

Appendix D - Arboricultural Report.



Arboricultural Report

**Demolition of Existing House and Erection of new Dwelling
2A Llwyn Y Cil
Chirk
Wrexham
LL14 5AB**

Commissioned by:

Alan & Heather Rogers
Owners

Surveyed and reported on by:

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

Survey date:

2nd September 2020

Report date:

15th September 2020

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1.0 Summary

- 1.1 *It is proposed to demolish an existing house and build a new dwelling, access and garage.*
- 1.2 *On the site, there are three category B and three category C trees. There is also two category C hedges and one category B group.*
- 1.3 *Three small category C garden trees are to be removed to allow the development to take place. The amenity provided by trees to the area will be unaffected.*
- 1.4 *Special engineering will allow roots of retained trees to be undamaged by the new drive passing over them. A very small amount of excavation is needed within the RPA of one tree but this area is small. The excavation is considered acceptable as compensatory areas are protected with the tree being a hardy and healthy species. Significant damage to the tree is not likely.*
- 1.5 *Trees can be effectively protected during the building process by using protective fencing.*
- 1.6 *The proposal is arboriculturally sound.*

2.0 Instructions

- 2.1 I am instructed by the owner of the property, Alan and Heather Rogers, to undertake a tree survey at 2A Llwyn Y Cil of all trees on the proposed site.
- 2.2 The proposal is to demolish the current building and replace it with a new dwelling access and garage.
- 2.3 There are several trees on-site. Some, in a line on the edge of the site, are mature and of moderate quality. The remaining trees are small garden trees of little value.
- 2.4 I am to produce a tree report to support the planning application.
- 2.5 The report is to be compliant with BS5837:2012 Trees in relation to design, demolition and construction: Recommendations (BS5837:2012 hereafter).

3.0 Preliminary Matters

- 3.1 The survey and report cover only arboricultural matters relating to trees that will be affected by the proposal.
- 3.2 The report deals with identifying the benefits and constraints trees will impose on the development site, if trees will need to be removed to allow construction, how remaining specimens can be protected and how retained trees will affect the site.
- 3.3 Statutory protection of trees, either tree preservation orders, conservation area status or historical planning conditions have not been investigated.
- 3.4 Plans supplied to myself:
 - i) Site plan and proposal supplied by architects Bench Mark Design.

Plans I have produced to accompany this report:

- i) Tree Constraints Plan PC20/409/TCP
 - ii) Tree Protection Plan PC20/409/TPP
- 3.5 Where buildings are constructed close to trees, reference should be made to the National House-Builders Council Standards Plus 2020 chapter 4.2. www.nhbc.co.uk This document, updated yearly, gives appropriate foundation depths for buildings close to trees. It is recommended that the soil's modified plasticity index is investigated to consider the likelihood of soil movement with moisture change. This will allow the appropriate foundation depth to be calculated.

- 3.6 The data, views and opinions of this report relate to the survey undertaken on the date shown and does not take into account the effects of extreme weather conditions, vandalism or accidental damage. Neither can the effects of poorly executed tree surgery work, not complying to current good practice, be predicted. Old Oak Tree Care cannot accept liability in connection with these factors. This report requires renewal in two years from the date of survey, or as soon as site conditions, tree health or tree structural conditions significantly alter.

4.0 Method of Survey

- 4.1 The survey was undertaken on 2nd September 2020.
- 4.2 Trees were surveyed to measure height, trunk diameter, crown spread and height, health, structural condition, estimated remaining life and overall quality.
- 4.3 Information was gathered to comply with section 4.4.2 of BS5837.
- 4.4 Stem diameters were measured using a surveyor's tape. Crown spreads and heights were estimated using a laser rangefinder. Heights were estimated using the height function of the laser rangefinder.
- 4.5 Where trees could not be reached when off-site, dimensions were estimated.

5.0 Site Details

- 5.1 The site is a rural residential property with several sheds and outhouses. The garden is large with some mature trees and hedges.
- 5.2 To the north, west and east are agricultural fields. The road runs to the east To the south beyond an agricultural access track, a dwelling sits within several mature trees. The site has a rural character.
- 5.3 The largest trees are a line of Western red cedars and cypress on the southern boundary. A few smaller garden trees are found around the site which is enclosed by hedges.
- 5.4 The profile of the site slopes gently downwards from north-west to south-east.
- 5.5 Viewing the Cranfield Soil and Agrifood Institute's Soilscales map www.landis.org.uk it appears that the soil is a freely draining slightly acid loamy type. Soil of this kind provides a good medium for tree growth. The modified plasticity index of the soil is not known.

6.0 Extract Tree Schedule

6.1 All tree data is supplied in Appendix E. Table 1 and 2, below, gives a summary of information.

6.2 Table 1 gives a brief description and breakdown of tree categories for single trees, groups and hedges.

Category	Description of category	Number
A	High quality with an estimated remaining life span of at least 40 years. Particularly good examples of their species, especially if rare or unusual. They will be visually important and may have significant conservation or historical values.	0
B	Moderate quality and expected to remain between 20 to 40 years. Might have been included as a category A, but downgraded by impaired conditions. Possibly lacking special qualities to be regarded as Category A. Group which collectively increases its value from C to B or a particularly effective screen.	3
C	Low quality with an expected lifespan of 10 to 20 years or below 150mm in diameter. Unremarkable trees, either young, impaired or poor species. Unlikely to increase in quality as time goes by. No conservation or cultural value.	3
U	Those in such a condition that they cannot be realistically retained as living trees for longer than 10 years. Serious structural or physiological problems. Also dead trees.	0
Group	Trees of similar species, size or character which are grouped together. The number of the group is given together with the categorisation.	1-B
Hedge	Groups of trees planted in lines as a hedge. Trees originally planted as a hedge but have not been managed in some time, reverting back to a line of trees. The number of the hedge is given together with its categorisation.	2-C

Table 1: Number of categorised trees, groups and hedges. A brief description of categorisation together with colour coding. Appendix E gives full detail.

6.3 A brief description of trees and features are given in table 2. A key to the table is found below it.

No.	Species	Height	Stem Dia.	Cat.	Comment
WRC1	W Red Cedar	20	700	B	0
G2	Group	20	500	B	line of cypress and western red cedar
WRC3	W Red Cedar	20	775	B	0
Ly4	Leylandii	6	150	C	0
Ly5	Leylandii	6	150	C	0
Ly6	Leylandii	6	150	C	0
H7	Hedge	2	100	C	hawthorn and some beech

SB8	Silver Birch	7	150	B	0
H9	Hedge	1	100	C	hawthorn by road, mixed species in garden

Table 2: Extract Tree Schedule (Key below)

- No:** Tree identifier using letters to indicate species and a sequential number. G indicates a group, H indicates a hedge.
- Species:** Tree species using the common name.
- Height:** Height in metres.
- Stem Dia:** Stem diameter measured at 1.5 metres from the ground in millimetres.
- Cat:** Category in relation to BS5837. See 5.2 and Appendix C for details on categorisation. Note: Numbers for sub-categorisation are not used.
- Comments:** Comments, if necessary. 0 if none.

7.0 Arboricultural Impact Assessment

- 7.1 The proposed development requires the removal of some trees. Ly4, Ly5 and Ly6 are small category C garden trees of very low value. The larger category B tree will remain.
- 7.2 The existing drive into the property will require upgrading. Some tree roots will likely be found underneath the drive and care will need to be taken to ensure tree roots are not significantly damaged. The drive should be carefully excavated back to the existing soil level. A cellular confinement system is to be used to prevent roots and soil below the drive from being significantly damaged by the drive. Section 9 gives details of this.
- 7.3 Once the drive leaves the root protection area (RPA) of WRC1, standard construction techniques can be used to construct the drive towards the garage.
- 7.4 Further cellular confinement system will be needed as the drive approaches the RPA of WRC3. Less than 1% of the RPA will be excavated to provide foundations for the garage. It would be acceptable to do this given the tree is not constrained in any other direction and additional areas can be protected as compensation for the small loss of RPA.
- 7.5 The Western red cedars WRC1 and 3 are both in good condition and being a fairly hardy tree are not likely to suffer from the slight works close to them.
- 7.6 All trees can be protected by protective fencing (Section 8).
- 7.7 As no work is taking place on any of the large trees, no change in the amenity value provided by trees to the area will occur.

- 7.8 It would be best to carry out the special engineering work to the drive first, put the protective fencing in place and then demolish the building before construction work begins. This will ensure trees are protected at all times.

8.0 Tree Protection

- 8.1 Appendix A and B show the crown spread and root protection area (RPA) of each tree. The area covered by these items require careful consideration within the design and construction process as damage to the tree within these areas will be very harmful to it. These zones are primarily set aside for the tree.
- 8.2 RPAs do not show the total extent of the tree's roots. The RPA is likely to be just one-third of the tree's total root system. This design tool recommends an area of 12 times the diameter of the tree's trunk, or mathematical equivalent for multi-stemmed trees, to be set aside for the tree and protected. This will ensure that a core area of rooting can be protected from harm allowing the tree to be retained without significant damage or reduction in longevity.
- 8.3 BS5837 recommends that RPAs are initially drawn as a circle around the tree. However, the presence of poor rooting areas such as under housing, roads, significant walls, watercourses, historical damage or buried obstructions may alter this. In this case, although there are some factors such as the farm track and drive which may cause some restrictions to rooting, no RPAs have been altered as the effect is unlikely to be severe.
- 8.4 Protected RPAs are to be kept clear of refuse, materials, fuels and chemicals. These items should also be prevented from leaking into the RPAs.
- 8.5 Fencing should be in place before any deliveries, plant, site offices or skips arrive on site. No demolition or construction work should take place until fencing is fully erected.
- 8.6 A bunded mixing area for the mixing of concrete and all chemicals and washings is shown in Appendix B. All mixing is to take place here without exception. The floor is to be waterproof with the bund walls being 100mm high.
- 8.7 Protective fencing similar to that shown in BS5837, shown in Appendix D, is to be used to protect RPAs from vehicular and foot access. The fencing is to be securely joined and attached to immovable objects to prevent it from being moved. Fencing should be firmly attached into the ground and will require tools to move it.

- 8.8 Any boundary fencing passing through RPAs should have post holes dug by hand avoiding severance of tree roots over 25mm in diameter. Should gravel boards be used, they are not to be dug into the ground.
- 8.9 Underground services are not to enter RPAs. Should a service run be required within an RPA then a site-specific method statement is to be produced to show how this will not cause damage to trees.

9.0 Work Within Root Protection Areas

- 9.1 The access to the plot will need to pass over the root protection area of WRC1 using a three-dimensional cellular confinement system (TDCCS) to avoid the need to significantly dig within the RPA of this tree. The current drive is to be removed back to the natural soil level.
- 9.2 Additional TDCCS is required over the RPA of WRC3 as it approaches the garage.
- 9.3 A small part, 2m², less than 1% of the RPA of WRC3 will require excavation to allow the garage to be built. In this case, this is considered acceptable because the area is small, additional areas outside of the RPA are to be protected and the tree is a hardy and healthy species which can withstand moderate root disturbance.
- 9.4 The load-bearing and size of the TDCCS will need to be specified by an engineer.
- 9.5 Table 2 shows the amount of coverage of the tree's RPAs by the drive.

	Total RPA	Covered RPA	Percentage
WRC1	222m ²	27m ²	12%
WRC3	272m ²	35m ²	13%

Table 3: RPA coverage

- 9.6 The amount of RPA coverage is less than the 20% limit within BS5837:2012.
- 9.7 No digging is to occur within the RPA. Appendix F is a checklist and method statement in the use of CellWeb, a well-known TDCCS. This should be closely followed when working within the RPA.

10.0 Conclusion

- 10.1 The proposal is to demolish an existing building and erect a new dwelling, garage and access.
- 10.2 There are three category B, three category C trees, two category C hedges and one category B group on this mature rural site.
- 10.3 Three category C garden trees require removal to allow the development to take place. The loss of these trees will not affect the amenity of the area.
- 10.4 All other trees are to remain. The access drive is to be improved with a TDCCS. A small amount of excavation is required within an RPA but this is not considered to be of significant harm to the tree.
- 10.5 Protective fencing will ensure retained trees can be suitably protected during the build.
- 10.6 The proposal is arboriculturally sound and complies with British Standard 5837:2012 Trees in relation to design, demolition and construction: Recommendations.



Appendix A
2A Llywn Y Cil, Chirk,
Wrexham, LL14 5AB

Tree Constraints Plan
Showing all trees, crown dimensions, tree
categories and root protection areas (RPAs)

SCALE :
1 : 200 @ A3 DATE :
18/09/2020

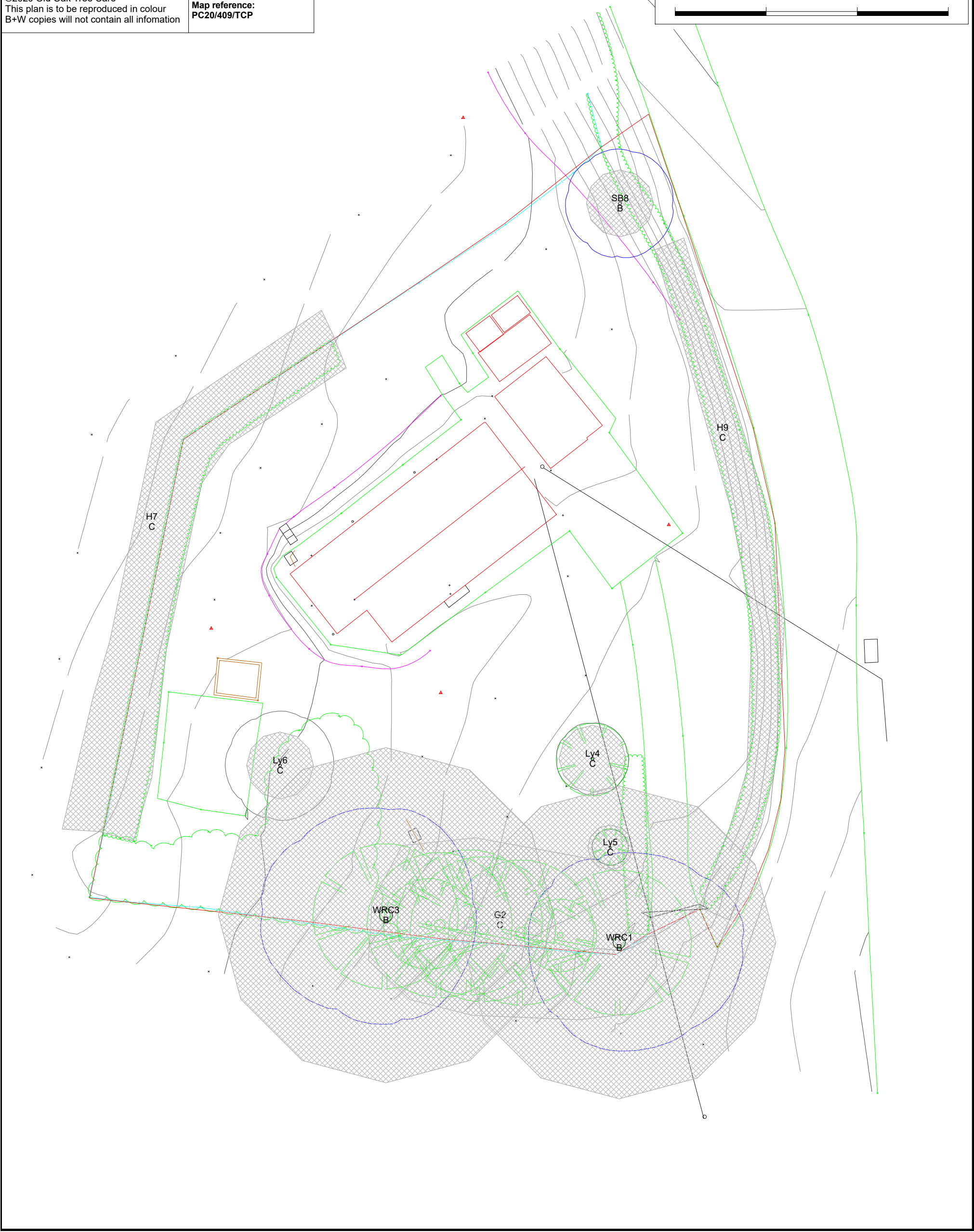
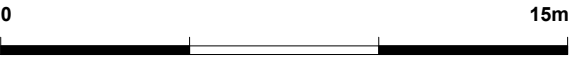
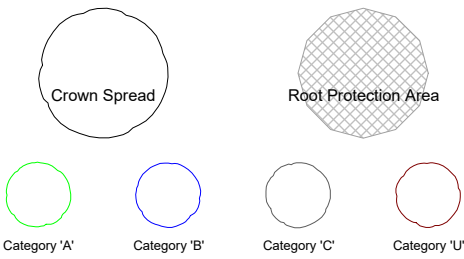


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Map reference:
PC20/409/TCP

Legend





Appendix B

2A Llynn-Y-Cil, Chirk,
Wrexham, LL14 5AB

Tree Constraints Plan
Showing all trees, crown dimensions, tree
categories, RPAs, fencing and special engineering

SCALE :
1 : 200 @ A3 DATE :
18/09/2020

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Map reference:
PC20/409/TCP

Legend

Category 'A'	Category 'B'	Category 'C'

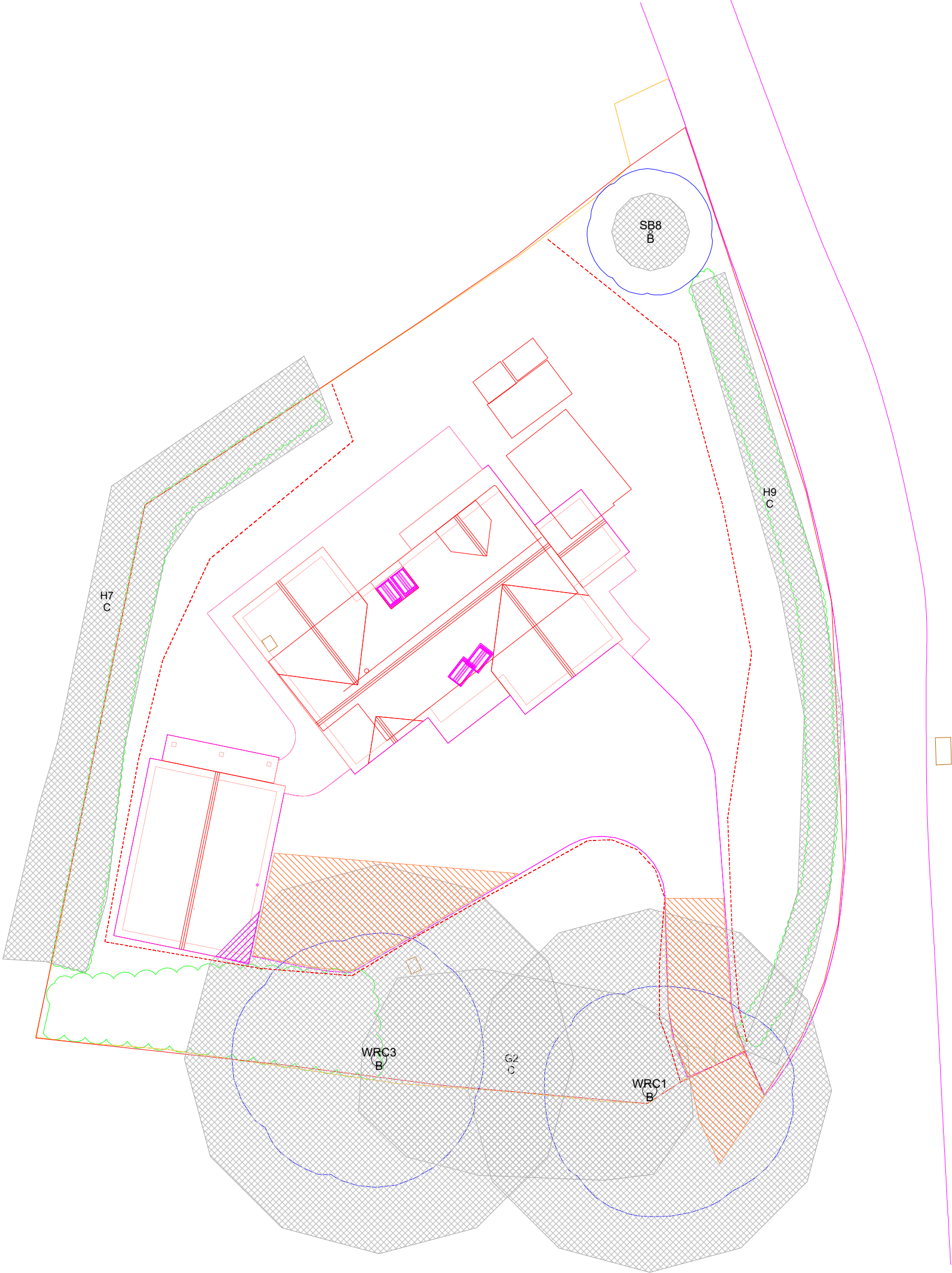
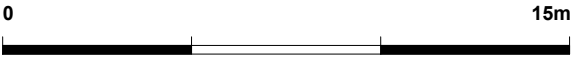


Table 1 Cascade chart for tree quality assessment

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 significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture)
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 with material conservation or other cultural value
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

Figure 2 Default specification for protective barrier

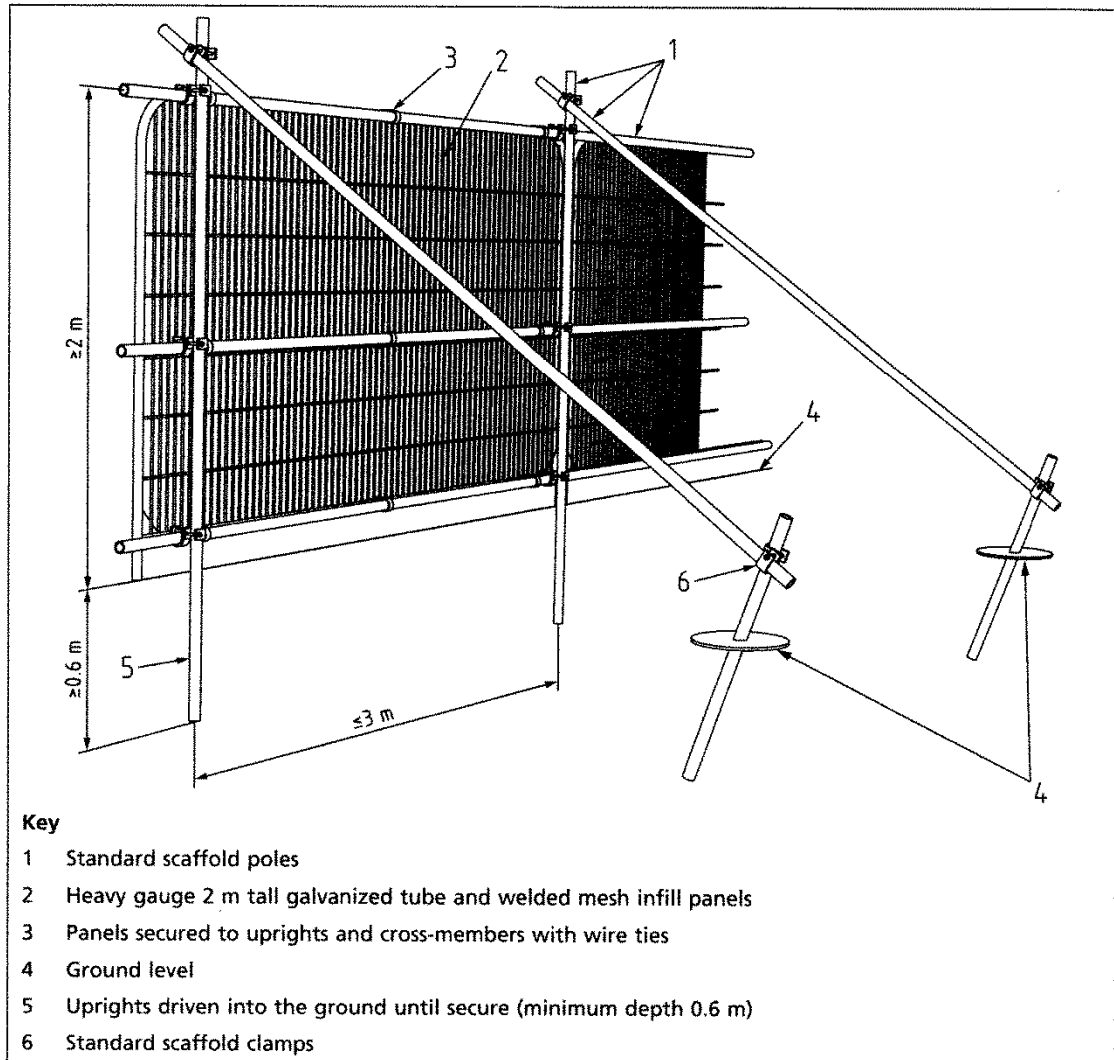
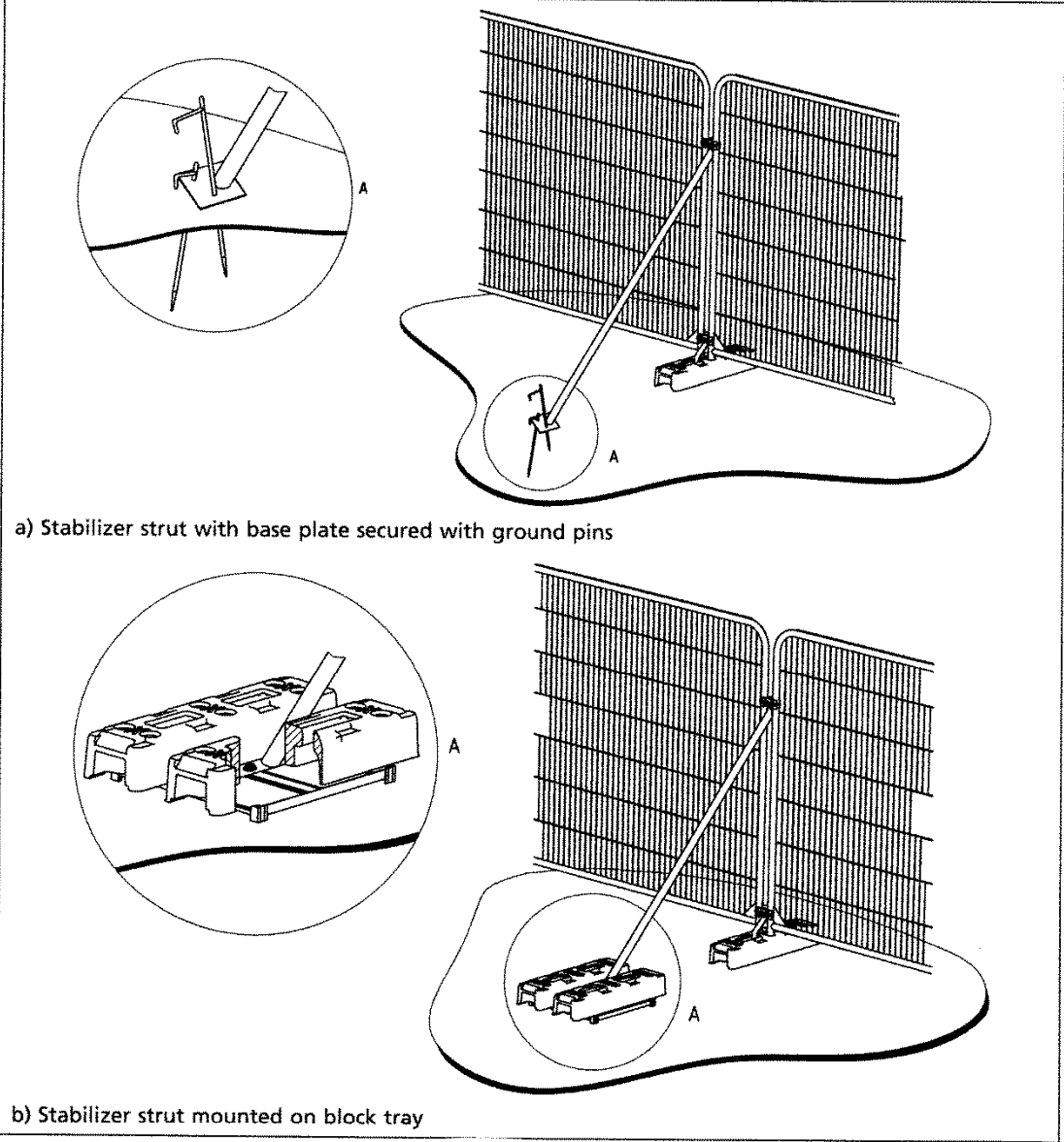


Figure 3 Examples of above-ground stabilizing systems



Appendix E Tree Schedule - Key

Where measurements are estimated due to lack of access or vegetation, a * denotes this.

Tree Number -	Identification for specific tree. Using a couple of letters to help with species identification together with a number. Groups or hedges will be identified as Gr.
Species-	Tree species, using common name.
Height-	Taken using angular triangulation function of a laser rangefinder.
Diameter-	Taken by measuring circumference with a tape measure and applying Pi equation or by measuring circumference by eye if entire circumference is not accessible (in this case denoted by *).
Crown spread-	Radius of crown at four cardinal points, north, east, south and west measured by laser rangefinder. (Estimates denoted with a *).
Crown height-	Height of lowest branch at each cardinal point. Measured by laser rangefinder. (Estimates denoted with a *).
Age bracket-	Estimated life stage of tree ranging from young, mid-aged, early-mature, mature and over-mature.
Physiological condition-	Assessment of health and vitality of the tree. Good, fair, poor or dead. Fair or poor will have more details attached.
Structural condition-	Assessment of physical structure of tree. Good, fair, poor or dead. Fair or poor will have more details attached.
Years remaining-	Estimate of likely useful life of tree taking into account age, species, character, situation and likely management requirements.
Quality assessment-	Subjective assessment. Either A- very good, B-good, C-reasonable or U- unsuitable for retention. See appendix C for more details.
RPA radius-	Positioning of root protection area (RPA) measured from centre of the tree to the radius. This is for circular RPAs. Where RPAs have been adjusted for site conditions and are no longer circular this value will not be correct. (Non-circular RPA will be denoted with a *).
RPA area-	Area of RPA irrespective of its shape.
Notes:	Any notable comments on group make up, physiological, structural condition or notable features.

Appendix E		Tree Schedule																		
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	
WRC1	W Red Cedar	20	700	5	7	6	5	3	3	4	4	mature	good	good	20 to 40	B	8.4	222		
G2	Group	20	500	5	5	5	5	3	3	3	3	mature	good	good	20 to 40	B	6	113	line of cypress and western red cedar	
WRC3	W Red Cedar	20	775	6	5	6	7	3	3	4	3	mature	good	good	20 to 40	B	9.3	272		
Ly4	Leylandii	6	150	2	2	2	2	0	0	0	0	mid-aged	good	good	10 to 20	C	1.8	10		
Ly5	Leylandii	6	150	3	3	3	3	0	0	0	0	mid-aged	good	good	10 to 20	C	1.8	10		
Ly6	Leylandii	6	150	3	3	3	3	0	0	0	0	mid-aged	good	good	10 to 20	C	1.8	10		
H7	Hedge	2	100	1	1	1	1	0	0	0	0	mature	good	good	20 to 40	C	1.2	5	hawthorn and some beech	
SB8	Silver Birch	7	150	3	3	3	3	1	1	1	1	mid-aged	good	good	20 to 40	C	1.8	10		
H9	Hedge	1	100	1	1	1	1	0	0	0	0	mature	good	good	20 to 40	C	1.2	5	hawthorn by road, mixed species in garden	

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.



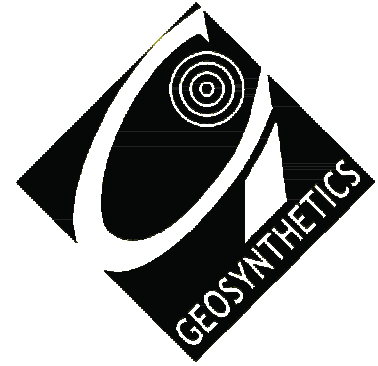
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Method Statement

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

- | | |
|---|--|
| 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;

