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Pre-Development BS5837 Tree Survey

Site: Sacred Heart Primary School, Lockwood Road, Goldthorpe, S63 9JY

On Behalf of: Align Property Partners

Date: 24/04/2026

Reference: BA26012TS

DOCUMENT CONTROL

Surveyed by*	Lloyd Barnes			**Report date**	17/04/2026
Prepared by*	Lloyd Barnes				
Reviewed by*	Sue Barnes				
Revision	A	**Date**	24/04/2026	**Notes:**	
	* Refer to qualifications and experience appendix				

VALIDATION STATEMENT FOR LPA REGISTRATION

This report contains the supporting tree information outlining the current state of the significant trees on and neighbouring the site.

For Local Planning Authority (LPA) validation purposes, this report contains the following:

- A full **Arboricultural Assessment** (tree survey) compliant to the requirements of *BS5837:(2012) Trees In relation to design, demolition and construction – Recommendations.* Undertaken by a qualified arboriculturalist. (Tree Assessment)
- A plan with a north point showing tree survey information, including BS5837 categories.

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ARBORICULTURAL ASSESSMENT

A full tree survey compliant to the requirements of BS5837:(2012) Trees In relation to design, demolition and construction – Recommendations. Undertaken by a qualified arboriculturalist. (Tree Assessment).

This arboricultural assessment includes general information on tree condition, value and management, in addition to detailing the notional root protection area outlined within BS3837:2012.

The purpose of this Report - This is an arboricultural assessment describing the trees on and near the proposed development site, what the impact of the development proposal on those trees will be and how any adverse impacts will be mitigated.

Its purpose is to provide sufficient tree information for the LPA to assess the impact of the proposal on local character as part of the process of determining the planning application, more detailed reasons relating to the protection of retained trees can be reviewed in this report.

Report Contents - The report includes: -

- a **tree assessment and tree survey plan** which is prepared in line with the guidelines set out in BS BS5837:*(2012) Trees In relation to design, demolition and construction – Recommendations.*

Background Administrative Information - All the trees that could be affected were inspected and their details are discussed in the schedule of information, which is included in APPENDIX – TREE SCHEDULE & EXPLANATORY NOTES in line with BS5837:2012.

Based on this information, guidance is provided on the constraints these trees impose on the use of the site. This submission proposal is a result of these consultations and has evolved, taking full account of the tree constraints.

Risk Assessment. I have undertaken a tree survey to identify the general nature of the trees and their relationship with significant targets. The level of detail with which the trees are assessed was informed by their relationship with targets. Large trees adjacent to higher-value targets requiring closer assessment than smaller trees adjacent to a lower value target.

The trees are assumed to offer a **Broadly Acceptable Risk** at which point the risk is already **'As Low as Reasonably Practicable' (ALARP)**. Overall, the risk offered by some of the trees is within the boundaries of tolerability that might ordinarily be applied by a reasonable and informed landowner.

Legislative Protection.

Type of Check	Body	Date	Status
Tree Preservation Orders	Barnsley Metropolitan Borough Council	17/04/2026	None
Conservation Area	Barnsley Metropolitan Borough Council	17/04/2026	None
National Park	Natural England http://tinyurl.com/3n2u3cdd	17/04/2026	None
Listed Buildings	Historic England https://historicengland.org.uk/listing/the-list/	17/04/2026	None
National Landscapes, Ancient Woodlands/other Woodland Habitats	DEFRA Magic Map https://magic.defra.gov.uk/magicmap.aspx	17/04/2026	None
Ancient Trees	Woodland Trust Ancient Tree Inventory https://ati.woodlandtrust.org.uk/tree-search/	17/04/2026	None

In general, the protection of trees is a duty of the LPA under the Town and Country Planning act 1990 and aims to encourage rational discussion and consideration of trees within the design process. The following guidelines are proposed to encourage rational discussion and consideration of trees within the design process. The legislation indicates that protection should be used to protect healthy trees that are likely to have a reasonable safe useful life expectancy. Generally, those classified with a condition rating of (A) Excellent & (B) Good are worthy of a TPO. Those classified (C) Fair are generally poorer and therefore unlikely to qualify for a TPO on grounds of poor appearance, management issues or unlikely to have a sufficient safe life expectancy. Those trees classified (U) are Unsuitable for retention, generally contain structural defects, have a short safe, useful life expectancy or are dangerous and therefore would not qualify for a TPO as indicated within the legislation.

The presence of a TPO should be expected upon development sites for the above reasons. It can however only be regarded as a material consideration, as can any other tree or significant natural feature, within the planning process and cannot be used as a means of preventing development. Any trees protected or otherwise, which are located on or close to the site can be expected to be regarded as a material consideration or offer a design constraint within the development process.

Soils. The soils on site appear to be maintained grass, An assessment of the information at http://www.landis.org.uk/soilscapes show the soils to the north of the site to be **'Slowly permeable seasonally wet acid loamy and clayey soils'**

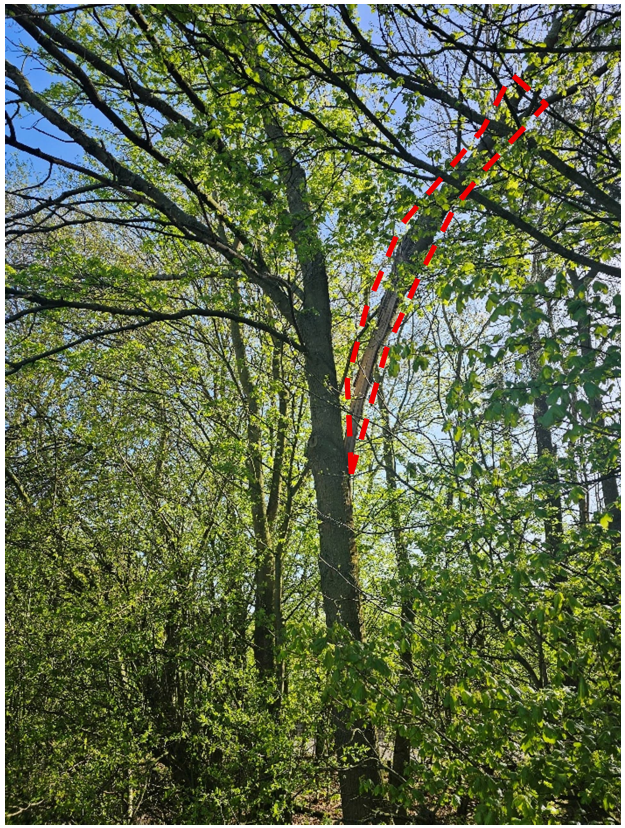
The Government geographical mapping information website 'Magic-Map' http://www.magic.gov.uk/ shows that the site is not covered by any tree specific designations.

Visual Assessment of Trees. The trees have been assessed from ground level only in line with the guidelines outlined in British Standard BS5837:2012. This provides information for the retention and protection of trees upon development sites. Information upon the trees is in the Tree Schedule in APPENDIX – TREE SCHEDULE & EXPLANATORY NOTES.

General Site Issues. Whilst on-site a range of general arboricultural issues were seen which have the potential to affect the development of trees and may result in future problems or which again could result in elevated management costs for the site in the future.

T5 has failed a limb, it is hung up over the woodland path going though the wooded section and this needs removing for safety irrespective of development, the failed limb is highlighted in dashed red below.

The photograph of T5 and failed limb



Please do not hesitate to contact me should you require any additional information or clarification of any of the points below.

General Tree Works. The trees require management to improve their condition. General works are detailed within the tree schedule in APPENDIX – TREE SCHEDULE & EXPLANATORY NOTES. This work is required regardless of the development proposals and should ideally be undertaken within the next 12 months. These works should be viewed in isolation to the development proposal in planning terms.

Tree constraints. Typically, trees can offer constraints to potential layouts. Ideally, the requirements of the trees and the proposal should be considered at the design stage. I have included a general guide to potential tree constraints in APPENDIX - TREE CONSTRAINTS .

In general, the proposed site changes should, wherever possible, be located outside the minimum Root Protection Area (RPA) indicated by the magenta circle/ Cyan dashed line on the Site Plan BA26012TS in APPENDIX - TREE SURVEY PLAN.

In addition to this, to help avoid future conflict, it is worthwhile locating higher use elements of the building outside the current and potentially the forecasted canopy shade areas, again these areas are indicated on the Site Plan BA26012TS in APPENDIX - TREE SURVEY PLAN.

General Risks to Trees. The development process does have the potential to both damage existing trees and compromise tree planting opportunities through the severance of roots or changes to the soil levels, volume or structure. I have included a general guide to potential tree damage in APPENDIX - RISKS TO TREES DURING CONSTRUCTION.

Protection of Trees. The potential for conflicts between a proposal and the existing trees may exist. However, often these foreseeable risks can be defended through the adoption of tree protection to help protect the Root Protection Area and maintain sufficient space to enable the confident retention of trees. Tree protection requires a combination of protective fencing, ground protection, and the adoption of building design, materials and techniques that can sustain normal growth, further details included in APPENDIX - TREE PROTECTION.

Ideally, a detailed appraisal of the potential impacts of a scheme should be discussed within an **Arboricultural Implication Assessment (AIA)**, once the development becomes better defined to detail the likely effects and protection requirements.

Conclusions. In general, the trees are in good to fair condition considering their location and past management, but I think for the safety of the site uses a walk round risk assessment on a 18-month basis would help manage the site as there were some large split out branches surrounding the playing fields.

Retained trees need to be considered as part of any site changes and protected from the potentially negative effects of alterations or construction.

Considering the relative size of the site and its past management, I conclude that a proposal to develop this site should be relatively straightforward, providing the protection requirements are detailed within an Arboricultural Impact Assessment and trees are acknowledged and appropriate protection methods are conditioned

Lloyd Barnes
Technical member of the Arboricultural Association,
Extended Diploma Level 3 in Arboriculture & Forestry

APPENDICES

APPENDIX - TERMS OF REFERENCE

The Terms of Reference. This report is based upon a ground based assessment and is based upon the Visual Tree Assessment (VTA) methodology, as devised by Mattheck (1993) in addition to Hazard Evaluation devised by Matheny & Clark (1993). Guidance is also taken from Lonsdale (1999) Principles of Tree Hazard Assessment and Management. The format of the survey follows the guidelines of British Standard BS5837:2012 'Trees in relation to design, demolition & construction - Recommendations' & The ISA Tree Risk Assessment Manual (2013).

Tree Categorization. To help understand the value of the trees both on the site and in relation to the wider area the trees have been assessed in line with the guidelines in BS5837:2012 Section 3.5 Tree categorization method. Which suggests that trees should be categorized using the criteria shown in Table 1 (BS5837), which is included on the Plan in APPENDIX – TREE SURVEY PLAN

Tree Risk - Target evaluation. To enable a balanced approach to the site assessment I undertook an initial assessment of the associated risks on site to identify areas of high public access, areas where trees are within striking range of valuable or fragile structures or high human occupancy locations. Targets are broadly zoned in the 'Target' ranges based on the levels of occupation, population and value. Target areas are assumed high as a result of the level of public access.

Risk Assessment. The assessment follows the general principles of Risk Assessment; Risk assessment is important to reduce the risk of injury to people, property damage or disruption of services. The International Society of Arboriculture (ISA) Tree Risk Assessment Methodology takes a qualitative rather than quantitative approach to risk assessment. The system uses matrices to compare the likelihood of failure of a tree or tree part, the likelihood of impacting the target and the potential consequences of failure.

Visual Assessment of Trees. The trees have been assessed from ground level only in line with the guidelines outlined in British Standard BS5837:2012. This provides information for the retention and protection of trees upon development sites. Information upon the trees is located in the Tree Schedule in APPENDIX – TREE SCHEDULE & EXPLANATORY NOTES.

General Tree Works. The trees require management to improve their condition. General works are detailed within the tree schedule in APPENDIX – TREE SCHEDULE & EXPLANATORY NOTES. This work is required regardless of the development proposals and should ideally be undertaken within the next 12 months. These works should be viewed in isolation to the development proposal in planning terms.

Tree Protection. To help reduce the potential impact of site changes BS5837:2012 recommends in Section 3.7 that a Root Protection Area (RPA) which is a protected area based upon the Root Protection Area - a point equivalent to 12 times the trunk diameter or by ensuring the effects of site changes such as excessive root severance or compaction can be controlled. This is included as a layout design tool. This indicates the minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the tree's viability, and where the protection of the roots and soil structure is treated as a priority. The Root Protection Area for each tree is plotted as a magenta circle on the plan included as APPENDIX – TREE SURVEY PLAN

Where pre-existing site conditions or other factors indicate that rooting has occurred asymmetrically, a polygon of equivalent area is included. This modification to the shape of the Root Protection Area reflects a soundly based arboricultural assessment of likely root distribution. This has been included as a dashed magenta line on the plan included as APPENDIX – TREE SURVEY PLAN
Ideally, this area should remain free from soil disturbance whenever possible. Tree protection should revolve around the need to prevent compaction or excavation within the soil profile or significant changes to the existing soil levels close to retained trees. Appropriate site organisation and management are essential following the adage of '*Prevention is better than Cure*'. Unfortunately, tree damage can easily occur and although it is costly to repair, it comes with few guarantees.

APPENDIX – CONSULTANT BRIEF QUALIFICATIONS AND EXPERIENCE

Mr Ian Barnes - Director
RCArbor.A, F.Arbor.A, C.Hort, CEnv,
Arboricultural Association Registered Consultant, Fellow Arboricultural Association, Chartered Horticulturalist, Chartered Environmentalist.
Professional member Consulting Arborist Society.
BSc (Hons), Arboriculture and Urban Forestry, HND Arboriculture. NDHt/Arb, Cert Arb L4 (ABC), ISA TRAQ Trained, QTRA Licensed

Ian has been in the Horticulture and Arboricultural industry since 1985. He has experience in commercial horticulture, Local Authority, and Highway Authority tree surveying. He has been a commercial Arboricultural climber for 15 years. He ran in partnership a tree and landscape contracting business for over 15 years. He has been a full time Arboricultural consultant since 2007. His main area of works are trees and development (BS5837) and advanced tree assessments using various advanced techniques. He is a qualified tree risk assessor and experienced in trees and subsidence claims. He is a trainer in the UK for Fakopp equipment, Sonic and Electronic tomography, and Dynaroot and Static Tree pulls. He is also director of a hi-tech arborist/ landscape equipment and training company Tree Diagnostics - providing training to arborists in advanced assessments. He undertakes ground-penetrating radar (Tree Radar) scans.

Mrs Sue Barnes- Director
CMLI, F.Arbor.A, C.Hort, CEnv, MBALI
Chartered Landscape Architect, Fellow Arboricultural Association, Chartered Horticulturalist, Chartered Environmentalist, Registered Designer BALI.
FdSc Arboriculture, NDHt/Arb
Professional Member Consulting Arborist Society, Affiliate member RIBA,

Sue has been in the Horticulture / Arboricultural industry since 1986. She has experience in amenity parks and gardens and has been a head gardener for Local Health Authority. In partnership she ran a tree contracting and landscape design and build company for 15 years and also has been a tree and landscape consultant full time since 2007. Her main area of works is detailed commercial planting design, specifications (NBS), tree planting specifications and Arboricultural management, Trees on development sites BS5837 reports and plans. Experienced in trees and subsidence and also legal and planning conditions in regard to trees and landscapes. Experienced in large scale landscape design for Housing developers, commercial schemes along with school design primarily detailed planting plans. Specialist landscape surveyor – Poisonous plants / invasives. LVIA Landscape Visual Impact Assessments. Tree and Landscape planning locum consultant for Local authorities. Sue assists in undertaking ground-penetrating radar (Tree Radar) scans along with assisting with other further investigation works on trees such as tomography scans and assists in dynamic and static tree tests.

Mr Matt Metcalfe – Lead Surveyor/Consultant/UAS Pilot
M.Arbor.A
Professional member of the Arboricultural Association,
City and Guilds NPTC assessor/ Instructor
FdSc Arboriculture, National Diploma in Arboriculture, Level 5 Certificate in Education.
VALID tree risk validator
GVC Commercial Drone Pilot
IOSH Managing Safety in the Workplace

Matt has worked in the Arboricultural Industry since 2000, Firstly, as a climbing arborist in both the public and private sector. In 2009 Matt started teaching Arboriculture at a land-based college in York and became a City and Guilds NPTC assessor. In 2013 he became a course manager and internal verifier for the level 2 work-based learning-apprenticeships where later he became a senior course manager overseeing the management of other arboricultural courses. In 2018 he became a fulltime consulting arborist and provides advanced tree assessment training, undertakes BS5837 tree surveys, Arboricultural safety audits and is a trained tree risk assessor/validator. He undertakes ground-penetrating radar (Tree Radar) scans along with other further assessments on trees such as tomography, dynamic tree testing and static tree pulls. In 2021 he undertook the A2CoC and GVC Drone licences and carries out drone surveys of trees which also includes 2D and 3D mapping of sites. Also, in 2021 mat completed IOSH Managing safety in the workplace.

Mr John Evans – Consulting Arborist
Technical member of the Arboricultural Association,
Forestry and Arboriculture Level 3
Lantra Professional Tree Inspector

For the past six years, John has been a climbing arborist, firstly working freelance for utility and domestic clients, then joining Darlington Borough Council. Whilst working for the council, he continued his professional development and working below and observing Darlingtons Tree Officer. John was very excited to move into a role with Barnes Associates to continue his development, learning how to use the advanced tree surveying equipment and developing into BS5837 report writing.

Mr Jim Barnes – Arboricultural Surveyor
Technical member of the Arboricultural Association,
Extended Diploma Level 3 in Arboriculture & Forestry
Level 4 in Arboriculture & Forestry Apprenticeship Scheme – Current
Lantra Professional Tree Inspector

Jim completed his Level 3 Extended Diploma in 2017 to become a commercial tree climber and tree care assistant as part of a private company. He gained experience of dealing with the latest, most invasive pest in Southern England, the Oak Processionary Moth, carrying out aerial decontamination and collection. He performed tree care works for District Councils and Highways, the Environment Agency through to medium to large scale forestry clearance and planting schemes. He has also undertaken plant healthcare throughout the country, using the latest modern technology and methods from soil aeration/decompaction works, utilising Air-Spade for root/ground care investigation, and remedial works to soil and/or roots in sensitive and hard to access locations. He then set up his own tree care company, focusing on proper care and management and carrying out remedial soil/ground works, general Arboricultural and tree surgery; coping with a range of clients and meeting the Local Authorities policies with managing planning applications and necessary aftercare, working to BS:3998:2010 standards. Before this he was involved within the Consulting industry from a young age, assisting with walkthrough tree assessments and further investigation works such as Tomography. He is now looking forward to expanding his education within the consulting industry by furthering his technical knowledge of further investigations and working towards advancing in BS5837 surveys.

Mr Lloyd Barnes – Arboricultural Surveyor
Technical member of the Arboricultural Association,
Extended Diploma Level 3 in Arboriculture & Forestry
Level 4 in Arboriculture & Forestry Apprenticeship Scheme – Current
Lantra Professional Tree Inspector

Lloyd completed his Level 3 Extended Diploma in 2020 and then started working for a small private tree surgery firm, carrying out all aspects of tree work from tree management to soil care and everything in between in domestic, highway, and forestry settings. He has worked for large councils, Environment Agency, Forestry Commission, large development sites with large planting schemes and aftercare. He then set up his own tree care business focusing on the care and management of trees, undertaking works to BS3998:2010 standards. He also got into the specialist area of soil/ ground care management for trees. He worked with a wide range of clients throughout the time of running the business, dealing with all sorts of problems that come with running your own business. He has grown up being surrounded by the arboricultural industry. He now undertakes walk-round tree risk assessments and further assessments using sonic and electrical impedance tomography, expanding his knowledge, experience, and education in these areas. He is advancing into BS5837 surveys, working with numerous architects and developers.

APPENDIX – TREE SCHEDULE & EXPLANATORY NOTES

The following survey has been prepared from a visual assessment taken from ground level without any detailed investigation. Observations are based upon the body language of the trees and any visual indicators present at the time of This survey should be regarded as a preliminary overview; ongoing inspections will be required as specified individually. In most situations, the health, condition and safety of trees should be checked on a cyclic basis, alternating between early and late seasons to ensure a full picture of tree health is established. Inspections should only be carried out by a suitably qualified arborist.

Similarly, numerous potential defects may not be detectable dependent upon the timing of inspection; in particular, wood decay fungi may only produce external fructifications annually (rather than perennially), or may not provide external symptoms until an advanced state is achieved.

Reasonable risk management generally aims to provide a tree that can be regarded stable in normal/foreseeable, regularly experienced storm events i.e. force 10 storms. The level of risk offered by the tree will be significantly greater as the wind speed that the tree is exposed to increases beyond this level. Additionally, the threat from aerial parts, i.e., included unions, may remain even following works, although failures of such parts are likely to be limited to small diameter branches and to periods of extreme weather.

As an arborist, I am a tree specialist and use my knowledge, education, training and experience to examine trees, recommend measures to enhance their beauty and health, and attempt to reduce the risk of living near trees. As a client, you may choose to accept or disregard these recommendations or seek additional advice.

As an arborist I cannot detect every condition that could possibly lead to a tree or limb failure. Trees are living organisms that may fail in many ways, some of which we do not fully understand.

Conditions are often hidden within the tree and below the ground. As arborists, we cannot guarantee that a tree will be healthy or safe under all circumstances or for a specified period of time. Sometimes trees may appear "healthy," but may be structurally unsound. Likewise, remedial treatment, like any medicine, cannot be guaranteed.

Treatment, pruning and removal of trees may involve considerations beyond the Arboricultural perspective, such as property boundaries and ownership, disputes between neighbours, planning issues, sight lines, landlord-tenant matters etc. Arborists cannot take such issues into account unless complete and accurate information is given to them. Likewise, as an arborist I cannot accept any responsibility for the authorisation or non-authorisation of any recommended treatment or remedial measure.

Furthermore, certain trees are borderline cases as to whether they should remain or be removed. If conditions change a tree may need further monitoring in the future to determine its health and structure. Trees can be managed, but they cannot be controlled, and to live near a tree is to accept some degree of risk.

Mathematical abbreviations: > Greater than, < Less than.

Est: This includes any attributes that have been estimated.

Measurements/estimates: Measurements are taken with a tape, clinometer or laser. If dimensions are estimated, this will be indicated within the Est column.

Tree number: Numbered Tag attached to each stem, usually on the inside face of the stem at roughly 2.5 metres. Where the number is prefixed by a T, G, H, A, ST, S or W this denotes that the tag refers to a Tree, Group, Hedge, Area, Stump, Shrub or Woodland.

Name: Tree species are detailed by their common name- Latin can be provided upon request.

Age: I record the age as an estimate of the tree's likely span for guidance only, i.e.:

Y	Young	Recently established/planted tree.	M	Mature	The middle one-third of its likely expected lifespan
SM	Semi Mature	Fully established and growing with high vigour	OM	Over Mature	The later one-third of its likely expected life span with sign of canopy retrenchment.
EM	Early Mature	The first third of its likely expected lifespan	V	Veteran	An aged example of the species, typically with defects & conservation value
			A	Ancient	Beyond its expected Life span possible of historical interest or in a state of decline

Height: I estimate height to the nearest metre to the mean height.

Crown Height: I estimate height to the nearest half metre to the mean underside of the canopy.

FSB: The height and direction of the First Significant Branch.

Diameter: These figures relate to a measurement of the stem at 1.5m above ground level recorded in millimetres, measured with a rounded-down diameter tape.

Canopy (N S E W): I estimate the distance of the canopy radius to the nearest metre to provide a mean distance of separation between the stem and the outer canopy.

Condition: Is a personal assessment of the tree's growth rate in the current season, in comparison to other trees within the locality, region and an indicator of the tree likely response to site change.

Good	A tree of normal vitality	Fair	A tree of lower vitality	Poor	A tree of low vitality	Dead	A dead or very low vitality tree

Life Expectancy: Is a personal assessment of the trees likely expected remaining safe life span in years, assuming the current site management continues, or the tree is protected from significant environmental change. Trees can enter into serious decline with site changes and likewise, the expected safe life can be significantly improved following changes/improvements to site management and following remedial works.

Category: Assess in line with Table 1 BS5837 – copied below.

Symbol Guide:

BS5837	Cascade chart for tree quality assessment			
Category and definition	Criteria (including subcategories where appropriate)			Identification on plan
Trees unsuitable for retention (see Note)				
Category U Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years	Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees (e.g. where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning) Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline Trees infected with pathogens of significance to the health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality *NOTE Category U trees can have existing or potential conservation value, which it might be desirable to preserve; see 4.5.7.*			Red on Plan
Trees to be considered for retention	1 Mainly arboricultural qualities	2 Mainly landscape qualities	3 Mainly cultural values, including conservation	
Category A Trees of high quality with an estimated remaining life expectancy of at least 40 years	Trees that are particularly good examples of their species, especially if rare or unusual; or those that are essential components of groups or formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue)	Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture)	Green on Plan
Category B Trees of moderate quality with an estimated remaining life expectancy of at least 20 years	Trees that might be included in category A, but are downgraded because of impaired condition (e.g. presence of significant though remediable defects, including unsympathetic past management and storm damage), such that they are unlikely to be suitable for retention for beyond 40 years; or trees lacking the special quality necessary to merit the category A designation	Trees present in numbers, usually growing as groups or woodlands, such that they attract a higher collective rating than they might as individuals; or trees occurring as collectives but situated so as to make little visual contribution to the wider locality	Trees with material conservation or other cultural value	Blue on Plan
Category C Trees of low quality with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150 mm	Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories	Trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value; and/or trees offering low or only temporary/transient landscape benefits	Trees with no material conservation or other cultural value	Grey on Plan

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.

Comments / Observations: General comments referring to tree health, structure and condition.

Management Options: Comments detailing remedial works required to improve immediate safety or improve the management of the tree.

Tree Risk Assessment: At Barnes Associates Ltd, we are experienced in the management of the risks associated with trees and have undertaken training in all of the principal methodologies in commercial use today, including Matheny and Clarke, Quantified Tree Risk Assessment (QTRA), THREATS (Tree Hazard: Risk Evaluation and Treatment System), Tree Risk Assessment Qualification (TRAQ) and VALID Tree Risk-Benefit Management & Assessment. Having experience in several methods, it was perhaps inevitable that we developed our own system to reflect both the benefits of the other systems and changes in current legislation and court decisions, following continual study and application of tree risk management in the real world across the wide range of environments where trees can be found and in which we find ourselves.

We typically apply our BARMY (Barnes Associates Risk Method (of) Yorkshire) - we are proudly based in Yorkshire and could not resist the inclusion of the 'Y'. We openly admit this is a method based upon the THREATS, methodology. The complete details of THREATS (Tree Hazard: Risk Evaluation and Treatment System) can be found at https://www.flac.uk.com/wp-content/uploads/2010/07/THREATS-GN-June-2010.pdf

Firstly, we must thank Julian Forbes-Laird (JFL), for his work and philanthropic approach to developing and gifting this risk assessment methodology to the arboricultural and forestry world, which has been and continues to be used widely.
However, following extended use and seeing several cases go through the legal system, one small element of the THREATS system became increasingly problematic for us; namely, the THREATS system included a 'None Apparent' failure score with a 0 (zero) and a Failure Score that attributed a 0 (zero) to sites with a Target Score of None. This results in a compounding multiplication risk assessment product of 0 (zero) score, as shown in the table below. Following long-term use, this felt increasingly uncomfortable and undefendable as it is difficult for us to conclude that any tree or site offers 'No Risk', unless access is strictly controlled or restricted.

Table 1 – Shows all possible outcomes using THREATS

	Impact Score	1	1	1	1	1	1	4	4	4	4	4	4	6	6	6	6	6	6	10	10	10	10	10	10
		Small <10cm	Small <10cm	Small <10cm	Small <10cm	Small <10cm	Small <10cm	Medium 10-35cm	Medium 10-35cm	Medium 10-35cm	Medium 10-35cm	Medium 10-35cm	Medium 10-35cm	Large 35-75cm	Large 35-75cm	Large 35-75cm	Large 35-75cm	Large 35-75cm	Large 35-75cm	Very Large >75cm	Very Large >75cm	Very Large >75cm	Very Large >75cm	Very Large >75cm	Very Large >75cm
	Target Score	0	7	15	20	25	40	0	7	15	20	25	40	0	7	15	20	25	40	0	7	15	20	25	40
Failure Score		None	Very Low	Low	Medium	High	Very High	None	Very Low	Low	Medium	High	Very High	None	Very Low	Low	Medium	High	Very High	None	Very Low	Low	Medium	High	Very High
0	None Apparent	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.8	Potentially with time	0	5.6	12	16	20	32	0	22.4	48	64	80	128	0	33.6	72	96	120	192	0	56	120	160	200	320
2	Likely Foreseeable	0	14	30	40	50	80	0	56	120	160	200	320	0	84	180	240	300	480	0	140	300	400	500	800
8	Probable Soon	0	56	120	160	200	320	0	224	480	640	800	1280	0	336	720	960	1200	1920	0	560	1200	1600	2000	3200
50	Imminent Immediate	0	350	750	1000	1250	2000	0	1400	3000	4000	5000	8000	0	2100	4500	6000	7500	12000	0	3500	7500	10000	12500	20000

We could not knowingly conclude that a site or tree offered no risk, and this led to the development of BARMY to help better reflect our instincts in relation to the small but still present risk offered by trees on sites even when access is very limited. Essentially, we have copied THREATS and to JFL we are eternally thankful for opening the door. However, to better reflect the site we manage and the sites we visit, we have substituted both the descriptors for the 'Target Score' from 'None' to 'Minimal' and the Failure Score from 'None Apparent' to 'Unlikely'. In undertaking these changes, we have adjusted the scores associated with these descriptions as described below and shown in the table below. We have elevated the score from 0 to 0.4 for 'Minimal. This is simply half of THREATS 'Potentially with time' score. Additionally, we have raised the score for None from 0 to 1.5 for 'Minimal'. The results of these small changes are shown in the table below.

Table 2 – Shows all possible outcomes using BARMY

	Impact Score	1	1	1	1	1	1	4	4	4	4	4	4	6	6	6	6	6	6	10	10	10	10	10	10
		Small <10cm	Small <10cm	Small <10cm	Small <10cm	Small <10cm	Small <10cm	Medium 10-35	Medium 10-35	Medium 10-35	Medium 10-35	Medium 10-35	Medium 10-35	Large 35-75	Large 35-75	Large 35-75	Large 35-75	Large 35-75	Large 35-75	Very Large	Very Large	Very Large	Very Large	Very Large	Very Large
	Target Score	1.5	7	15	20	25	40	1.5	7	15	20	25	40	1.5	7	15	20	25	40	1.5	7	15	20	25	40
Failure Score		Minimal	Very Low	Low	Medium	High	Very High	Minimal	Very Low	Low	Medium	High	Very High	Minimal	Very Low	Low	Medium	High	Very High	Minimal	Very Low	Low	Medium	High	Very High
0.4	Unlikely	0.6	2.8	6	8	10	16	2.4	11.2	24	32	40	64	3.6	16.8	36	48	60	96	6	28	60	80	100	160
0.8	Potentially	1.2	5.6	12	16	20	32	4.8	22.4	48	64	80	128	7.2	33.6	72	96	120	192	12	56	120	160	200	320
2`	Likely	3	14	30	40	50	80	12	56	120	160	200	320	18	84	180	240	300	480	30	140	300	400	500	800
8	Probable	12	56	120	160	200	320	48	224	480	640	800	1280	72	336	720	960	1200	1920	120	560	1200	1600	2000	3200
50	Imminent	75	350	750	1000	1250	2000	300	1400	3000	4000	5000	8000	450	2100	4500	6000	7500	12000	750	3500	7500	10000	12500	20000

As can be seen from the table above, no tree now offers a Zero risk, which we would suggest better reflect the sites which we find ourselves assessing for clients. The only significant differences are that Large and Very Large trees with an Imminent failure score now are recorded as offering a Moderate Risk, which after much consideration, sits a little more comfortably with both our teams and clients.
So, whenever we are assessing trees, the BARMY method will be used and has been designed to offer all those who have responsibility for evaluating and managing trees a means of assessing them for risk in a consistent fashion.

BARMY also assists the user in determining the appropriate response to the level of identified risk, and this includes both works and intermediate control measures. The method multiplies three values together to give a threat category which guides the inspector on an appropriate response to the risk posed.

Failure Score: Identified defects in relation to species/clone history, established failure criteria & time of year are considered.

Target Score: Impact radius of identified defect against potential targets (objects or persons liable to be affected by tree defect), forward visibility available to drivers (Poor Forward Visibility / Good Forward Visibility) & whether vehicles are likely to be stationary, e.g., at junctions are all considered. If targets are liable to include unsupervised children &/or the elderly or infirm the score is increased by one category.

Impact Score: Height of fall/momentum & whether e.g., lower branches would impede the agent's descent are considered.

Table 3 – Example of the BARMY calculation method and products

Failure Score	
Likelihood of failure	Score
Imminent	50
Probable/Soon	8
Likely, foreseeable	2
Potentially with time	0.8
Unlikely	0.40

X

Target Score	
Value	Score
Very High	40
High	25
Medium	20
Low	15
Very Low	7
Minimal	1.5

X

Impact Score	
Value	Score
Very Large	10
Large	6
Medium	4
Small	1

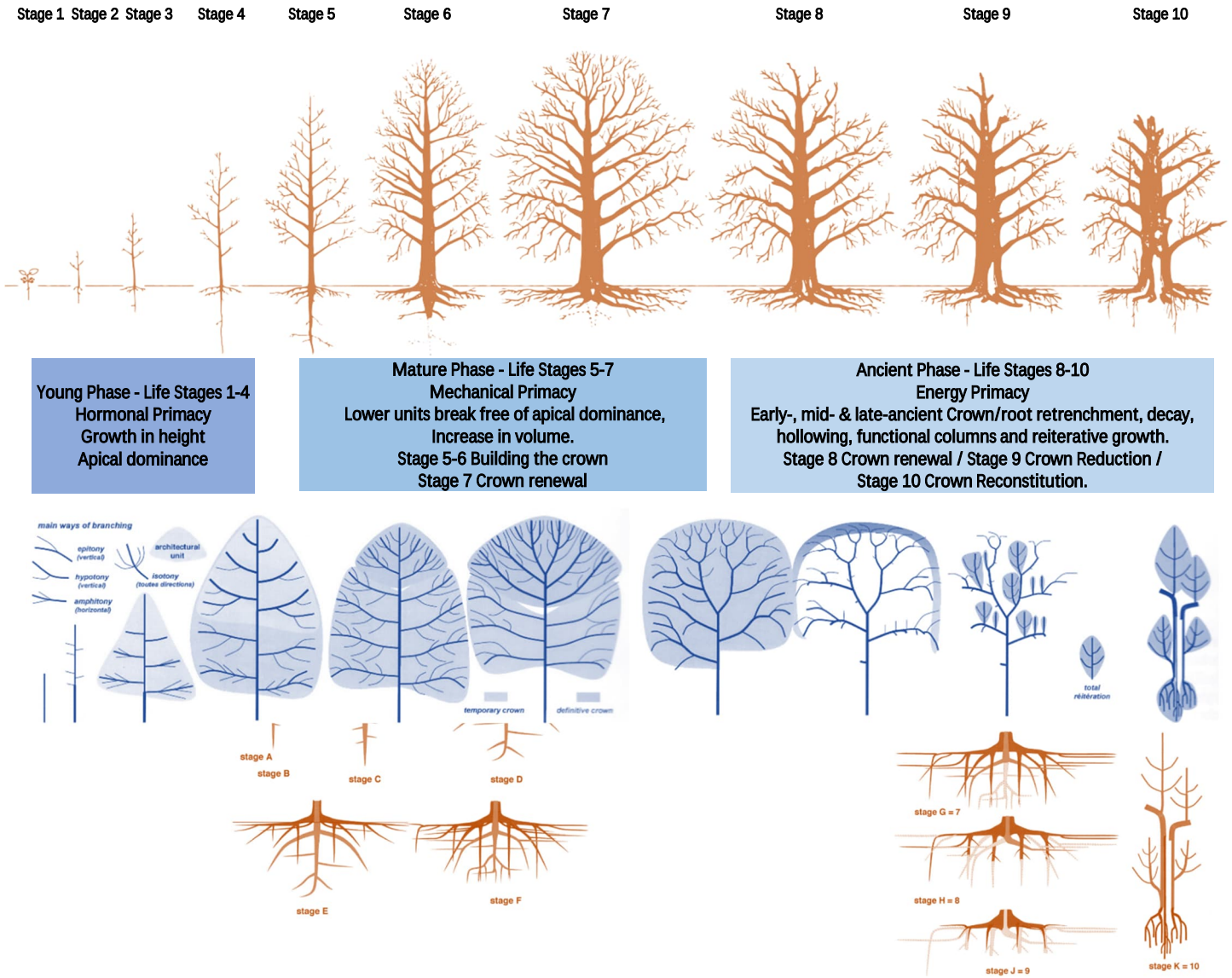
=

BARMY - Risk Category		
Score Range	Threat Category	Priority, Recommended Action & Completion deadline
4000+	7 – Extreme	Critical - Work to be carried out as soon as practically possible. i.e. <7 days or control access
2001 - 3999	6 – Serious	Urgent – Work to be carried out as soon, i.e within 1 month or control access
1000 - 2000	5 – Significant	High – Work to be carried out in the near future i.e. within 3 months or restrict access
330 - 999	4 – Moderate	Moderate - Work to be carried out in the current season i.e. within 6 months or limit access
160 - 329	3 – Slight	Low – Work to be carried out before the next inspection i.e. within 18 months
50 - 159	2 – Minimal	Minor - Works to be carried out If these meet management objectives and if budgets allow
0 - 49	1 – Insignificant	Minor - Works to be carried out If these meet management objectives and if budgets allow

Unless stated otherwise, the risk assessment assumes the risk is offered over the next year.

Priority: Guidance for the time scale in which works should be completed, from the date of the report.

Morpho-physiological stages of development: Developmental stages of (a) aerial & root systems through the ageing process corresponding to (b) trunk decay habitat (after Raimbault 1995; Lonsdale 1999; Fay 2002)



Safety Factor. Safety factor is the ratio of the wood strength from the species database as shown at "Strength" and this computed maximal stress, multiplied by a correction factor of 70%. The formula is: (SF=0.7 $Strength$ / $MaxStress$). The rationale behind this approach is that given all the parameters above the software tries to estimate the stress in the wood and if this exceeds the maximum limit the material can resist, then the trunk would break. This is based upon several key elements including:

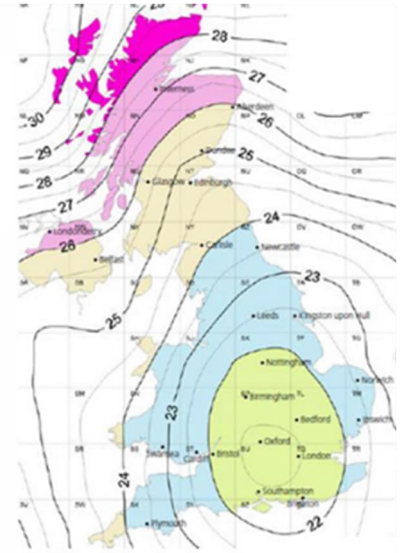
- Expected wind speed will not breach 33m/s or 72 mph.
- Drag factor is the drag coefficient of the crown, taken from the tree species database.
- Strength is the yield strength of the trunk wood, also taken from the species database.
- Wind force the calculated force acting on the crown size & centre at a given wind speed.
- The estimated total weight of tree that is above the selected layer.
- The torque resulting from the wind and gravity forces.
- Max stress is the maximal stress resulting from the torque and mass of the tree, taking into consideration the tomogram. The Layer Details section shows the details for the selected layer. Decayed area is the percentage of the decayed region on the selected layer compared to the total layer area.

Safety Factor	SF >1.5 (150%)	SF 1.5 - 1 (150% - 100%)	SF 1 – 0.5 (100% - 50%)	SF <0.5 (50%)
Risk Rating	Low Risk	Moderate Risk	High Risk	Extreme Risk

Wind Speed. In general, the windiest parts of the UK are the north and west. This is because the prevailing west to south-westerly winds across the UK lead to northern and western areas being typically more exposed than the south and east.

There are also a lot of localized effects with most hills, mountains and coasts being windier than low-lying inland areas. Wind speed increases as you go upwards away from the friction caused by the earth's surface. This also explains the windier coasts as the sea surface produces less friction than the land.

The map opposite is based upon information published in the UK National Annex to Eurocode 1 - Actions on structures Part 1-4: General actions - Wind actions and provide design wind speed for area in the UK.



Est	Tag No.	Name	Age	Height (m)	Crown Height (m)	North (m)	East (m)	South (m)	West (m)	Condition	Life Exp (Yrs)	BS5837 Category	Diameter (mm)	Stem No.	Comments	Recommendations	Risk	Root plate (m)	Root Protection Radius (m)	Root Protection Area (m^2)
	T1	Flowering Cherry	SM	6.5	2	3	3.5	3	4	Good	20 or more	B2	200	1	Located on site growing as part of a group. Located next to hard Surfacing tarmac, a security fence. Single stem. Crown distorted due to group pressure. A good example with good potential. large buttress towards the west	Crown lift to provide highway clearance.	Insignificant	0.8	2.4	18.1
	T2	Black Pine	EM	12	2	2	3.5	3	3	Good	20 or more	B2	400	1	Located on site growing as part of a group. Located next to hard Surfacing tarmac, a metal fence a security fence, road. Single stem. Crown distorted due to group pressure Crown distorted due to available light. Typical foliage suggests good vitality. Typical foliage density. A good example with good potential.	Crown lift to provide highway clearance.	Insignificant	1.6	4.8	72.39
Est Pos	G3	Common Ash, Cherry Plum, Black Pine	EM	12	1.5	2.5	2.5	2.5	2.5	Fair	20 or more	B2	300	1	Located on site growing as part of a group. Growing as part of a woodland. Growing within a lawn. Located close to a metal fence, security fence, road. A good group with good potential with signs of regular management. A typical group for the area.		Minimal	1.2	3.6	40.72
Est Pos	T4	Cherry Plum	M	10	0.5	5	3	5.5	7	Fair	20 or more	B2	4004 50	2	Located on site growing as part of a group. Biforked close to ground level with a slight lean, with buttress and trunk epicormic shooting, biforked below the canopy with open union. An open union co-dominant stem is developing from the main stem. Small diameter deadwood in the inner canopy. High-end loading can be seen on branches elongated branches are visible within the canopy. Crown distorted due to group pressure.	Reduce the elongated branches within the canopy	Slight	2.41	7.22	163.79

Est	Tag No.	Name	Age	Height (m)	Crown Height (m)	North (m)	East (m)	South (m)	West (m)	Condition	Life Exp (Yrs)	BS5837 Category	Diameter (mm)	Stem No.	Comments	Recommendations	Risk	Root plate (m)	Root Protection Radius (m)	Root Protection Area (m^2)
Est Pos	T5	Pedunculate Oak	SM	13	2	7	4	4.5	6	Poor	10 or more	C2	300	1	Located on site growing as part of a group. Growing as part of a woodland. Single stem broken branches visible within the canopy and loose branches can be seen within the canopy. Hung up branches can be seen within the canopy. Unbalanced crown shape.	Remove failed branches within the canopy.	Slight	1.2	3.6	40.72
Est Pos	T6	Common Ash	M	15	3	6	6	6	6	Fair	20 or more	B2	580	1	Located on site growing as part of a group growing as part of a woodland. Located next to road, single stem. Small diameter deadwood in the inner canopy. Ash Dieback Class 1 100-75% canopy remaining, Ash Dieback Class 2 75-50% canopy remaining. Fair potential and well-located.		Minimal	2.32	6.96	152.2
Est DBH, Est Pos	G7	Field Maple, Silver Birch, Common Hawthorn, Common Ash, Cherry Plum, Black Pine	SM	12	2	2	2	2	2	Fair	20 or more	B2	250	1	Located on site growing as part of a group growing as part of a woodland. Growing as part of a shelterbelt. Located close to a metal fence security fence, road. Small diameter deadwood in the inner canopy. Crown distorted due to group pressure. A good mixed group with good potential.		Minimal	1	3	28.28
Est DBH, Est Height, Est Pos, Est Spread	G8	White Willow	SM	6	3	1	1	1	1	Poor	10 or more	C2	100	1	Located on site growing as part of a group. Single stem broken branches visible within the canopy. Hung up branches can be seen within the canopy not maintained.	Remove failed branches. Maintain the group.	Insignificant	0.4	1.2	4.52
Est DBH, Est Group Numbers, Est Height, Est Pos, Est Spread	G9	Norway Maple, Silver Birch, Purple-Leaved Cherry, Common Plum, Black Pine	SM	12	0.5	2.5	2.5	2.5	2.5	Fair	20 or more	B2	300	1	Located on site growing as part of a group growing as part of a woodland. Located next to a metal security fence, road. Single stem. Small diameter deadwood in the inner canopy. Crown distorted due to group pressure. A good group with good potential. A typical group for the area. Standing dead trees within the group.		Minimal	1.2	3.6	40.72

Est	Tag No.	Name	Age	Height (m)	Crown Height (m)	North (m)	East (m)	South (m)	West (m)	Condition	Life Exp (Yrs)	BS5837 Category	Diameter (mm)	Stem No.	Comments	Recommendations	Risk	Root plate (m)	Root Protection Radius (m)	Root Protection Area (m²)
	T10	Black Pine	EM	12	2	3	3	3	3	Good	20 or more	B2	400	1	Located on site growing as part of a group. Located next to a metal security fence, road. Single stem. Crown distorted due to group pressure. Crown distorted due to available light. Typical foliage suggests good vitality. Typical foliage density. A good example with good potential.		Insignificant	1.6	4.8	72.39
Est DBH, Est Group Numbers, Est Height, Est Pos, Est Spread	G11	Field Maple, Norway Maple, Common Ash, Cherry Plum, Flowering Cherry	SM	13	1.5	2.5	2.5	2.5	2.5	Fair	20 or more	B2	250	1	Located on site growing as part of a group growing as part of a woodland. Located next to a metal fence security fence, road. A good group with good potential, good mixed group with good potential. A typical group for the area. Standing dead trees within the group Some trees have failed within the group.		Insignificant	1	3	28.28
Est DBH, Est Group Numbers, Est Height, Est Pos, Est Spread	G12	Norway Maple, Common Hawthorn, Common Ash, Apple, Bird Cherry, Flowering Cherry, Cherry Plum, Black Pine	EM	14	1.5	3.5	3.5	3.5	3.5	Fair	20 or more	B2	300	1	Located on site growing as part of a group growing as part of a woodland. Located next to a metal security fence. Small diameter deadwood in the inner canopy, Ash Dieback Class 1 100-75% canopy remaining, Ash Dieback Class 2 75-50% canopy remaining. Crown distorted due to group pressure crown distorted due to available light. A good group with good potential a good mixed group with good potential. A typical group for the area. Some trees have failed within the group. Some standing dead trees within the group. Included unions within the group. Elongated branches within the group.	Inspection of Ash trees in full leaf.	Insignificant	1.2	3.6	40.72

Est	Tag No.	Name	Age	Height (m)	Crown Height (m)	North (m)	East (m)	South (m)	West (m)	Condition	Life Exp (Yrs)	BS5837 Category	Diameter (mm)	Stem No.	Comments	Recommendations	Risk	Root plate (m)	Root Protection Radius (m)	Root Protection Area (m^2)
Est DBH, Est Group Numbers, Est Height, Est Pos, Est Spread	G13	Common Ash	EM	15	2.5	3.5	3.5	3.5	3.5	Fair	20 or more	B2	350	1	Located on site growing as part of a group located close to hard Surfacing tarmac. Close to a metal security fence, footpath and main building. Damage to surface roots visible. Small diameter deadwood in the inner canopy. Ash Dieback Class 1 100-75% canopy remaining. Ash Dieback Class 2 75-50% canopy remaining. Crown distorted due to group pressure. Crown distorted due to available light. A typical group for the area developing group with fair potential. Roots are starting to lift the tarmac path.	Inspection in full leaf to check vitality. Reduce the elongated branches within the canopies.	Minimal	1.4	4.2	55.42
Est DBH, Est Group Numbers, Est Height, Est Pos, Est Spread	G14	Silver Birch, Common Hawthorn, Elder	EM	6	1.5	2	2	2	2	Fair	20 or more	B2	200	1	Located on site growing as part of a group located next to hard Surfacing. a wooden fence and metal fence. A typical group for the area. A reasonably developing group with fair potential.		Insignificant	0.8	2.4	18.1
Est DBH, Est Group Numbers, Est Height, Est Pos, Est Spread	G15	Elder	EM	6	2	1.75	1.75	1.75	1.75	Fair	10 or more	C2	100	1	Located on neighbouring land. Growing as part of a group. Located next to a wooden fence and metal fence. A typical group for the area. Full inspection not possible		Insignificant	0.4	1.2	4.52
	T16	Common Ash	EM	12	2.5	4	3	3.5	4.5	Poor	10 or more	C2	380	1	Located on site growing as part of a group located next to a metal security fence. Single stem. Small diameter deadwood in the inner canopy. Minor epicormic shoots are visible within the canopy. Ash Dieback Class 2 75-50% canopy remaining. Ash Dieback Class 3 50-25% canopy remaining. Unable to inspect the buttress due to AstroTurf around the base of the tree.	Inspection of the tree in full leaf to check vitality.	Insignificant	1.52	4.56	65.33

Est	Tag No.	Name	Age	Height (m)	Crown Height (m)	North (m)	East (m)	South (m)	West (m)	Condition	Life Exp (Yrs)	BS5837 Category	Diameter (mm)	Stem No.	Comments	Recommendations	Risk	Root plate (m)	Root Protection Radius (m)	Root Protection Area (m^2)
	T17	Field Maple	M	13	2	6	6	6	5	Fair	20 or more	B2	640	1	Located on site growing as part of a group located within gravel. Single stem, multiple forks below the canopy with tight unions. A tight union co-dominant stem is developing from the main stem. Small diameter deadwood in the inner canopy. Wounding from previous pruning wounds.		Minimal	2.56	7.68	185.32
Est Group Numbers, Est Height, Est Pos, Est Spread	G18	Field Maple, Norway Maple, Common Hawthorn, Flowering Cherry	EM	13	2	2	3.5	2	4	Fair	20 or more	B2	300	1	Located on site growing as part of a group located next to and located within gravel. Close to metal security fence, play area and outbuilding. Small diameter deadwood in the inner canopy. Crown distorted due to group pressure. Crown distorted due to available light. A typical group for the area. A reasonably developing group with fair potential.		Minimal	1.2	3.6	40.72
	T19	Common Ash	EM	12	2	5	5	4.5	5	Fair	20 or more	B2	360	1	Located on site growing as part of a group. Girdling roots visible around the base of stem. Single stem. Small diameter deadwood in the inner canopy. Minor epicormic shoots are visible within the canopy. Ash Dieback Class 1 100-75% canopy remaining. Ash Dieback Class 2 75-50% canopy remaining. A typical example with reasonable potential.	Inspection of tree in full leaf.	Minimal	1.44	4.32	58.64
Est DBH, Est Group Numbers, Est Height, Est Pos, Est Spread	G20	Norway Maple, Silver Birch, Hazel, Apple, Cherry Plum, Bird Cherry, Flowering Cherry, Elder, Rowan	EM	12	2	3	2.5	3	2.5	Fair	20 or more	B2	300	1	Located on site growing as part of a group. Located next to a metal security fence, footpath, road and play area. Small diameter deadwood in the inner canopy. A good broadleaf group with good potential. A typical group for the area. A reasonable developing group. Crossing and rubbing branches within the canopy. Signs of recent failures within the canopy and splitting below the canopy to the tree closest to the footpath close to the entrance of the school.	Reduce the canopy of the tree closest to the school entrance that has recently failed.	Minimal	1.2	3.6	40.72

APPENDIX - TREE CONSTRAINTS

Legal constraints. Trees can be protected by planning legislation in several ways. These include being located within a National Park or on a Site of Special Scientific Interest, located within the grounds of a listed building, conservation area or by being subject to a current Planning condition. In general, the main type of protection for trees adopted by the Local Planning Authority (LPA) on potential development sites is the Tree Preservation Order (TPO).

The protection of trees is a duty of the LPA under the Town and Country Planning act 1990 and aims to encourage rational discussion and consideration of trees within the design process. The following guidelines are proposed to encourage rational discussion and consideration of trees within the design process. Legislation indicates that protection should be used to protect healthy trees that are likely to have a reasonable safe useful life expectancy. Generally, those classified with a condition rating of (A) Excellent & (B) Good are worthy of a TPO. Those classified (C) Fair are generally poorer and therefore unlikely to qualify for a TPO on grounds of poor appearance, management issues or unlikely to have a sufficient safe life expectancy. Those trees classified (U) are Unsuitable for retention, generally contain structural defects, have a short safe useful life expectancy or are dangerous and therefore would not qualify for a TPO as indicated within the legislation.

The presence of a TPO should be expected upon development sites for the above reasons. It can however only be regarded as a material consideration, as can any other tree or significant natural feature, and cannot be used as a means of preventing development. Any trees protected or otherwise, which are located on or close to the site can be expected to be regarded as a material consideration or offer a design constraint within the development process.

General Constraints posed by existing trees. The constraints imposed by trees, both above and below ground should inform the site layout design, although it is recognized that the competing needs of development mean that trees are only one factor requiring consideration.

Certain trees are of such importance and sensitivity as to be major constraints on development or to justify its substantial modification. However, care should be taken to avoid misplaced tree retention; attempts to retain too many or unsuitable trees on a site can result in excessive pressure on the trees during demolition or construction work, or post-completion demands for their removal.

Our tree survey schedule in APPENDIX – BS5837 TREE SCHEDULE & EXPLANATORY NOTES and the tree survey plan in APPENDIX - PLANS includes the relevant constraint information, plotted around each of the categories A, B and C trees and included information on shading and the minimum Root Protection Area (RPA), in addition to a suggested limit for construction.

Typically, development should endeavour to retain category A & B trees and category C trees where they can be either improved and included in low risk areas or help improve biodiversity.

Ideally, structures should be located outside areas of shading and the recommended construction limit (Minimum Root Protection Areas plus an additional 2 metres) of trees to be retained should inform the development. However, in some cases the existing site layout has impacted on the trees, in particular when existing structures or hard surfacing extend or have been installed in the root protection areas. To help understand this I have colour coded the principal Structures, Hard Surfacing, Services, Earthworks and areas of High water content on the tree survey plan in APPENDIX - PLANS

However, where there is an overriding justification for construction within the RPA, technical solutions might be available that prevent damage to the tree(s). If operations within the RPA are proposed additional information can be provided to demonstrate that the tree(s) can remain viable and offer mitigation measures such as but not limited to, improvements to the soil environment that is to be used by the tree for growth.

APPENDIX - DESIGN CONSIDERATIONS

Care is needed regarding the retention of large, mature, over-mature or veteran trees which become enclosed within the new development. Where such trees are retained, adequate space should be allowed for their long-term physical retention and future maintenance. However, such retentions are seen as beneficial, helping to contribute to climate change resilience, amongst other benefits of habit and biodiversity. Achieving successful integration of large species trees requires careful consideration at the conceptual and design stages and specialist arboricultural input.

Design Considerations. To enable a realistic assessment of the probable impacts of any proposed development on the trees, and vice versa, the characteristics and condition of the trees should be taken into account. To maximize the probability of successful tree retention, the following factors are considered:

- Shading of Buildings. This can be a problem, particularly where there are rooms which require natural light.
- Shading of Open Spaces & Gardens. Enjoyment of outdoor spaces normally requires direct sunlight for at least for part of the day. However, *shading can be desirable to reduce glare or excessive solar heating, or to provide for comfort during hot weather.*
- Privacy and screening. The retention of trees helps to reduce overlooking by neighbours or to mitigate undesirable views, such as busy roads, railway lines or industrial premises.
- Direct damage. Below ground, damage to structures can occur because of incremental root and stem growth. In addition, above ground damage can occur to trees and structures by the continuous whipping of branches against the fabric of a building. Therefore, this needs to be considered to avoid the need for frequent remedial pruning or other maintenance.
- Future pressure for removal. The relationship of buildings to large trees can cause apprehension to occupiers or users of nearby buildings or spaces, resulting in pressure for the removal of the trees. Buildings and other structures should be sited to allow adequate space for a tree's natural development, with due consideration given to its predicted height and canopy spread.
- Seasonal nuisance. Trees are naturally growing and shedding organisms. Leaves of some species can cause problems, particularly in the autumn, by blocking gullies and gutters. Fruit can cause slippery patches or accumulations of honeydew, which can be damaging to surfaces. These aspects should also be considered.

In general, developments close to trees needs to maintain the site, and particularly the soils, close to the current prevailing conditions and avoid significant changes. However, a development is achievable providing the 8 key points listed below can be incorporated into the proposal's design: -

1. Available Space, the proposal should consider the available space both now and in the future, and avoid the need to remove large diameter branches and stems whilst providing sufficient space for future growth.
2. Foundations, the proposal will need to offer support to the structures with the need for minimal excavation to avoid tree root severance, typically a pile and beam or partial cantilever solution could be considered following the advice of a structural engineer.
3. The Building, particularly the underside of the proposal, will need to be above the current soil level to avoid compaction, excavation and ensure continued soil hydration and aeration. Typically, either a timber frame or block and beam can be adopted to achieve this relatively simply.
4. Ground Protection needs to be a principal theme running throughout the proposal with the current ground being protected from Excavation, Cultivation or Compaction and should remain wherever possible close to its current condition. This can be significantly simplified through the adoption of timber frame construction avoiding the need for potentially damaging heavy weights and potential noxious material such as concrete blocks, bricks and chemicals such as cements to be used near trees.
5. Services for the proposal should be located outside the Root Protection Area to avoid the need for excavation. Where new services are required within the Root Protection Area, these should adopt low impact methods of installation such as moling. Ideally, existing site utilities should be either isolated and retained in situ where they extend into the RPA or recycled or upgraded where this can be done without excavation.
6. Hard surfacing will typically be required unless it can be substituted for decking or above ground walkways. Hard surfacing will need to be installed without the need for excavation and should be porous to allow continued soil hydration and aeration. Typically, either a porous paving system or gravel supported by a NO-dig foundation such as Cell-Web can be adopted to achieve this.
7. Building use, within the proposal, available light should help inform the building design, layout and its use. Ideally, windows and views should be directed away from trees and toward open areas. In addition, the use of secondary or passive light through light reflecting tubes should be considered to help reduce the negative aspects of large trees.
8. Building maintenance will be required, particularly where canopies of trees extend close to or above the roofline, causing maintenance difficulties due to leaf and organic matter build up in the gutters and down pipes. This problem needs to be designed out as far as possible by the addition of filters in the gutters to restrict the access to leaves and small twigs.

The design should take account of the effects of any tree loss required to implement the design, and any potentially damaging activities proposed near retained trees. This might include the removal of existing structures and hard surfacing, the installation of new hard surfacing and the installation of services.

APPENDIX - RISKS TO TREES DURING CONSTRUCTION

The following operations are all very damaging to trees. I have included a poster that demonstrates these points, and this might be useful for full circulation:

Compaction of the soil - Compaction will destroy the soil structure by removing the spaces between soil particles preventing the uptake of oxygen and nutrients. Compaction is caused by storage of materials, including bricks, soil, gravel and cement, and even a single vehicle movement will cause damage. Compacted ground will also affect soil drainage, which may then cause waterlogging.

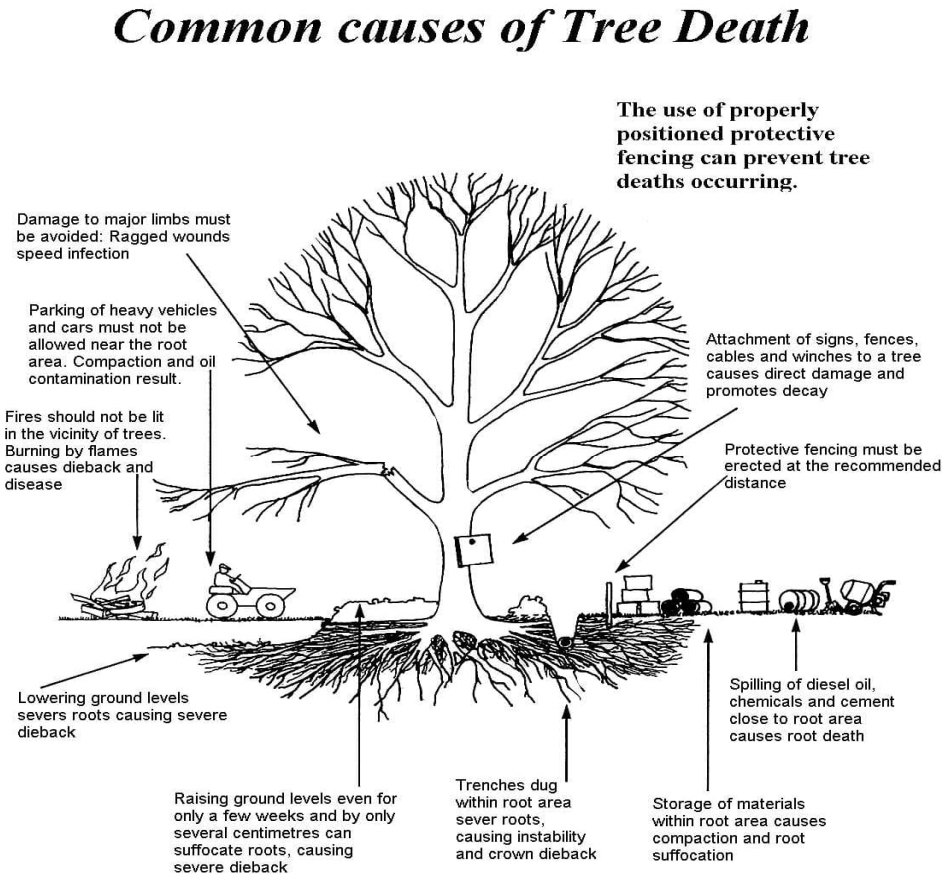
Excavations - any excavations close to the tree are likely to cause root severance. The closer excavations occur to the tree the more severe the damage. Root severance will lead to loss of vigour of the tree, reduce uptake of water and nutrients, allow access for decay organisms, and increase likelihood of wind throw.

Ground level changes - both reduction and raising of soil levels will be detrimental even if this is only by a few centimetres. Reducing ground levels will sever roots and can increase the drainage of a site thereby reducing water availability. Raising ground levels will cause compaction, suffocate roots and damage fibrous roots.

Impact damage - this can be caused by machinery - including torn branches and damage to bark and trunks. This will lead to entry for decay organisms and reduced vigour.

Soil contamination - this can be caused by spillage of oil, fuel and chemicals, and mixing cement or other materials. Allow for sloping ground – keeping toxic material downhill from trees and aim to store them 10m from the Protected Zone to allow for leaching through the soil.

Fires - both the intense heat and direct flame will damage the trees causing loss and damage to both major roots and fibrous roots. Intense heat will damage the trees vascular system under the bark even if the bark does not appear burnt.



APPENDIX - TREE PROTECTION

Protection of retained trees. The successful retention of trees depends on the quality of the protection and the administrative procedures to ensure those protective measures remain in place while there is a risk of damage. An effective means of doing this is through an arboricultural method statement that can be specifically referred to in a planning condition. A method statement for this site should ideally be agreed. Implementation of a method statement will allow all the retained trees to survive without any adverse impact and allow them to continue to contribute to local amenity and character.

Limiting Threats to Trees. To help reduce the potential impact of site changes BS5837:2012 recommends in Section 3.7 that a Root Protection Area (RPA) is included as a layout design tool. This protected area is based upon the Root Protection Area - a point equivalent to 12 times the trunk diameter. This indicates the minimum area around a tree deemed to contain sufficient roots and rooting volume to sustain the tree's viability, though ideally the offset shown as the Construction Limit should be adopted to provide additional space and enable trees to thrive.

Tree Protection: where retained trees need to be protected this is most easily achieved by establishing a Construction Exclusion Zone (CEZ) as part of a Tree Protection Zone (TPZ) to protect the roots and aerial parts as recommended in BS5837:2012 – further details upon request. Within this area, retained trees need to be protected from the effects of site changes and in particular excessive root severance, soil level changes or soil compaction.

Appropriate site organisation and management are essential following the adage of '*Prevention is better than Cure*'. Unfortunately, tree damage can easily occur and although it is costly to repair, it comes with few guarantees.

Inside the exclusion area of the fencing, the following actions need to be avoided: -

- No linear mechanical excavation whatsoever.
- No excavation by any other means without arboricultural site monitoring.
- No hand digging without a written Method Statement having first been approved in writing by the consulting arboriculturist.
- No lowering of levels for any purpose (except removal of grass sward by hand).
- No construction of a sealed hard surface (except where agreed with the arborist)
- No storage of plant or materials.
- No storage or handling of any chemical, including cement washings.
- No vehicular access.
- No fire lighting.

In addition to the above, further precautions are necessary adjacent to trees: -

- A 10m separation distance shall be observed between any tree and substances injurious to tree health, including fuel, oil, bitumen, cement (including cement washings), builders' sand, concrete mixing and other chemicals.
- No fire shall be lit such that flames come within 5m of tree foliage; this shall be taken to mean a fire separation distance of 20m from any tree's canopy.

Protective Fencing: Based on tree survey data, Root Protection Area (RPA) have been calculated for the trees identified for retention and included in the tree schedule in Appendix C. The RPA's are designed to protect at least a functional minimum of tree root mass in order to ensure that the trees survive the construction process. Tree protection will need to

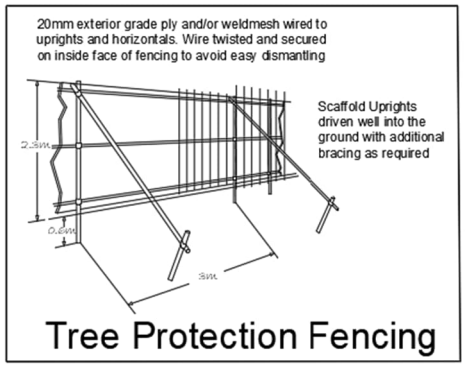
be installed following the initial tree works and before the onset of any demolition or ground works. The RPA should remain in position for the whole of the construction and demolition phase.

Protection fencing is highlighted on the Impact assessment Plan.

Severe Risk Area's - Stem Protection (TST).
To be protected from impact damage by Boarding or Plywood Boxes constructed clear of the stem. Boxes are to contain compressible material to absorb shock loading. To be located where vehicles may come into direct contact with existing trees.

High Risk - Tree Protection Fencing (TPF1)
Alternative TPF1 – upon agreement only.
Ideal for where space is limited. Posts are fixed into ground.

High Risk - Tree Protection Fencing (TPF1)



This is to be provided by Braced Heras Fencing or solid panels. Post-holes shall be excavated by powered hand auger or low ground-pressure plant working of ground protection or outside the Precautionary Zone. Alternative more traditional post supports such as the Heras Steadfast system with an additional brace can be used where this can be pinned into position and fitted with an Anti-Tamper Coupler.

Protection Fencing (TPF2)
This is to be erected as a temporary barrier to protect areas designated for later construction or landscaping the Precautionary Zone. This shall consist of Heras type panels mounted onto rubber/concrete 'boots' as shown opposite.

Low Risk - Protection Fencing (TPF3)

This is to be erected as a visual barrier to protect areas designated for no or later construction. Consisting either stock fencing, post and rail fencing, Chestnut Pale fencing or Orange Extruded Plastic Netting.

Ground Protection (Temporary): Access across the RPA, if this is required this can be achieved for the duration of the development phase in such a way, which will reduce the potential negative effects of compaction.

No Dig-Ground Protection GP1 - Option 1

For lower traffic areas, where heavy vehicles are expected, substitute compacted stone infill with a temporary above ground Trackway. This avoids the need for excavation and limits the weight of material build up and limits compaction when installed with compressible sub-surface.

Ground Protection GP2 - Option 1

Where pedestrian-operated plant up to a gross weight of 2t are forecasted, proprietary, interlinked ground protection boards are available, such as DuraDeck or Ground Guard. These can limit compaction when installed with compressible sub-surface.

Ground Protection GP2 - Option 2

For more permanent small plant and pedestrian movements ground protection in the form of a single thickness of scaffold boarding supported by scaffold, as opposite, can be adopted to bridge areas and avoid compaction.

No Dig-Ground Protection GP1 - Option 2

For high use areas or were heavy vehicles are expected, substitute traditional dig out and compacted stone infill with an above ground Cellweb or similar, to avoid the need for excavation and limit compaction – may be retained as a porous sub base for hard Surfacing within the scheme.

No Dig-Ground Protection GP1 - Option 3

Void forming system such as Permavoid or ArborRaft act as a protection to the tree roots and avoid the need for excavation. These systems also limit the weight of material build up and can be installed with compressible sub-surface. – may be retained as a porous subbase for hard surfacing within the scheme.

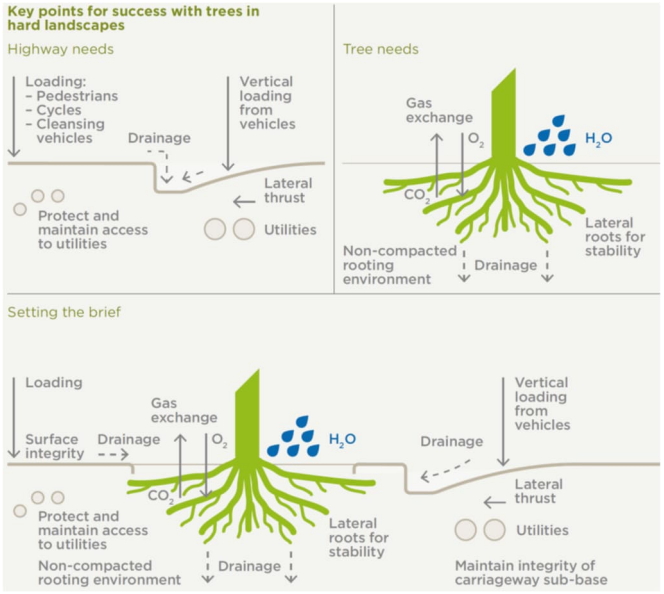
Ground Protection GP3

For Pedestrian movements ground protection in the form of a single thickness of scaffold boards or plywood on top of a compressible layer (Woodchip) laid onto a geotextile, or supported can be used to form the access or provide a sub base to other ground protection.

Ground Protection (Permanent): The creation of Hard Surfacing within or close to trees offers a risk to trees through compaction, excavation, soil level changes or contamination and these need to be avoided or appropriately defended as indicated opposite, so that underlying soils can continue to allow the ingress of water and exchange of gas between the soil and the atmosphere. Protective measures can be adopted successfully to help retain trees and this information should be agreed within Arboricultural Method Statement.

To counter risks, all hard surfacing shall be above the existing ground within the Root Protection Area using a porous sub-base or by bridging to support f a permanent porous surface/wearing course. This will maintain continued gaseous exchange and water ingress as outlined in the opposite brief copied from Tree in the Hard Landscape (TDAG).

On the majority of sites, substituting traditional compacted stone infill with ArborRaft or Cellweb as described above will provide appropriate protection. Alternatives may include grates, a suspended pavement or road by installing pre-cast elements avoiding largescale excavation and limiting the weight of material build up. Alternatively, a cast concrete slab or above ground concrete deck supported by piles can be adopted for sites with difficult access, soils or strata as shown in the examples below.



Construction within the Root Protection Area: The creation of structures within or close to trees offers a risk to trees through compaction, excavation, soil level changes or contamination and again these need to be avoided or appropriately defended so that underlying soils can continue to allow the ingress of water and exchange of gas between the soil and the atmosphere. Protective measures can be adopted successfully to help retain trees and this information should be agreed within Arboricultural Method Statement. The

work is in line with best practice guidance detailed in section 7.5.2 and 7.5.5 of BS5837:2012 Trees in relation to design, demolition and construction – Recommendations, that states:

Section 7.5.2 recommends Root damage can be minimized by using:

- piles, with site investigation used to determine their optimal location whilst avoiding damage to roots important for the stability of the tree, by means of hand tools or compressed air soil displacement, to a minimum depth of 600 mm.
- beams laid at or above ground level, and cantilevered as necessary to avoid tree roots identified by site investigation.

In section 7.5.5 the standard states - Where piling is to be installed near to trees, the smallest practical pile diameter should be used, as this reduces the possibility of striking major tree roots, and reduces the size of the rig required to sink the piles. If a piling mat is required, this should conform to the parameters for temporary ground protection given in 6.2.3. Use of the smallest practical piling rig is also important where piling within the branch spread is proposed, as this can reduce the need for access facilitation pruning. The pile type should be selected bearing in mind the need to protect the soil and adjacent roots from the potentially toxic effects of uncured concrete, e.g. Sleeved bored pile or screw pile.

Example 1 -Screw Piles. Using the hydraulic rotation motor, the screw pile can be installed from outside the outside the Root protection area. Usually, heavy buildings that need several piles to be installed use this method of installation before being joined by a beam.

Example 2 – Thrust or Bored Piles. Small plant piles can be installed within Root protection area. To enable heavy buildings to be supported several smaller piles can be connected to form a pile cap providing improved support as shown below.

Tree Survey Plan – BA26012TS (A1 Plan Attached)

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Registered in England and Wales

BARNES associates ltd
SURVEY MANAGE IMPROVE

Tree Diagnostics®

TREE SURVEYS

Health & Safety Surveys
Risk Assessments
Homebuyer (Mortgage and Insurance)
Veteran & Venerable Trees
Legal & Law (TPO & Valuations)

ADVANCED ASSESSMENTS

Decay & Defect Scans
Tree Stability Checks
Tree & Plant Health Care
Root Detection & Mapping
Aerial Inspections

PLANNING & DEVELOPMENT

BS5837 Tree Surveys
Impact Assessments
Method Statements
Planning Conditions
CAD Plans (2D & 3D)

LANDSCAPE ARCHITECTURE

Commercial Landscape Design
LVIA (Landscape Visual Impact Assessments)
Landscape Management
Garden Design
Green Infrastructure

AA Registered Consultant trees.org.uk
Arboricultural Association Fellow Member
ISA Qualifications Tree Risk Assessment
VALID Tree Risk-Benefit Validator
Chartered Institute of Horticulture
QTRA Licensed User
BALI Registered
Landscape Institute Registered Practice