently planted specimen within area of naturalised green space forms part of a group of three trees crown to 1m above ground level	11	1.9	C (i)
T42	Himalayan Birch <i>Betula utilis</i>	7	150	2	SM	G	Recently planted specimen within area of naturalised green space forms part of a group of three trees crown to 1m above ground level strimmer damage to main stem at base	10	1.8	C (i)

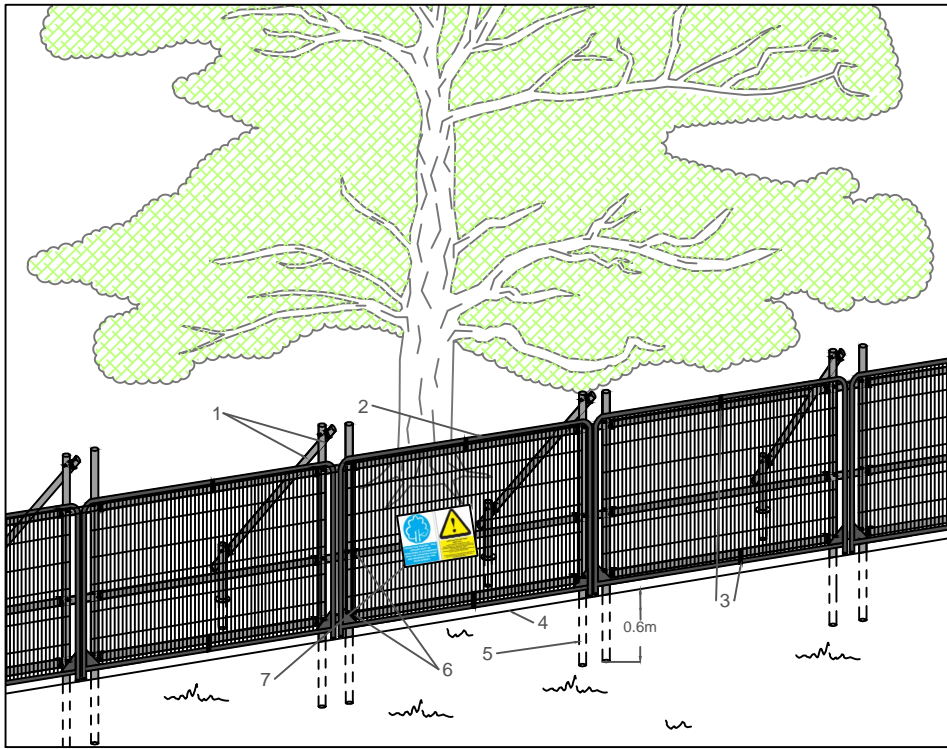
Tree No	Species	Height	Stem Dia.	Crown Radius	Age Class	Overall Condition	Structural Condition	RPA	RPA Radius	BS5837 Cat
T43	Himalayan Birch Betula utilis	7	135	2	SM	G	Recently planted specimen within area of naturalised green space forms part of a group of three trees crown to 1m above ground level strimmer damage to main stem at base	8	1.6	C (i)
T44	Himalayan Birch Betula utilis	7	155	2	SM	G	Recently planted specimen within area of naturalised green space forms part of a group of three trees crown to 1m above ground level strimmer damage to main stem at base	11	1.9	C (i)
T45	English Oak Quercus robur	7.5	220	3	SM	G	Recently planted specimen within area of naturalised green space forms part of a group of three trees crown to 1.5m above ground level	22	2.6	B (i)
T46	English Oak Quercus robur	7.5	230	3	SM	G	Recently planted specimen within area of naturalised green space forms part of a group of three trees crown to 1.5m above ground level	24	2.8	B (i)
T47	English Oak Quercus robur	6	200	3	SM	F	Recently planted specimen within area of naturalised green space forms part of a group of three trees crown to 1.5m above ground level appears to have previous lost main leader at 3m forming a multi leadered crown	18	2.4	C (i)
T48	Silver Birch Betula pendula	13	280	3	SM	F	Situated within naturalised green space low crown to 1m above ground level main stem leans to east at circa 10 degrees from vertical no obvious lifting of root plate	35	3.4	C (i)
T49	English Oak Quercus robur	6.5	240	3	SM	G	Recently planted specimen within area of naturalised green space forms part of a group of three trees crown to 1m above ground level	26	2.9	B (i)
T50	English Oak Quercus robur	6.5	190	2.5	SM	G	Recently planted specimen within area of naturalised green space forms part of a group of three trees crown to 1m above ground level	16	2.3	B (i)

Tree No	Species	Height	Stem Dia.	Crown Radius	Age Class	Overall Condition	Structural Condition	RPA	RPA Radius	BS5837 Cat
T51	English Oak Quercus robur	5	160	3	SM	F	Recently planted specimen within area of naturalised green space forms part of a group of three trees crown to 1m above ground level appears to have previously lost main leader at 2.5m with twin leaders developing at this point	12	1.9	C (i)

Group No	Species	Height	Stem Dia.	Crown Radius	Age Class	Overall Condition	Structural Condition	RPA	RPA Radius	BS5837 Cat
GROUPS OF TREES										
G4	Ash Fraxinus excelsior Blackthorn Prunus spinosa Crack Willow Salix fragilis English Oak Quercus robur Field Maple Acer campestre Goat Willow Salix caprea Hawthorn Crataegus monogyna Wild Cherry Prunus avium Hazel Corylus avellana Holly Ilex aquifolium Dogwood Cornus sanguinea	10	avg 150	2	SM / EM	F / G	Recently planted buffer group along site boundary no obvious management post planting close spacing between trees low crowns to near ground level restricts access within group forms an effective screen with moderate screening value ash die back evident within group class 2 predominantly shrub and small tree species along boundary with site small number of dead trees within group	10	1.8	B (ii)
G11	Lilac Syringa vulgaris	6	7x 80	3	EM / M	P	Limited future potential Low crown form Multi stemmed from base	20	2.5	C (ii)

Group No	Species	Height	Stem Dia.	Crown Radius	Age Class	Overall Condition	Structural Condition	RPA	RPA Radius	BS5837 Cat
G12	Ash Fraxinus excelsior Blackthorn Prunus spinosa Crack Willow Salix fragilis English Oak Quercus robur Field Maple Acer campestre Goat Willow Salix caprea Hawthorn Crataegus monogyna Wild Cherry Prunus avium Damson Prunus insititia Hazel Corylus avellana Holly Ilex aquifolium Red Oak Quercus rubra Dogwood Cornus sanguinea	10	avg 150	2	SM / EM	F / G	Recently planted buffer group along site boundary no obvious management post planting close spacing between trees low crowns to near ground level restricts access within group forms an effective screen with moderate screening value ash die back evident within group class 2 predominantly shrub and small tree species along boundary with site small number of dead trees within group	10	1.8	B (ii)
G22	Scots Pine Pinus sylvestris	15	upto 465	4	EM	G	Group of three trees with circa 2m spacing between them planted within grassed area between car park and footpath low crowns to 1m to North small diameter dead branches and branch stubs noted in lower crowns typical of species	98	5.6	B (ii)

Hedge No	Species	Height	Stem Dia.	Crown Radius	Age Class	Overall Condition	Structural Condition	RPA	RPA Radius	BS5837 Cat
HEDGEROWS										
H3	Beech Fagus sylvatica	2.5	avg 100	0.5	EM	G	Regularly maintained hedgerow Climbing plant had established along hedgerow suppressing sections	5	1.2	B (ii)



Standard specification for protective barrier

1. Standard scaffold poles
2. Heavy gauge 2m tall galvanized tube and welded mesh infill panels
3. Panels secured to scaffold frame with wire ties
4. Ground level
5. Uprights driven into the ground until secure (min depth of 0.6m)
6. Standard scaffold clamps
7. Construction Exclusion Zone signs



Above ground stabilising systems

1. Stabiliser strut with base plate secured with ground pins
2. Feet blocks secured with ground pins
3. Construction Exclusion Zone signs

NOTES

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APPENDIX B PROTECTIVE FENCING SPECIFICATIONS

CAD file: S:\Arb resources\Basic Templates\Tree Protection\Appendix B - Protective Fencing A4.dwg