



Arboricultural Report

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Land behind Sion Chapel,
Pontfadog,
Wrexham

*For the purpose of dealing with all tree issues in accordance with
BS5837:2012 Trees in Relation to design, demolition and
construction: Recommendations for a development at the site*

Commissioned by:

Gareth Edwards
DPA

Surveyed by:

David Bailey
BSc (hons), M.Arbor.A, cert.Arb.(RFS)

Survey date:
28th December 2018

Report date:
18th January 2018



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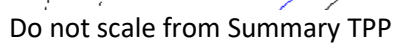
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1.0 Instructions

- 1.1 I am instructed by Gareth Edwards of DPA to undertake a tree survey at land behind Sion Chapel to support a planning application at the site.
- 1.2 It is proposed to build six small houses with associated access, parking and gardens.
- 1.3 There are a number of trees and hedges which may be affected by the development.
- 1.4 I am therefore to visit the site, survey all trees of importance, work with the developer to produce a viable design and then produce a tree report to support the planning application.
- 1.5 The survey is to be compliant with BS5837:2012 Trees in Relation to design, demolition and construction: *Recommendations*.

2.0 Summary

- 2.1 *The proposal is to build six properties on an agricultural field in the village.*
- 2.2 *There are a number of trees on site, mainly mature specimens on the western flank, next to a stream.*
- 2.3 *Just one large category C tree with significant basal decay is to be removed along with some gappy parts of a hedgerow. Some crown reduction work is required on three other trees to balance their crowns and prevent overshadowing.*
- 2.4 *All retained trees and hedges can be sufficiently protected during development using standard tree protection methods.*
- 2.5 *The proposal is arboriculturally sound.*



3.0 Extent of Survey

- 3.1 A brief resume of my qualifications and experience as a professional arboriculturist is found in Appendix F.
- 3.2 I visited the site on 28th December 2018. Weather conditions were overcast, cold with light winds.
- 3.3 The survey covers only arboricultural matters on, or adjacent to the site.
- 3.4 Statutory protection (either Tree Preservation Orders or Conservation Area Status), has not been officially investigated.
- 3.5 Information was gathered to comply with British Standard 5837:2012 Trees in relation to design, demolition and construction – Recommendations. Trees were surveyed to assess their health, structural condition, estimated remaining longevity and amenity value to the area.
- 3.6 The survey deals with identifying the constraints retained trees will impose on development of the site, if trees will need to be removed to allow development and how remaining trees can be protected to prevent significant damage to them. The survey is to recommend necessary tree work if required.
- 3.7 Documents seen:
 - i) Proposed development plans as supplied by DPA.
- 3.8 Documents referred to:
 - BS5837:2012 Trees in Relation to design, demolition, and construction - *Recommendations*.
 - BS3998:1010: Tree Work – *Recommendations*.
 - The Body Language of Trees: Mattheck and Breloer. DofE Research for Amenity Trees no. 4, 1994.
 - Tree roots in the built environment. TSO Research for Amenity Trees no. 6, 2006.
 - BS8545:2014 Trees: from nursery to independence in the landscape.
 - National House Building Council Standards 2017. Chapter 4.2 Building Near Trees. <http://www.nhbc.co.uk>
- 3.9 Any tree work suggested or recommended in Section 6 is to comply with British Standard 3998:2010 Tree Work – Recommendations.
- 3.10 Any engineering solutions referred to are done so on the understanding that specifications will be required from a suitably qualified professional. Reference is made to them purely to show an end result is possible using the method prescribed.

- 3.11 Where buildings are constructed close to trees, reference should be made to the National House-Builders Council Standards Plus 2018, chapter 4.2, which will give appropriate foundation depths for the given situation.

4.0 The Site

- 4.1 The site is an agricultural field used for livestock grazing.
- 4.2 To the north is a similar agricultural field with a farmhouse beyond. In an easterly direction is a lane with houses beyond. To the south are residential properties including the old chapel. To the west is a wooded stream with a field on the other side.
- 4.3 The profile of the site slopes gently downwards from north-west to south-east.
- 4.4 There are a number of trees and hedges on site, the trees are located near the stream and a heavily gapped hedgerow borders the road to the east.
- 4.5 Viewing the Cranfield Soil and Agrifood Institute's Soilsmap (www.landis.org.uk) it appears that the soil is a freely draining acid loam over rock. Fertility is registered as low. Soil on this kind of bedrock is generally free draining and provides a good medium for the growth of trees. Vegetation sourced soil shrinkage and heave is not associated with this soil.
- 4.6 As long as there are no buried obstructions, severe soil compaction or historical root damage, a typical root distribution could be expected for all of the trees on site.

5.0 Trees Surveyed

The schedule of trees surveyed is set out in the following section.

- Tree Number Tree identifier. Letter denotes species and number is sequential
- Species Using common names
- Height In metres
- Stem diameter Taken 1.5 m from the ground in accordance to Annex C of BS5837:2012
- Age class Either young, mid aged, early mature, mature, over mature or veteran
- Est R Cont Estimated Remaining Contribution. Trees useful life in years
- Physiological Assessment of the physiological condition of the tree
- Structural Assessment of the structural condition of the tree
- Ret. Cat. Retention Category. See Appendix C for details
- RPA radius Radius of the Root Protection Area (RPA) from the centre of the tree
- Fence from... Distance from the tree bark a protective fence should be placed, measured at 1.5 metres height



- Prelim Man Rec Preliminary management recommendations
- Notes Notes of importance to the survey

Tree Number:	As1	Species:	Ash	Height:	20m
Stem diameter:	400mm	Age Cat.	mature	Est R cont.	10to20years
Physiological cond:	good	Structural:	good	Ret. Cat.	B
RPA radius if RPA is circular:	4.8m			RPA area:	73m2
Prelim Man. Rec.					
Notes:					

Tree Number:	As2	Species:	Ash	Height:	20m
Stem diameter:	425mm	Age Cat.	mature	Est R cont.	10to20years
Physiological cond:	good	Structural:	good	Ret. Cat.	B
RPA radius if RPA is circular:	5.1m			RPA area:	82m2
Prelim Man. Rec.					
Notes:					

Tree Number:	Sy3	Species:	Sycamore	Height:	20m
Stem diameter:	800mm	Age Cat.	mature	Est R cont.	10to20years
Physiological cond:	good	Structural:	fair	Ret. Cat.	C
RPA radius if RPA is circular:	9.6m			RPA area:	290m2
Prelim Man. Rec.					
Notes: Considerable decay and rot holes at base of tree. Water caused					

Tree Number:	EL4	Species:	Elm	Height:	20m
Stem diameter:	550mm	Age Cat.	mature	Est R cont.	10to20years
Physiological cond:	good	Structural:	good	Ret. Cat.	B
RPA radius if RPA is circular:	6.6m			RPA area:	137m2
Prelim Man. Rec.					
Notes: Large tree spreading unevenly over field					

Tree Number:	As5	Species:	Ash	Height:	14m
Stem diameter:	300mm	Age Cat.	mid-aged	Est R cont.	10to20years
Physiological cond:	good	Structural:	good	Ret. Cat.	C
RPA radius if RPA is circular:	3.6m			RPA area:	41m2
Prelim Man. Rec.					
Notes: Semi-suppressed by elm					

Tree Number:	Gr6	Species:	Group	Height:	6m
Stem diameter:	100mm	Age Cat.	young	Est R cont.	10to20years
Physiological cond:	good	Structural:	good	Ret. Cat.	C
RPA radius if RPA is circular:	1.2m			RPA area:	5m2
Prelim Man. Rec.					
Notes: Group of willow, hazel and alder					

Tree Number:	Gr7	Species:	Hedge	Height:	1m
Stem diameter:	100mm	Age Cat.	mature	Est R cont.	10to20years
Physiological cond:	good	Structural:	good	Ret. Cat.	C
RPA radius if RPA is circular:	1.2m			RPA area:	5m2
Prelim Man. Rec.					
Notes: Very gappy hedge by road					

6.0 Arboricultural Work Required

- 6.1 There is significant basal decay and weakness at the base of the large sycamore, Sy3. Although currently considered to be displaying a fairly low level of risk, the building of the properties would elevate this tree to a position where it was displaying a high level of risk to users of the site. The tree should be felled to ensure this risk is abated. A replacement tree should be planted further away from the stream, being a tree that would cope well with the wet habitat. A common alder would be a good choice.
- 6.2 El4 has spread branches considerably above the field, a 3 metre crown reduction on just the eastern aspect of the tree would add to the amenity of the tree and reduce overshadowing of garden areas and the houses.
- 6.3 In addition to this, the crowns of As5 and As2 should be cut back, away from the site by 2 metres to further reduce overshadowing and increase the amenity of the trees. Appendix B shows the extent of crown reshaping.
- 6.4 Some of the gappy hedge, Gr7, will need to be removed to allow the access drive to be built. That which remains could be interplanted with further hawthorn to build it up into an effective hedge.
- 6.5 All trees that are to remain should be crown cleaned to remove significant dead wood, ivy, poor or rubbing branches and check the trees conditions from an aerial perspective, if necessary.
- 6.6 All tree work is to be carried out by a qualified and experienced contractor to BS3998:2010 Tree Work: Recommendations.

7.0 Tree Protection

- 7.1 Root Protection Areas (RPAs) do not show the total extent of a tree's roots but is an area around a tree that contains the minimum amount of roots and rooting medium to maintain the viability of the tree. This area is prioritised for the tree. The RPA should contain the area of growing medium as set out in section 5 even if the RPA shape needs to be adjusted to more accurately reflect the rooting architecture.
- 7.2 RPAs are usually drawn as a circle, its radius measuring 12 times the diameter of the tree trunk. Although tree roots are often found underneath roads, buildings and in inhospitable places, the tree would suffer if this area was 'set aside' for the roots, especially if there was better rooting mediums close by.
- 7.3 RPAs for most trees have been re-drawn to prevent them entering the stream to the west. Elm, sycamore and ashes are not trees that are entirely happy in such a wet environment.
- 7.4 All retained trees can be effectively protected by a fence as shown in the tree protection plan TPP, Appendix B.
- 7.5 Where RPAs are not drawn as a circle, it has been estimated that the rooting architecture of the tree will not prosper in parts of its environment where rooting is difficult such as roads, buildings, underground obstructions or natural barriers such as rivers or embankments.
- 7.6 The Tree Protection Plan (TPP), Appendix B, shows all retained trees and how their RPAs are to be protected by a fence as shown in Appendix D.
- 7.7 RPAs are to be protected from infill, chemical incursion, fuel spillage, building material storage, solid waste disposal, liquid waste disposal or soil compaction of any kind, be it machinery, goods, foot traffic or vehicular.
- 7.8 Where specified, tree protection should be facilitated by a fence. Examples of such a fence are given in Appendix D. It is essential these fences cannot be moved without concerted effort.
- 7.9 Underground services are not to enter RPAs. Should a service run be required within an RPA, a site-specific method statement will need to be prepared describing what measures will be taken to prevent significant root loss from installation of runs within RPAs.
- 7.10 Given protective fencing will be placed at 1 metre away from the building on the western aspect, only foot or wheelbarrow traffic will be able to reach the rear of the property. Vehicular access will need to travel around the northern corner of the building.

- 7.11 The fencing of the garden within the RPA of EI4 will need to take place without significant digging which could disturb roots. Posts can be hand dug taking care not to damage any significant roots. A significant roots is classified as being over 25mm in diameter. Should a root of this diameter be encountered then the post should be moved slightly to avoid it by a distance of 25mm. Dug in gravel boards should not be used.
- 7.12 The footpath to the rear of the properties will need to be constructed using a no-dig construction method. The use of a light weight three dimensional cellular confinement system (TDCCS) under the final surface of the footpath would prevent damage to the soil and roots below it. A site specific risk assessment will need to detail construction methods for this. A generic method statement for a well-known manufacturer is found in Appendix H.
- 7.13 All hedges are to be given a 1.2 metre gap between the hedge centre and protective fencing.

8.0 Conclusion

- 8.1 The proposal is to build six residential properties, access, parking and garden space on a field close to the village.
- 8.2 There are a number of trees on site, mainly mature specimens which border a stream to the west.
- 8.3 Tree loss will amount to Sy3, a large sycamore tree which is displaying a significant amount of basal decay. Such a tree would not be acceptable to retain on a residential site. The crowns of As2, EI4 and As5 are to be cut back. A small amount of the gappy hedge Gr7 will also need to be removed to allow access..
- 8.4 All retained trees can be fully protected by standard tree protection measures as shown in Appendix B.
- 8.5 The proposal is arboriculturally sound and complies with British Standard 5837:2012 Trees in relation to design, demolition, and construction – Recommendations.

The data, views and opinions of this report relate to the survey undertaken on the date shown and do not take into account effects of weather conditions, vandalism or accidental damage. Neither can the effects of tree surgery work, poorly executed or which does not comply with BS3998:2010, be predicted. Old Oak Tree Care cannot accept any liability in connection with any of these factors. This report becomes out of date and in need of renewal two years from the survey date. Data relating to tree health and condition will become out of date and in need of renewal six months from the survey date.



Appendix A

Land behind Sion Chapel,
Pontfadog

Tree Constraints Plan

Showing all trees, crown dimensions, tree categories and Root Protection Areas (RPAs)

SCALE :
1 : 250

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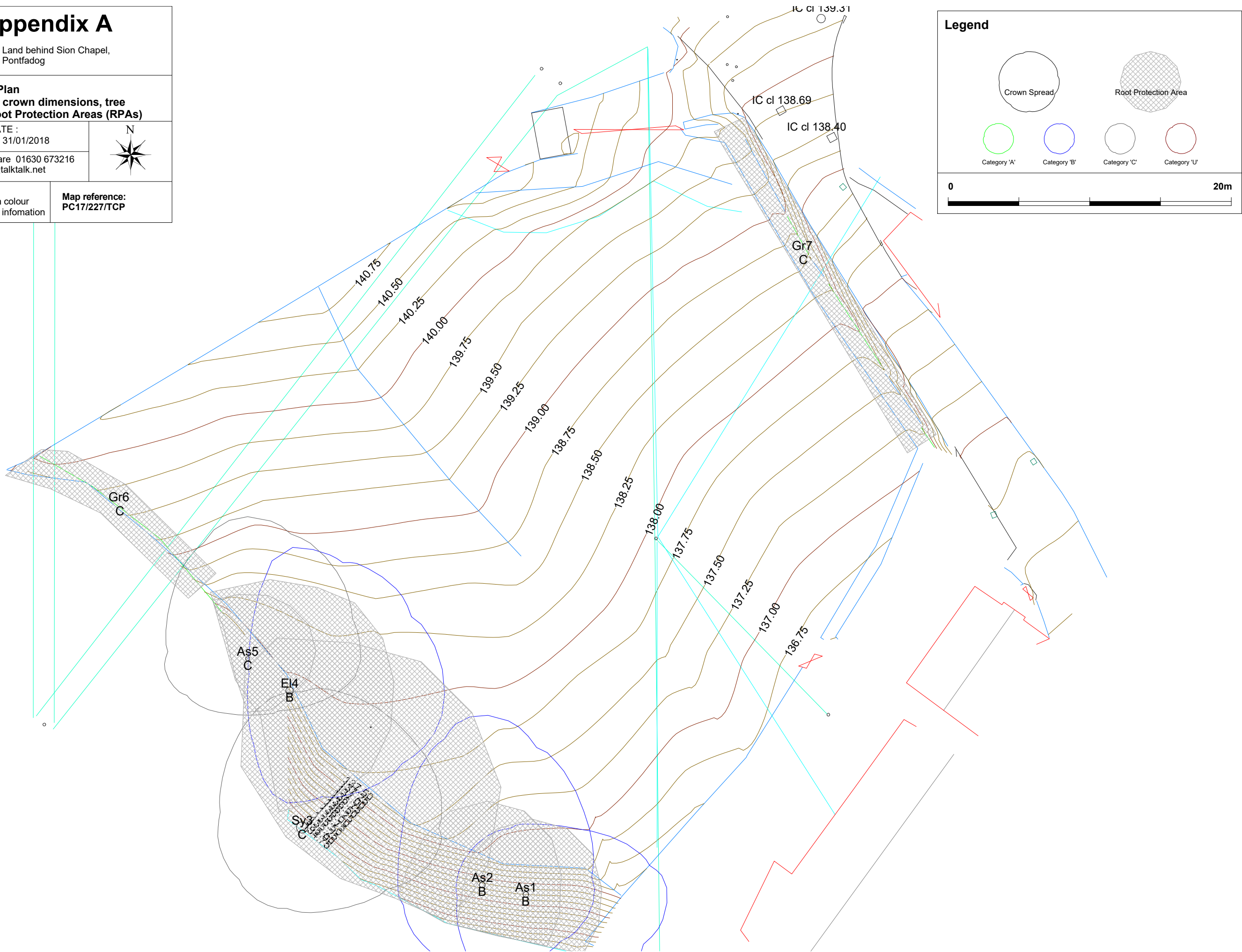
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Map reference:
PC17/227/TCP





Appendix B

Land behind Sion Chapel,
Pontfadog

Tree Protection Plan
Showing all retained trees, crown dimensions, tree
categories, RPAs and protective fencing

SCALE :
1 : 250

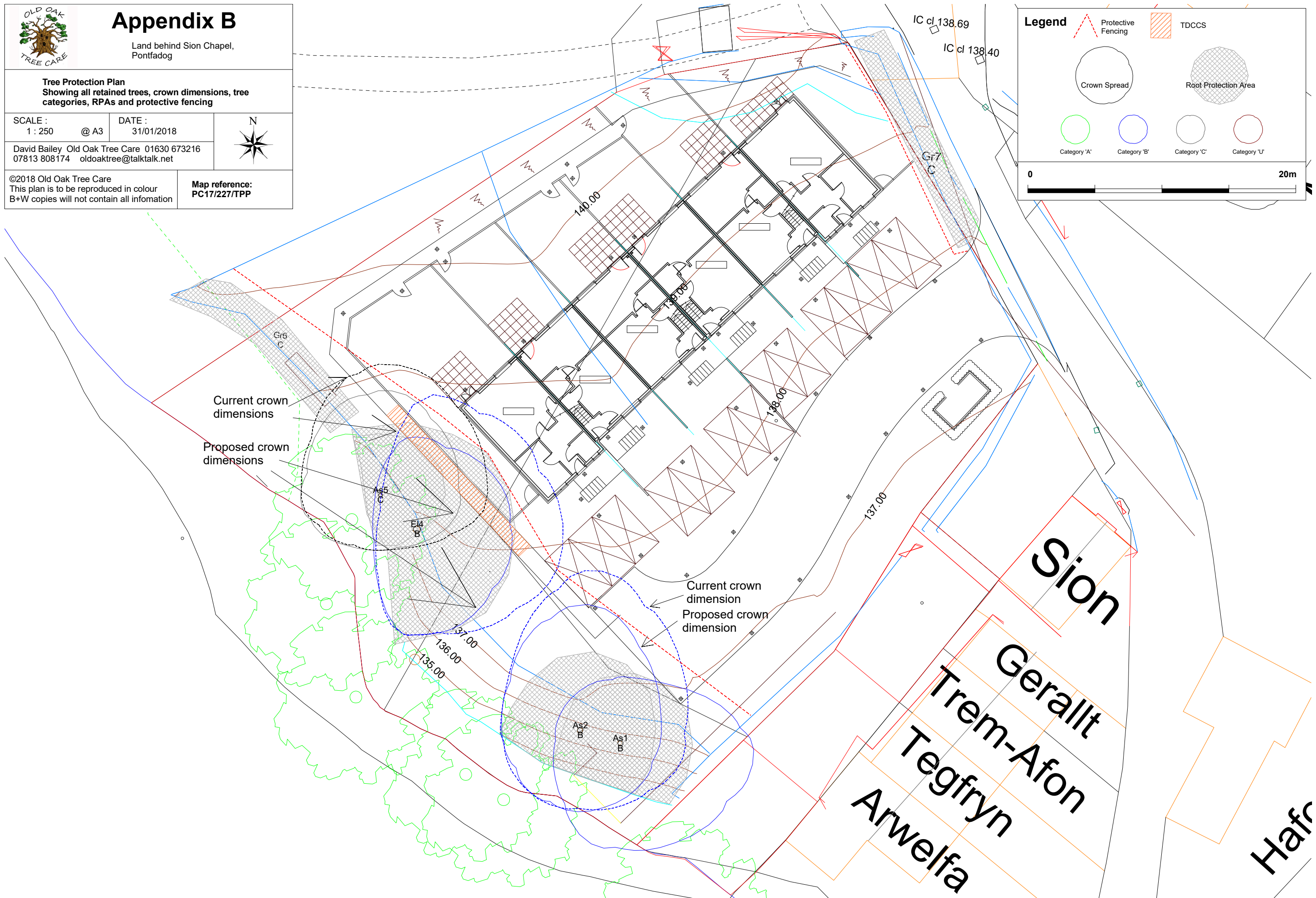
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Appendix C

Survey Methodology, describing how tree survey was conducted

- 1.1 Where trees are not shown on a topographical survey their positions were plotted using triangulation from marked positions on the plan using a laser rangefinder.
- 1.2 Crown diameters and heights were estimated using a laser rangefinder.
- 1.3 I viewed each tree, or group, on the survey to assess structural integrity, health, presence of dysfunction and form. The basis of the survey was undertaken using VTA (visual tree assessment method) as expounded by Mattheck and Breloer in *The body language of trees, A handbook for failure analysis*, TSO 1994.
- 1.4 Stem diameters were measured in millimetres, taking the circumference at approximately 1.5 metres above the ground and dividing by π (Pi), in accordance with Annex C of BS5837:2012. Where ivy or any other material would give an incorrect measurement, a suitable correction was made before recording. Results were rounded up or down to the nearest 25mm. Where trees could not be reached, their diameters were estimated.
- 1.5 The trees were assessed for longevity using survey data, experience gained in working with similar trees and likely management decisions.
- 1.6 Trees were placed into categories using the criteria set out in BS5837:2012 (Appendix D).
- 1.7 All trees that will be affected by the entire development were surveyed, excluding those due to distance from the development, those of insignificant nature or unremarkable trees that fall within the RPAs of more significant trees.
- 1.8 No invasive testing was carried out.
- 1.9 No soil samples were taken.
- 1.10 Internal investigations and tissue samples were not taken.
- 1.11 All tree information is tabulated in Appendix F and plotted in Appendix A, overlaid on top of a survey plan of the area.

Table 1 Cascade chart for tree quality assessment

Category and definition	Criteria (including subcategories where appropriate)	Identification on plan
Trees unsuitable for retention (see Note)		
Category U Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years	- Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees (e.g. where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning) - Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline - Trees infected with pathogens of significance to the health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality <i>NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve; see 4.5.7.</i>	See Table 2
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
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
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 with no material conservation or other cultural value

BS 5837:2012

BRITISH STANDARD

Figure 2 Default specification for protective barrier

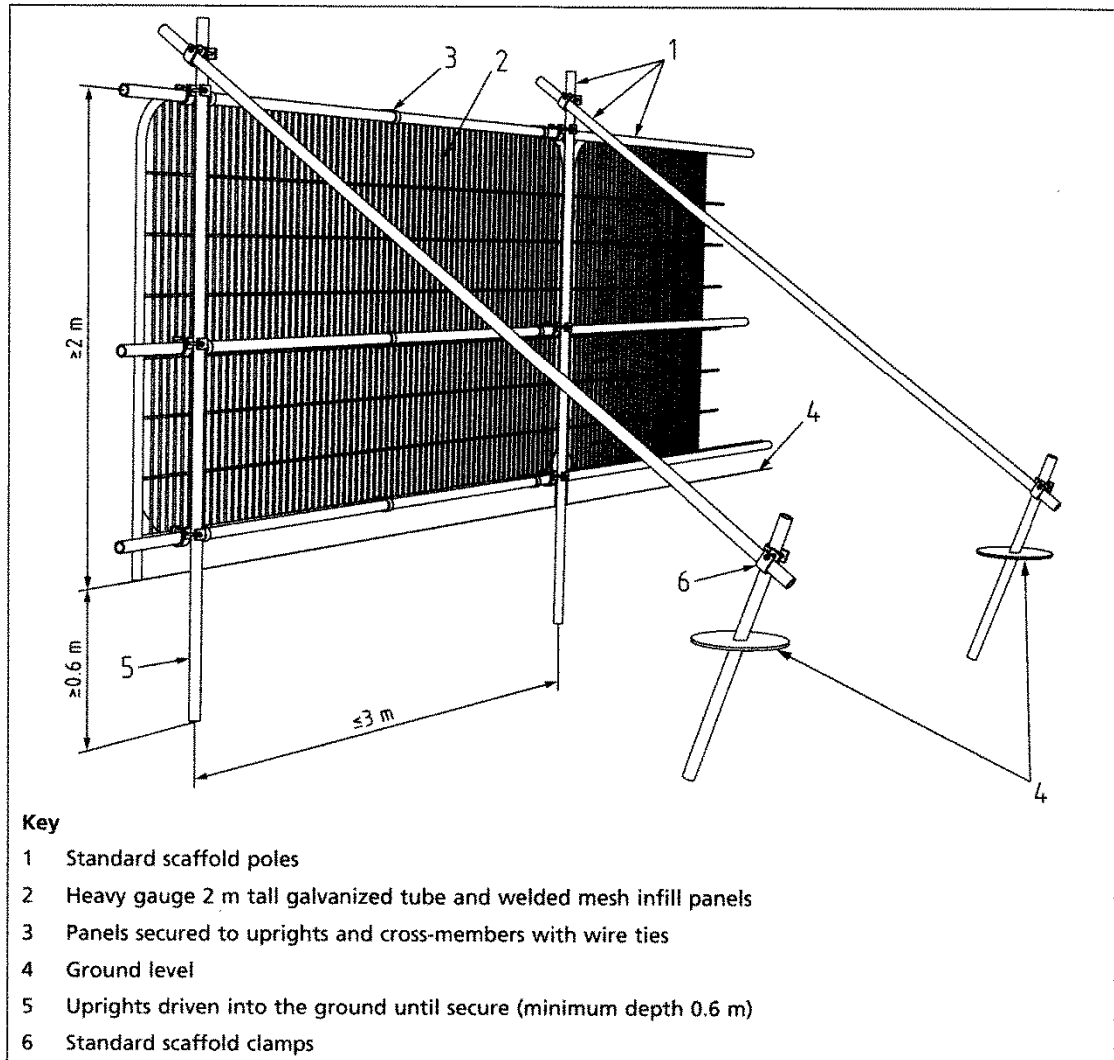
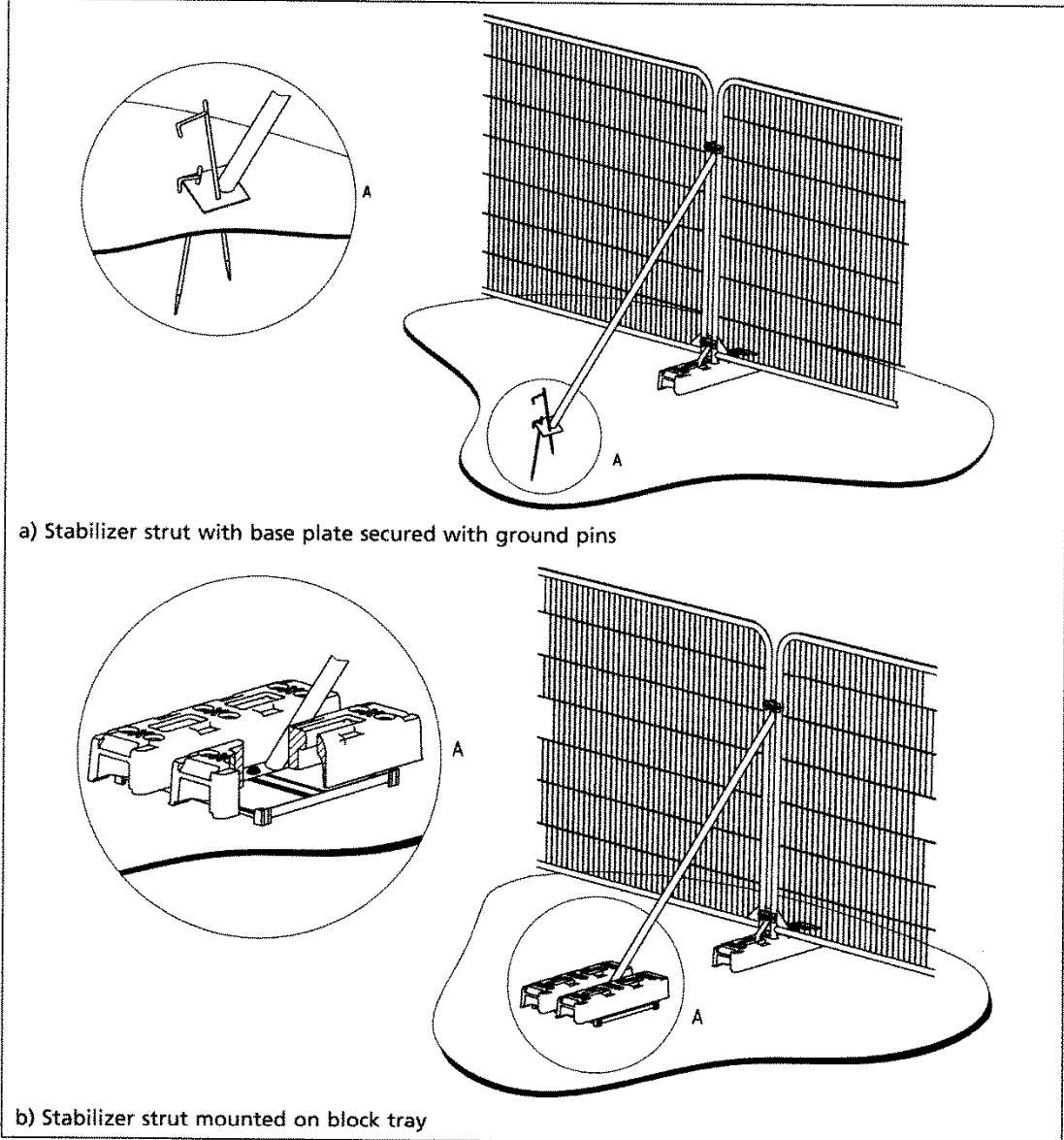


Figure 3 Examples of above-ground stabilizing systems



Appendix F: Qualifications and Experience

- 1.1 Old Oak Tree Care is solely an independent arboricultural consultancy business, wholly owned and run by David Bailey *BSc(hons), M.Arbor.A, cert.Arb(RFS)*.
- 1.2 Old Oak Tree Care was established as a Tree Surgery business in 2004. In 2008 the business began engaging in consultancy work. In 2014 Old Oak Tree Care ceased contracting work to concentrate solely on consultancy.
- 1.3 A broad range of skills were developed during the ten years as a contractor and lead climber of the business. Specialised areas worked in were wetland bog and moss management, use of pesticides in sensitive environments, large scale planting and thinning on urban forest schemes, deadwood management in standing trees and sectional removal of trees in confined spaces.
- 1.4 David Bailey achieved the Royal Forestry Societies Certificate of Arboriculture in 2006, fusing a level 2 academic qualification with 7 certificates of competence for practical work, including felling of trees with chainsaw, use of chainsaws in trees, planting and pesticide use.
- 1.5 In 2008, a Foundation Degree in Arboriculture was achieved at Merit level, from a 3 year part time course at Myerscough College, Preston. In 2012 an Honours Degree in Arboriculture at and upper second was achieved from the same establishment. The dissertation for this degree looked at the spread of alder phytophthora disease in the south Shropshire AONB and factors which influenced infection rates.
- 1.6 Since completing the honours degree, David Bailey has remained committed to continued professional development by attending courses, reading books, attending conferences and being part of arboricultural group discussion forums with similar professionals.
- 1.7 Work undertaken includes development surveys to BS5837:2012, large and small scale health and safety inspections, tree health and disorder identification, applications for work to trees covered by preservation orders (TPO) or within conservation area, appeals for refusal for work to trees and working as an expert witness giving both written and oral evidence to CPR35 and PD35.
- 1.8 Customers requiring consultancy work have ranged from both large and small developers, planning consultants, architects, schools, The Forestry Commission, Town and Parish Councils, solicitors, NGOs and private individuals.

Appendix G		Tree survey raw data																	
Tree number	Species	Height (m)	Diameter (mm)	N Crown spread (m)	E	S	W	N Crown Height (m)	E	S	W	Age bracket	Physiological Condition	Structural Condition	Years remaining	Quality assessment	RPA radius(m)	RPA Area (m2)	Notes
As1	Ash	20	400	5	10	8	5	10	4	5	10	mature	good	good	10to20	B	4.8	73	
As2	Ash	20	425	10	12	6	6	6	2	12	4	mature	good	good	10to20	B	5.1	82	
Sy3	Sycamore	20	800	6	12	6	6	6	2	12	4	mature	good	fair	10to20	C	9.6	290	significant basal decay
EL4	Elm	20	550	8	12	10	8	3	3	2	10	mature	good	good	10to20	B	6.6	137	
As5	Ash	14	300	6	10	4	6	2	5	10	10	mid-aged	good	good	10to20	C	3.6	41	
Gr6	Group	6	100	3	3	3	3	0	0	0	0	young	good	good	10to20	C	1.2	5	group of coppiced alder, willow and hazel
Gr7	Hedge	1	100	1	1	1	1	0	0	0	0	mature	good	good	10to20	C	1.2	5	gappy hedge on wall.

CellWeb TRP (Installation Checklist)

Installation of the CellWeb™ Cellular Confinement System within the Root Protection Area of Trees



The following installation checklist can be used on projects where CellWeb™ is being installed as a permanent hard surface, a sub-base, or as temporary root protection during construction works.

The installation procedure can be utilised by the Local Authority (LA) tree officer to ensure that CellWeb™, that is being used for tree root protection, will be effectively installed. Alternatively, it may be more appropriate to request that the installation is certified by arboricultural consultants who are experienced in the installation of CellWeb™ and who can offer installation certification as part of a package endorsed by Geosynthetics.

The completion of the CellWeb™ installation in accordance with this procedure will enable planning conditions to be successfully signed off on completion of the project.

Stage 1 Initial site meeting to assess tree protection requirements in line with the Arboricultural Method Statement (AMS) produced by the developer's arboricultural consultant.

- Check the ground conditions, including the presence of compaction or made ground.
Is any remedial work required, such as the removal of old hard surfaces and rubble or soil decompaction?
- Compare the existing ground levels with the new levels proposed in the development.
Do the new levels allow for the depth of hard surfaces installed with a CellWeb™ foundation without excavation?
Will excavation be required to achieve the proposed levels or to enable site drainage or integration with other water management solutions?
- Assess the suitability of tree protection proposals, including the fencing and ground protection that will be used throughout the demolition and construction phases of development.
Can CellWeb™ be used as ground protection throughout the development period and also form the foundation for final hard surfaces?
Is a temporary CellWeb™ installation needed to enable site access for construction traffic over an area designated as requiring tree root protection?
- Consider how utility service installations can be integrated with the installation of CellWeb™.
Can services be installed before the CellWeb™ is laid, or is it possible to use directional drilling later on in the development?
- Consider how other water management solutions for the site can be integrated with CellWeb™, including porous hard surfaces, drainage and underground storage.
Has a combined and integrated water management plan been designed that considers retained trees?
Do the water management solutions for the site consider the water requirements of retained trees?
Do the storage solutions allow for the slow release of water into areas of the site accessible by tree roots, while also dealing with potential soil pollutants from surface water run-off?
- How are the developers going to ensure that the CellWeb™ is specified and installed effectively?



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Stage 2 Approval of the CellWeb™ site-specific installation method statement, which should include:

- Details of the sensitive removal of existing hard surfacing.
- Details of any remedial de-compaction work required.
- Root investigation procedures where site level changes require limited excavation to allow the installation of CellWeb™.
- A scaled site plan illustrating where the CellWeb™ will be installed that includes both existing and proposed levels.
- Details of how the CellWeb™ tree root protection system will be integrated with other traditional hard surface foundations on site.
- An integrated water management site plan illustrating working porous surfaces, drainage and water storage solutions, with consideration of the physical presence of roots and tree water requirements.
- Details of the CellWeb™ load limit specifications, with site-specific information.
- Engineering drawings provided by Geosynthetics showing the CellWeb™ specification.
- An engineering design indemnity policy based on a site-specific soil assessment.

Stage 3 Site visit before CellWeb™ installation to check that the ground has been prepared in accordance with the AMS. Check:

- Site level layout.
- The need for root investigations where excavation work is required to meet level requirements.
- Soil bulk density (compaction) CBR has been maintained.
- Completion of any site remedial work required before the installation of CellWeb™.

Stage 4 Site visit to check that materials supplied for installation comply with the installation method statement and AMS specifications. Check:

- The specification of the geotextile underlay.
- The specification of the cellular confinement system (depth and product used).
- The specification of the fill material (4/20, 20/20 or 20/40 washed angular stone with site-specific pH if required and appropriate structural load rating).

Stage 5 Site visit to check that the installation methodology meets the manufacturer's specification and is in accordance with the AMS. Check:

- The minimum cell size.
- The orientation of the sheet layout.
- There is sufficient fill to form a cell structure.
- The upper geotextile has been installed to maintain the CellWeb™ sandwich.

Stage 6 Site visit to check that the final surface installation meets the porosity specification in the installation method statement and the AMS.

Stage 7 Project sign off.

Following this checklist should ensure the successful specification and installation of CellWeb™ as a tree root protection system, either as a temporary ground covering during development or as a structural sub-base for permanent porous hard surfaces.

This checklist has been written to enable Local Authority Tree Officers to plan site visits and document checks in a structured way. However, the same procedure can be completed by an independent arboricultural consultant as part of a certification program offered by Geosynthetics Ltd using dedicated arboricultural consultants and approved installers.



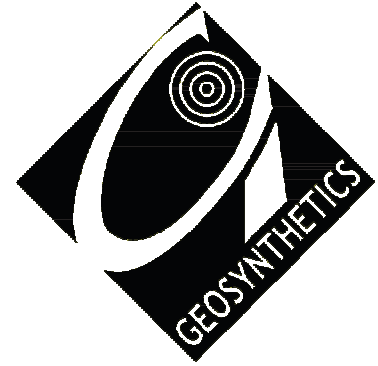
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Method Statement

For The Installation of Cellweb Tree Root Protection System.



When considering damage to tree roots, in applications of vehicular access and parking, the risk of oxygen depletion caused by compaction of subsoil's, site clearance damaging the root source and type of reinforcement are areas which need to be given due consideration.

Other risk factors are:

- Creating an impermeable surface
- Causing a rise in the water table due to construction
- Increasing ground level
- Contamination of subsoil's

1. Compaction

When looking at site conditions and use, the following information should be considered to enable a load bearing structure capable of supporting traffic to be proposed:

- Californian Bearing ratio (CBR) – Standard test method for measuring soil strength
 - Soil types
 - Water table
 - Maximum load (vehicles)
 - Acceptable rut depth
 - Reinforcement type Cellweb Cellular Confinement 150mm deep
- Type and Depth of engineered infill material Clean, angular. Usually 40mm to 20mm.

2. Dig (site strip)

Site stripping does damage some root structure prior to construction; however, the use of no-dig construction elevates the access road requiring edge protection.

3. No dig

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|---|--|
| 3.1. Remove surface vegetation | Use a suitable herbicide suitable for the specific vegetation and not harmful to the tree root system |
| 3.2. Place geotextile separation filtration layer | Use a Treetex T300 non woven Geotextile over the prepared sub-grade. Overlap dry joints by 300mm. The three dimensional cell structure, is formed by ultrasonically welding polyethylene (perforated) strips / panels together to create a three dimensional network of interconnecting cells. A high degree of frictional interaction is developed between infill and the cell wall, increasing the stiffness of the system |
| 3.4. Edge restraint | A treated timber edging is usually acceptable. |

4. Cellular Confinement and Backfill Material.



Expand the Cellweb 2.56m wide panels to the full 8.1 metre length. Pin the Cellweb panels with staking pins to anchor open the cells and staple adjacent panels together to create a continuous mattress. Infill the Cellweb with a no fines angular granular fill (typically 4-20mm) within each open cell. The use of cellular confinement reduces the bearing pressure on the subsoil by stabilising aggregate surfaces against rutting under wheel loads. Comparisons between cellular confinement and traditional aggregate and geogrid-reinforced structures demonstrate a 50% reduction in construction thickness of the granular material.

5. Surfacing Options

Block Paving:

- 5.1. Lay second layer of Treetex T300 Geotextile separation fabric over the infilled Cellweb sections
- 5.2. Lay sharp sand bedding layer compacted with a vibro compaction plate to recommended depth.
- 5.3. Place block paviors as per manufacturers instructions.

Tarmac:

Place 25mm surcharge of the granular material above the Cellweb system and lay the bitumen base and wearing courses.

Loose Gravel:

- 5.4. Ensure Cellweb is completely filled.
 - 5.5. Place decorative aggregate to required depth
- NOTE: A treated timber edge should be provided to restrict gravel movement.

Grass Blocks:

- 5.6. Place second layer of Treetex T300 Geotextile separation fabric over the infilled Cellweb sections
 - 5.7. Place 50/50 rootzone bedding layer to the required depth
 - 5.8. Lay recycled Duo Block 500 Grass Protection System infilled with 50/50 rootzone mix.
 - 5.9. Seed as per architects instructions.
- (Alternatively the Grass Blocks may be infilled with gravel.)

Concrete Slab

- 6.0 Lay Cellweb as previous and place second layer of Treetex Geotextile directly over the filled panels. Pour concrete base as specified.

Below are illustrations of the correct stapling procedure for joining both edges and ends of panels together;

