
BS5837:2012 ‘TREES IN RELATION TO DESIGN, DEMOLITION AND CONSTRUCTION - RECOMMENDATIONS’

INITIAL ARBORICULTURAL SURVEY REPORT

SITE OF SURVEY	Pine Valley Cwmavon Neath Port Talbot
CLIENTS	Mr. John Reape
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DATE SURVEYED	15 th April 2019 Report valid for 60 months * Notes on tree health valid 12 months

1. INTRODUCTION

1.1 ASSIGNMENT

We have been instructed by C2J Architects to carry out a tree survey in accordance with BS5837:2012 'Trees in relation to design, demolition and construction - recommendations' at a proposed development site at Pine Valley Cwmavon Neath Port Talbot.

1.2 REPORT METHODOLOGY

The methodology for preparing this report is in accordance with BS5837:2012 'Trees in relation to design, demolition and construction - recommendations' is as follows:-

Tree Survey Plan

The purpose of the Tree Survey is to identify significant trees on site that may be within influential distance of any proposed development. The plan will record the condition of the trees, their quality and benefits within the context of the development and their above and below ground constraints in relation to both the site and any proposed development.

1.3 NEXT STAGE

This document is intended to be used as an aid for the site design and layout.

Following the finalised design, and any further arboricultural consultation that this may require, the next stage is the drawing up of an Arboricultural Implications Assessment followed by an Arboricultural Method Statement.

Arboricultural Impact Assessment

The purpose of this part of the report is to identify, evaluate and possibly mitigate the extent of any direct and indirect impacts on the trees. It will also identify any potential impacts of the trees on the proposed development.

Arboricultural Method Statements and Tree Protection Plan

The Arboricultural Method Statement and Tree Protection Plan outline all necessary aspects of arboricultural work and tree protection that is required during the development process.

1.4 LEGAL CONSTRAINTS

If these trees are located in a Conservation area or designated with a Tree Preservation Order, the Local Planning Authority will need to be consulted before any work commences.

1.5 IMPLEMENTATION OF TREEWOR

All tree work should be carried out to BS 3998:2010 'Tree work - Recommendations'.

1.6 SOILS

No soil analysis has been undertaken at this site

2. CONCLUSION

The development involves the construction of 20 residential plots with associated access roads parking spaces and service runs. Much of the site is free of trees and the main trees affected on site, on the South Eastern Boundary, with most of these located outside of the site, and outside of the development area. The main tree of concern in respect of this development is tree 5 Oak which is showing signs of die back and possible decline and root death from either previous disturbance, or local ground water level changes. Tree 5 could have a long-term life expectancy with the right care and monitoring although its removal and replacement as part of an overall replanting scheme would also ensure long term tree cover. Other considerations include allowing for the use of pile and beam foundations for plots 15 16 and 17 and a small area of low impact or no dig construction for the car parking area adjacent to plots 15 16 and 17.

The site appears to have impeded drainage and there is a lot of waterlogging and the development overall is likely to affect this with proposed drainage schemes although this may benefit trees on site and the potential for new planting.

APPENDIX 1

TREE SCHEDULE KEY

The trees and groups of trees at the site have been assessed as per the recommendations set out in BS 5837 2012.

Type	Represents the type of vegetation being assessed. These are Tree (T), Group (G), Stump (S), Woodland (W)
Tag No	Each tree has been marked by a numbered tag for on site identification. Where possible this number is related to, or similar to the given tree number. There may be occasions when the tag number bears no relationship to the tree number, but is still useful for on site identification
Common Name Botanical Name	The tree species have been identified and both common and botanical names are given.
Age	Young – (Shown as Y in the schedule) juvenile tree with dominant leading shoot growth and short side branches. Vigorous growth and often of conical form. Semi-mature – (Shown as SM in the schedule) young adult tree, leading shoot growth may not always be dominant but side branches are usually ascending. Vigorous growth, flower and seed production. Minimal deadwood. Early maturity – (Shown as EM in the schedule) adult tree with the main framework of the crown formed. Not yet at full dimensions. Vigorous growth and some shedding of inner branches and deadwood. Horizontal side branches. Mature – (Shown as M in the schedule) adult tree at full crown volume and dimensions. Maximum flower and seed production. Dead wood likely within the crown and reiteration growth in the lower canopy. Over mature – (Shown as OM in the schedule) loss of overall vigor and reduction of full dimensions due to limb loss and branch tip die back. Major dead wood within the crown and possible hollowing and cavities. Retrenchment of the crown through increased reiteration growth on the lower branches. Veteran / Ancient – (Shown as V in the schedule) a tree that has passed beyond maturity and is old in comparison with other trees of the same species. They often have decayed or hollow stems and branches and abundant deadwood. They are important for heritage, landscape and ecological value.
Height (m)	Where site lines allow, tree height has been calculated by means of a laser clinometer and recorded in metres. If the use of a laser clinometer is restricted due to confined space or obscuring vegetation, the height of the tree may be estimated based on the surveyor's experience. Adjacent trees or buildings with a clear view may be measured and used as a height scale. Where several trees are located in close proximity, one tree may be measured and the other trees estimated using the measured tree as a reference.
Diameter (mm)	The stem diameter is measured in millimetres in accordance with Annex C of BS5837 2012.
Crown Height (m)	Is the distance from the lowest point of the crown from ground level.
FSB Height (m) /Direction	The height of the First Significant Branch (FSB) is recorded in metres and the direction of growth is in relation to the cardinal points of the compass.
North (m) South (m) East (m) West (m) (Crown Spread)	As it is rare that a tree's crown is asymmetric, the crown spread is measured at the four cardinal points of the compass to give an estimated representation of the crown spread which is then recorded on the tree survey plan.
Condition	<u>Physiological Condition</u> Each tree has undergone a brief preliminary visual inspection from ground level. This information is only relevant at the time of inspection because circumstances influencing a tree's condition can change rapidly. This section is divided into two separate sections: G = Good – fully foliated/twigged canopy for the tree's situation with an indication of natural vigor from shoot extension growth and signs of good vitality throughout the tree's system. F = Fair – signs of adequate vigour and vitality up to 70% canopy coverage. May show signs of slight stress such as branch tip die back, slightly sparse foliage, yellow or small foliage. Stress may be alleviated by prescribed maintenance. P = Poor – obvious signs of advance stress including less than 70% canopy coverage, crown die back, significant deadwood. Sparse and discoloured foliage. D = Dead – moribund or dead trees
Comments	<u>Structural Condition</u> Any structural defects are noted such as splits, cracks, tight forks, rubbing branches, cavities, decay and the presence of pests or diseases. These may compromise the mechanical integrity of the tree's structure. (Veteran trees may pose many physiological and structural faults yet still be considered in good condition for their age.)
Recommendations	Following visual inspection preliminary recommended action, further detailed inspection, or maintenance may be prescribed.
RPR (m) Root Protection Radius	This is calculated from Annex D of BS 5837 2012 'Trees in relation to construction - Recommendations'.
RPA (m) Root Protection Area	This measurement is the total area of root protection. This can be modified if necessary by the Arboricultural Consultant.

Category	The tree's overall value is categorised in accordance to the cascade chart (table 1) of BS 5837 2005, see Appendix 2 of this report. In brief, the purpose of the tree categorisation is to identify and quantify the value of the existing tree stock. This will allow informed decisions to be made concerning which trees should be removed or retained should the development occur.
<u>Category A</u>	Trees of high quality and value that make a substantial contribution. Marked in light green on the tree survey plan.
<u>Category B</u>	Trees of moderate quality and value that make a significant contribution. Marked in mid blue on the tree survey plan.
<u>Category C</u>	Trees of low quality and value that provide only an adequate contribution. Marked in grey on the tree survey plan.
<u>Category U</u>	Trees in such a condition that any existing value would be lost within ten years. This includes trees that should be removed for good arboricultural reasons. Marked in dark red on the tree survey plan.

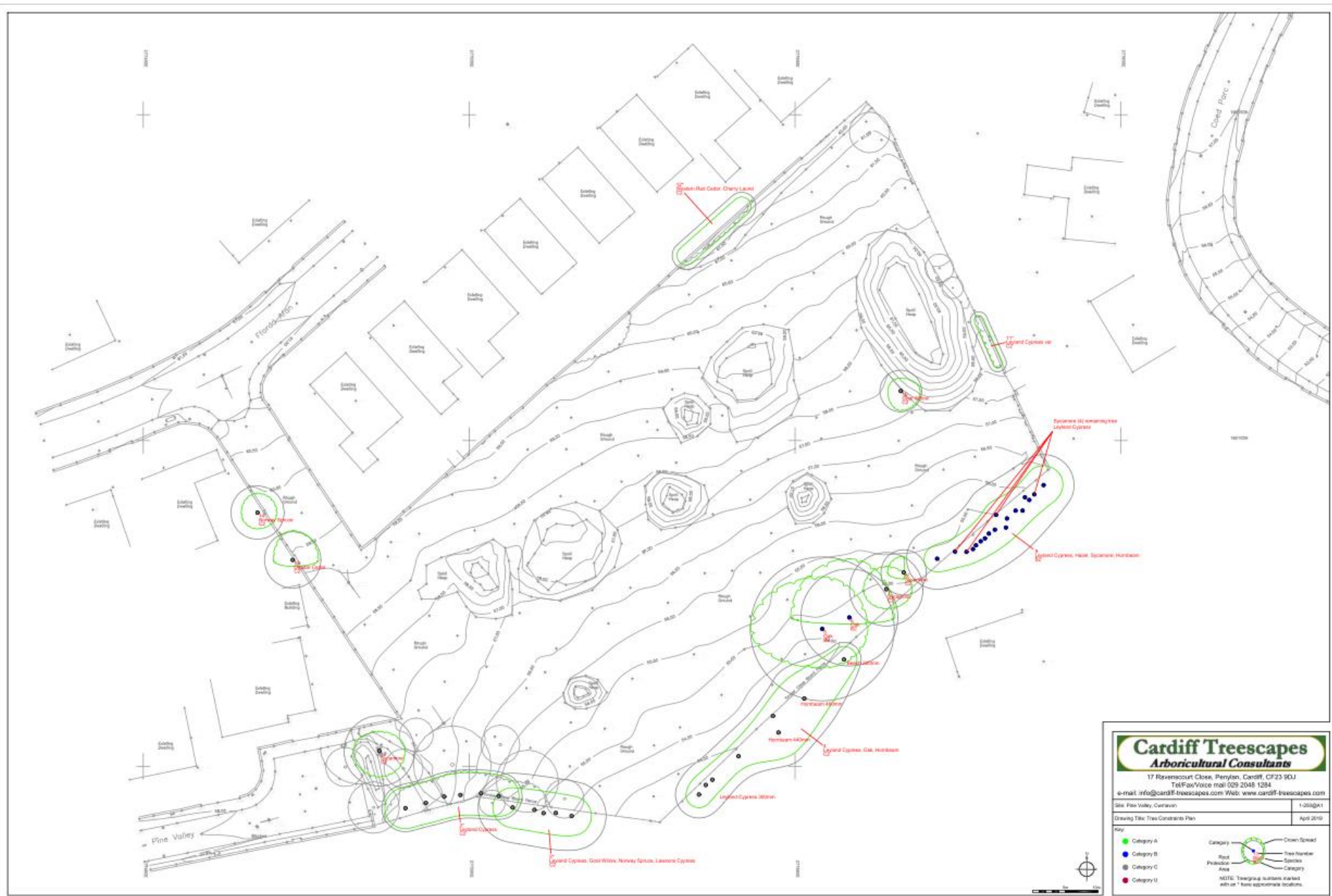
Appendix 2 Tree Schedule

Tree Number	Tag number	Age	Type	Tree Name (Common name)	Tree name (Botanical)	Condition	Crown height	Height	Trunk Dia. (mm)	Single stem (1) or multi-stem (m) *	North (m)	South (m)	East (m)	West (m)	BS Cat.	RPA radius (m)	RPA Area (m2)	Comments	Action	ERC	
1	401	SM	T	Sycamore	<i>Acer pseudoplatanus</i>	Good	2N	8	540	m	3	4	4	4	C2	5.40	91.6	Open grown tree with single stem and natural taper, supporting a full and naturally formed canopy. Multi stemmed tree. Growing close to site boundary, adjacent to boundary and residential garden.	Monitor future growth.	10 TO 40 YRS	
2	402	EM	Group	Leyland Cypress	<i>X Cupressocyparis leylandii</i>	Good	0	12	300	1	See plan				C2	3.60	40.7	Group trees with suppressed canopy towards neighbouring building and full crown towards the light. Split limb in lower crown extends over site area. Limbs encroach onto site. Growing on site boundary adjacent to boundary fence.	Remove split limb in lower crown. Monitor future growth.	10 TO 40 YRS	
3	403	EM	Group	Leyland Cypress, Goat Willow, Norway Spruce, Lawsons Cypress	<i>X Cupressocyparis leylandii</i> , <i>Salix caprea</i> , <i>Picea abies</i> , <i>Chamaecyparis lawsoniana</i>	Good	0	15	440	1	See plan				C2	5.28	87.6	Group trees with suppressed canopy towards neighbouring building and full crown towards the light. Growing on site boundary adjacent to boundary fence within adjoining property.	Monitor future growth.	10 TO 40 YRS	
4	404	SM	Group	Leyland Cypress, Oak, Hornbeam	<i>X Cupressocyparis leylandii</i> , <i>Quercus robur</i> , <i>Carpinus betula</i>	Poor	2N	14	460	1	See plan				C2	5.52	95.7	Group trees with suppressed canopy towards neighbouring building and full crown towards the light. The Hornbeams have significant die back present within the upper crown, this die back may be root related. Growing on site boundary adjacent to boundary fence within adjoining property.	Carry out detailed hazard risk assessment of trees in this area. Monitor future growth.	40 YRS	

5	405	EM	T	Oak	<i>Quercus robur</i>	Fair	6W	17	920	1	8	6	7	11	B2	11.04	382.9	Group tree with suppressed canopy towards neighbouring tree and full crown towards the light. Ivy growth present on main stem. Evidence of water logged soil. Heavily end loaded limbs developing over site area. Some significant deadwood present and crown die back of leading shoots. . Growing within recreational greenspace.	Sever Ivy. Reduce end loading of vulnerable limbs developing over site area. Remove significant deadwood. Monitor future growth.	40 YRS	
6	406	EM	T	Oak	<i>Quercus robur</i>	Fair	3W	15	620	1	9	1	7	9	B2	7.44	173.9	Group tree with suppressed canopy towards neighbouring tree and full crown towards the light. Ivy growth present on main stem. Evidence of water logged soil. Heavily end loaded limbs developing over site area. Some significant deadwood present and crown die back of leading shoots. . Growing within recreational greenspace.	Sever Ivy. Reduce end loading of vulnerable limbs developing over site area. Remove significant deadwood. Monitor future growth.	40YRS	
7	407	EM	T	Sycamore	<i>Acer pseudoplatanus</i>	Good	4W	10	470	1	3.5	3	4	3.5	C2	5.64	99.9	Group tree with suppressed canopy towards neighbouring tree and full crown towards the light. Growing close to site boundary and boundary fence.	Monitor future growth.	20-40YRS	
8	408	SM	T	Sycamore	<i>Acer pseudoplatanus</i>	Good	2.5N	9	290	1	2.5	1	0	2.5	C2	3.48	38.0	Group tree with suppressed canopy towards neighbouring tree and full crown towards the light. Ivy growth on main stem. Growing close to site boundary and boundary fence.	Sever Ivy. Monitor future growth.	20-40YRS	

9	409	EM	Group	Leyland Cypress, Hazel, Sycamore, Hornbeam	<i>X Cupressocyparis leylandii</i> , <i>Corylus avellana</i> , <i>Acer pseudoplatanus</i> , <i>Carpinus betulus</i>	Good	2.5W	13	390	1	See plan				B2	4.68	68.8	Group tree with suppressed canopy towards neighbouring tree and full crown towards the light. Branches encroach onto site area. Growing close to site boundary and boundary fence.	Monitor future growth.	20YRS	
10	410	EM	T	Goat Willow	<i>Salix caprea</i>	Good	0	4	320	m	2	3	3	2	C2	3.20	32.2	Group tree with suppressed canopy towards neighbouring tree and full crown towards the light. Multi stemmed tree. Growing in recreational greenspace.	Monitor future growth.	0-10YRS	
11	411	SM	Group	Leyland Cypress var	<i>X Cupressocyparis leylandii</i> var	Good	0	3	110	1	See plan				C2	1.32	5.5	Group trees with suppressed canopy towards neighbouring tree and full crown towards the light. Growing as hedgerow on site boundary.	Monitor future growth.	10-20YRS	
12	412	EM	Group	Western Red Cedar, Cherry Laurel	<i>Thuja plicata</i> , <i>Prunus laurocerasus</i>	Good	0	2.5	180	1	See plan				C2	2.16	14.7	Group trees with suppressed canopy towards neighbouring tree and full crown towards the light. Growing in adjacent property as hedgerow on site boundary.	Monitor future growth.	40 YRS	

13	413	EM	T	Deodar Cedar	<i>Cedrus deodara</i>	Good	4.5N	11	360	1	4.5	1	4	3	C2	4.32	58.6	Group tree with suppressed canopy towards neighbouring tree and full crown towards the light. Evidence of damage to boundary wall. Growing within adjacent property close to site boundary wall.	Monitor future growth.	10 YRS	
14	414	EM	T	Norway Spruce	<i>Picea abies</i>	Good	4.5E	10	340	1	3	2.5	3	2.5	C2	4.08	52.3	Group tree with suppressed canopy towards neighbouring tree and full crown towards the light. Evidence of damage to boundary wall. Growing within adjacent property close to site boundary wall.	Monitor future growth.	10 TO 20 YRS	





3.1 DIRECT LOSS OF TREES

Table 1

Tree No.	Species	Category	Reason for loss	Impact
1 (401)	Sycamore	C2	Construction of access road and parking area	Low
10 (410)	Goat Willow	C2	In middle of site development area	Low

It appears that the only trees requiring removal are the two trees above(T1 Syc. T10 Willow) which are self-sown trees of low quality with little amenity or habitat value and their loss will have little impact.

3.2 CONSTRUCTION WITHIN ROOT PROTECTION AREAS

The following trees appear to have construction works proposed within the root protection areas.

TABLE 2 CONSTRUCTION WITHIN ROOT PROTECTION AREAS

Tree No.	Species	Category	Approximate % of RPA affected	Impact
T5	Oak	B2*	35%	Loss of roots mainly feeding fibrous but possible loss of lateral structural that could affect stability and long-term health (Plot 15-17)
T6	Oak	B2	10%	Minor loss of fibrous roots towards edge of RPA (car park area)
T7	Sycamore	C2	10%	Minor loss of fibrous roots towards edge of RPA (car park area)
T8	Sycamore	C2	10%	Minor loss of fibrous roots towards edge of RPA (car park area)

***Tree 5 has been observed to be in a state of decline and although categorized as B2, may well have some previous root damage or death due to waterlogged soils. Its future management would include a reduction in size and retention at a reduced size with monitoring. Further root loss would not be advisable but it is possible that there may already be root death in the area affected and further work should be done in the form of trial pits to establish health and spread of viable roots. If substantial viable roots from tree 5 are located within the proposed development area, it will be necessary to consider alternative foundations to traditional strip ones for the affected plots that would minimise the impact.**

It may be possible to retain all the above trees in table 2 with careful excavation and care of exposed roots as detailed in the attached method statements.

Construction of the car parking areas in proximity to the above trees may also require the use of a no dig technique as detailed in method statements below although it should be noted trees 7 and 8 are category C trees and could be replaced easily.

Note also requirements for tree protection.

3.3 CONFLICT WITH BRANCHES AND FACILITATIVE PRUNING

There may be some conflict with low limbs from trees 5, 6 7 8 and from trees within group 9. It is anticipated that minor crown lifting or reduction of limbs maybe required that would not affect the long-term health of the affected trees.

3.4 ON SITE STORAGE OF SPOIL, BUILDING AND TOXIC MATERIALS

Prior to and during construction works on site, no spoil or construction materials will be stored within the root protection area of any tree on site or within the adjacent land.

Any facilities for the storage of oils, fuels or chemicals will have to be sited on impervious bases and surrounded by impervious bund walls. The volume of the bund compound will have to be at least equivalent to the capacity of the tank plus 10%. In case of accidental leakage, the compound will have to be at least equivalent to the capacity of the largest tank, or the combined capacity of interconnected tanks plus 10%. All filling points, vents, gauges and sight glasses will have to be located within the bund. The drainage system of the bund will have to be sealed with no discharge to any watercourse, land or underground strata. Associated pipe-work will have to be located above ground and protected from accidental damage. All filling points and tank overflow pipe outlets will have to be detailed to discharge downwards into the bund.



Pollution image 1: Where fuel or other chemicals are stored on site, it is now standard practice to have emergency spillage kits available to restrict the environmental impact of accidents.



Pollution image 2: Soil bunding or a supporting framework covered in heavy-duty plastic sheeting is essential where there is a risk of spillages contaminating RPAs. This specifically applies to cement mixing areas and vehicle washing facilities.

3.5 CHANGES IN GROUND LEVEL

Ground level changes must be avoided within the root protection area of Trees retained on site.

3.6 INSTALLATION OF SERVICES

We have not been provided with details indicating the proposed route for all services sewer, water, electric and gas to the proposed properties but these should all be routed outside of the root protection areas of all retained trees.

4. TREE PROTECTION REQUIRED DURING DEMOLITION GROUND CLEARANCE AND DEVELOPMENT PHASE

Trees being retained will need to be protected with fencing and or ground protection boards and stem protection boards where appropriate which must be in place prior to any works commencing on site. Any ground required for soft landscaping should also be protected to avoid the destruction of soil structure, fauna and drainage properties. A provisional tree and ground protection plan is indicated below and will be confirmed with a scaled tree and ground protection plan once more details and comments are received on the development proposal.

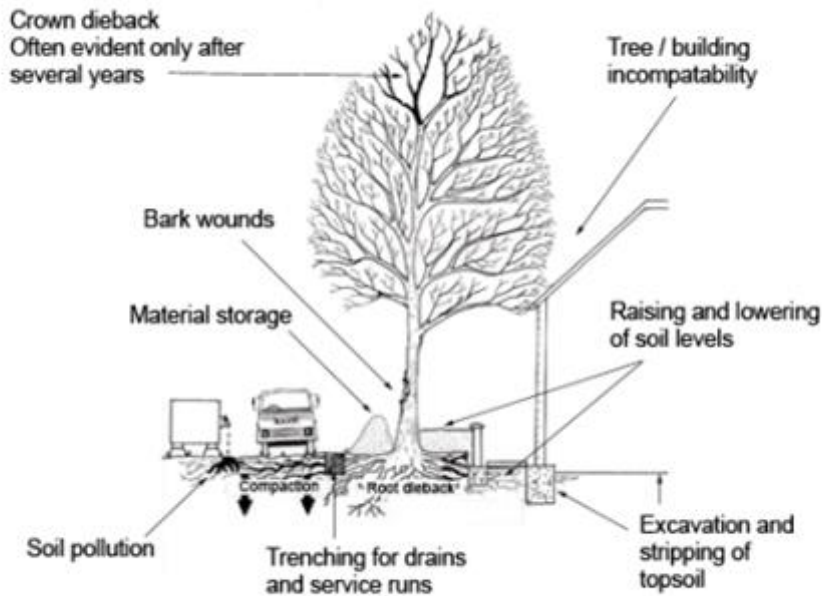
4.1 TREE PROTECTIVE BARRIERS

Trees are often damaged both above and below ground level and soils compacted as a result of construction activity. In order to minimise this risk, tree protective barriers will be erected to prevent construction activities that may have a detrimental effect on any retained trees within influential distance of the construction area. Where ground protection is more practical this should be used in accordance with the method statement below.

Trees within soft landscape areas in proximity to the development area should be protected by fencing and or ground protection as appropriate.



Potential causes of damage to trees on development sites.



The barriers will be erected prior to the start of any construction or demolition activities and remain in place until all construction works are complete.

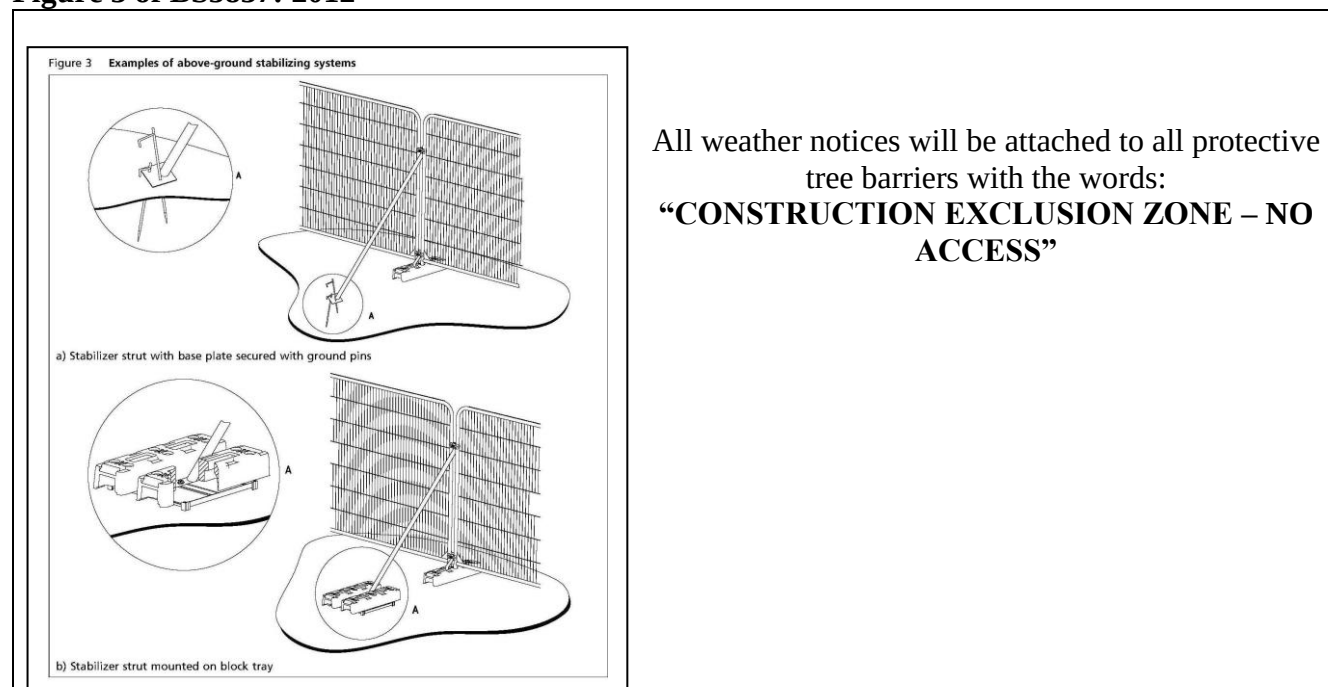
The area protected by barriers will be considered sacrosanct and will not be entered into by construction contractors without consultation with the commissioned Arboriculturalist and Local Authority Tree Officer.

Barriers will be erected in accordance with the specifications detailed in figure 3 of BS5837:2012 'Trees in relation to design, demolition and construction - recommendations'

The protective barriers will enclose the root protection areas of the following trees as detailed on the Tree Protection Plan.

These weldmesh panels should be 2m tall and mounted on rubber or concrete feet. The panels should be joined together using a minimum of two anti-tamper couplers, installed so as they can only be removed from the inside of the fence. The distance between the couplers should be at least 1m and should be uniform throughout the fence. The panels should be supported on the inside by stabiliser struts, which should normally be attached to a base plate secured with ground pins (figure 3a). Where the fencing is to be erected on retained hard surfacing or it is otherwise unfeasible to use ground pins, e.g. due to the presence of underground services, the stabiliser struts should be mounted on a block tray (figure 3b). Where fencing is not at the edge of the specified RPA ground protection will be installed between the fencing and RPA radius.

Figure 3 of BS5837: 2012



AMS 1

THE CONSTRUCTION OF TREE GROUND PROTECTION AREAS AND TEMPORARY ACCESS ROADS

1. INTRODUCTION

Where it has been agreed at the design and planning stage that vehicle and pedestrian access for the construction operations may take place within the root protection area, special ground protection measures should be taken. Protective fencing may be positioned within a tree's root protection area at the edge of the agreed working zone but the soil structure of the root protection area beyond the barrier should be protected with ground protection. Please refer to accompanying Tree Protection Plan, which clearly shows the working zones that require protection.

The purpose of protecting the ground within the root protection zone is to

- a) Prevent physical damage such as abrasion, compaction and severing of roots during the construction phase.
- b) Make provision for water and oxygen to reach the roots.
- c) Protect the soil surface from contaminants.
- d) Preserve the soil structure at a suitable bulk density for natural root growth and function.

2. METHODOLOGY

- a) The soil surface should not be skimmed to establish a level surface. Loose organic matter or turf should be removed carefully using hand tools. The new level surface should be established above the former ground level using a granular fill where necessary.
- b) If temporary ground levels are to be raised within the root protection area this should be achieved by using granular materials that do not inhibit vertical gaseous diffusion such as no fines gravel, washed aggregate or cobbles.
- c) Prior to the installation of the temporary ground protection, any existing ground cover should be cut back to as near ground level as possible. This should not involve ground compaction, excavation or stripping of the soil. An acceptable method would be the use of a manually operated brush cutter operated by a competent person trained to NPTC A012 level and in accordance with industry best practice AFAG leaflet 203. The cut organic material should be raked away from the protection area to prevent the buildup of anaerobic conditions which might otherwise occur as vegetation begins to decompose.
- d) All ground protection should be installed prior to the commencement of any operations within the root protection area with the exception of the erection of protective fencing.
- e) All vehicles and/or plant involved in the laying of the temporary protective surfacing should operate outside the root protection area. The temporary ground protection should be laid so that it is sighted as close to the protective fence line as possible and extends to at least the outer edge of the root protection area.



Ground protection image 1: Heavy-duty plywood set onto a compressible woodchip layer and pinned into position is suitable to spread the loading from pedestrian access.



Ground protection image 2: Spreading soil excavated from footings is an effective way of buffering the plywood surface from the wear of light vehicles.



Ground protection image 3: Plywood fixed to a wood frame is another effective method of protecting soil from pedestrian compaction.



Ground protection image 4: A scaffold framework attached to the main scaffold fencing can be used to support either scaffold planks or plywood to create an elevated platform with a gap beneath.



Ground protection image 5: Cellular products are a very effective means of providing ground protection where heavy vehicle use is expected. Here, it is being used to temporarily widen an existing road, to be removed once the construction is finished.



Ground protection image 6: Custom designed sectional tracks can be joined to support very heavy traffic use through sensitive areas.

- f) Once in place, the temporary ground protection should not be removed or altered without prior recommendations from an arboriculturalist and approval has been gained from the Local Planning Authority.
- g) An arboriculturalist should supervise the laying and removal of the temporary protective surfacing.
- h) Any system used for temporary protective surfacing should be designed specifically for the purpose intended and be able to withstand all loads likely to be placed on it whilst achieving its purpose of ground protection. A specialist engineer may be required to advise on this matter.
- i) On final removal of the temporary protective surfacing, amelioration of the underlying surface should be implemented. Please refer to the method statement "Tree root area decompaction, aeration and amelioration"

AMS 2

SPECIALIST METHOD FOR EXCAVATING PITS WITHIN TREE ROOT PROTECTION AREAS

1. INTRODUCTION

Where it has been agreed that excavation can be carried out within a root protection area, the work should be done sensitively in order to minimise wounding, compaction and other impacts on the tree's system.

2. METHODOLOGY

- a) Up until the time that excavation is necessary, the area should either be protected within protective fencing or by ground protection.
- b) The area should be assessed for underground services by means of cable detection equipment.
- c) Excavation should not be carried out by mechanical excavator. The work should be carried out manually with hand tools.
- d) Where tree roots are encountered, the work should be undertaken by a trained arborist or by contractors supervised by a consulting arborist acting as a 'watching brief'.
- e) Excavation around tree roots should be undertaken by means of a 'soil pick'. This specialist equipment uses high velocity compressed air to remove soil particles yet leaving tree roots unharmed.
- f) The period of time that tree roots are exposed should be kept to a minimum. Tree roots should be kept moist and covered by Hessian cloth during periods that excavation is not in progress.
- g) Exposed roots should be protected from building materials such as cement, concrete etc by plastic sheeting.
- h) If root pruning is required it should be carried out by a trained arborist using sharp hand saw and secateurs. The diameter of roots severed should be kept to a minimum.
- i) Following completion of the construction, the excavation should be back filled with a good top soil and organic matter mix and tightly firmed.

ARBORICULTURAL METHOD STATEMENT 3

‘NO DIG’ CONSTRUCTION OF A POROUS ROAD WITHIN THE ROOT PROTECTION AREA OF TREES 5, 6, 7 and 8

1. INTRODUCTION

- 1.1 This method statement describes the procedure required to undertake the **NO DIG** construction of a driveway whilst minimising any adverse effects on underlying tree roots. The proprietary cellular confinement system, Cellweb 100, 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 product. It is employed to create a structurally sound layer which confines the aggregate particles allowing free drainage, permeability and efficient dissipation of loading. An appropriate specialist should be employed to design and install the surface this method statement is indicative only.
- 1.2 This method statement must be read in conjunction with the manufacturer’s installation instructions and an appropriate site-specific risk assessment.
- 1.3 Conventional methods of the construction of hard surfacing involve the scraping and removal of top soil and compaction of the sub base materials onto the sub soil in order to stabilise the structure. This conventional method is detrimental to tree roots, in that it causes root severance and prevents the penetration of water and oxygen to the underlying soils.

Although the prescribed Cellweb system is designed to dissipate surface loading, it is laid on non-compacted soils and therefore distortion of the surface make-up can occur from continual heavy vehicular traffic movement. It may be necessary to repair or re-lay this system in the future if major distortion occurs.

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:

- Depth of engineered infill material
- Californian Bearing ratio (CBR) – Standard test method for measuring soil strength
- Soil types
- Water table
- Maximum load (vehicles)
- Acceptable rut depth
- Reinforcement type
- Type and Depth of engineered infill material

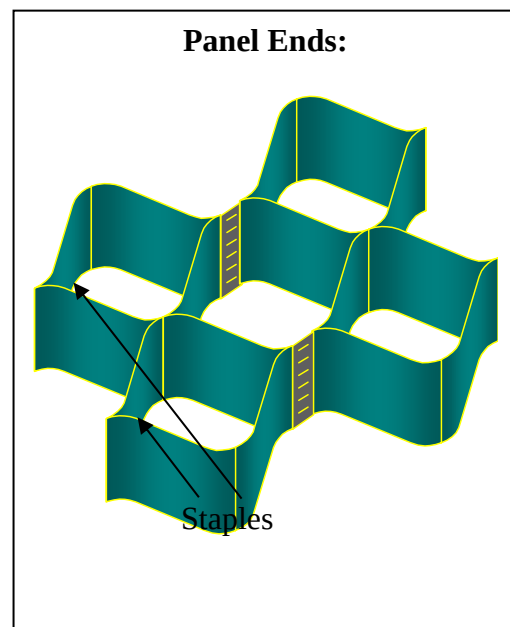
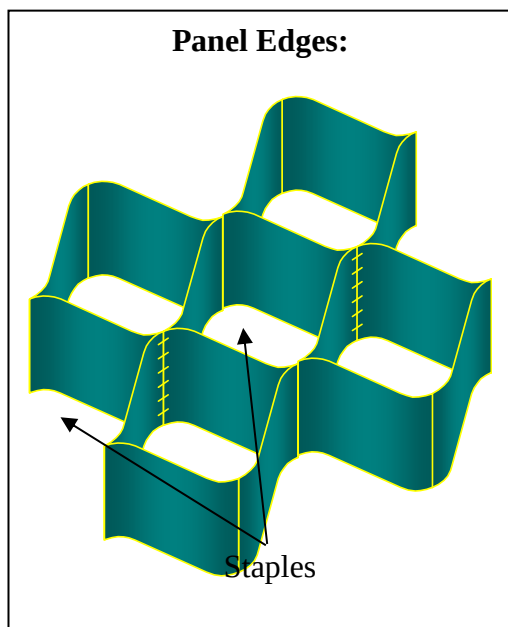
2. **METHODOLOGY**

- 2.1 Construction of the road will preferably be undertaken when the ground is reasonably dry with no water logging of the underlying soils.
- 2.2 Kill surface ground vegetation using a translocated herbicide. Care should be taken in the selection of herbicide so that desirable vegetation is not affected. This will be carried out by a suitably qualified and competent person.
- 2.3 All dead organic material will be removed using hand tools to prevent severe oxygen depletion in the soil during the process of decomposition.
- 2.4 All major protrusions such as rocks, large stones etc. will be removed from the root protection area by hand.
- 2.5 Fill major hollows using clean sharp sand – **DO NOT COMPACT OR SCRAPE THE SURFACE TO GRADE OFF HIGH SPOTS.**
- 2.6 The use of no-dig construction methods and materials elevates the structure above the existing ground level. Protective edging is therefore required to contain and support the construction materials. Timber edgings are an ideal support and are installed by:
 - Carefully hammering treated softwood stakes into the ground at suitable distances to enable the support required for edging boards. If it is apparent that the pegs are coming into contact or are likely to contact roots, the installer must **STOP** immediately and re-position the peg or seek advice from the Arboricultural Consultant
 - The final levels of the stakes shall be positioned lower than the edging boards to accommodate the finishing surface.
 - Treated softwood edging rails shall be fixed to the outside edge of the timber pegs. The rails will be of an appropriate size as to leave a finished height equal to or above that of the finished surface level of the driveway.
 - The timber rails must be seated directly onto the existing ground level without any surface excavation or soil scraping to enable leveling.

The dimensions and positioning of the support stakes and edging rails will be specified by the Project Engineer.

- 2.7 If service cables are to be incorporated into the sub base structure, they can be installed at this stage, along the inside edge of the timber rails above ground level.
- 2.8 Lay a non-woven geotextile separation fabric over the prepared surface between the edgings, making sure it is taut and that there are no folds.
- 2.9 Overlap the adjoining geotextile, as to the manufacturer's instructions and taking into account the soil strength (CBR) and temporarily retain it with weights. This overlap must be a minimum of 300mm on dry soils.
- 2.10 Expand the Cellweb 2.56m wide panels to the full 8.1m length.
- 2.11 Pin the Cellweb panels with the staking pins to anchor open the cells.
- 2.12 Staple the adjacent Cellweb panels together to create a continuous mattress. This will be carried out to the manufacturer's instructions.

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



2.13 Where necessary, cut the Cellweb panels to size using a sharp craft knife.

2.14 The infill material and its placement will be to the following method

•	Infill the expanded Cellweb panels with a 40/20mm, no fines , clean angular aggregate.
•	The specified infill material shall be placed into the expanded cells, making sure that each individual cell is filled to its full depth.
•	The filling of the Cellweb cells must be carried out by working in a direction from previously filled panels, so as to prevent any ground compaction and distortion of the unfilled panels. The maximum drop height of the specified infill into the cells will be limited to 1m to avoid damage or displacement of the cell walls. The gross weight of any machinery or vehicles used to infill the panels will not exceed the load bearing capacities of the Cellweb structure, as specified by the manufacturer.

2.15 The finished surfacing will be of a porous material to allow moisture and gas filtration to the underlying soils and tree roots. If using concrete block pavers or slabs, the joints will be filled with a porous material or left open.

2.16 The finishing surfacing will be laid to the following specifications:

Surfacing Options

Block Paving:

- Lay second layer of Fibretex F4M Geotextile separation fabric over the infilled Cellweb sections
- Lay sharp sand bedding layer compacted with a vibro compaction plate to recommended depth.
- Place block paviors as per manufacturer's instructions.

Tarmac (porous):

- Place 25mm surcharge of the granular material above the Cellweb system and lay the bitumen base and wearing courses.
- **Both the wearing surface course and the underlying binder course must be porous**, in order to allow both surface water and oxygen to penetrate through to the underlying sub base materials.

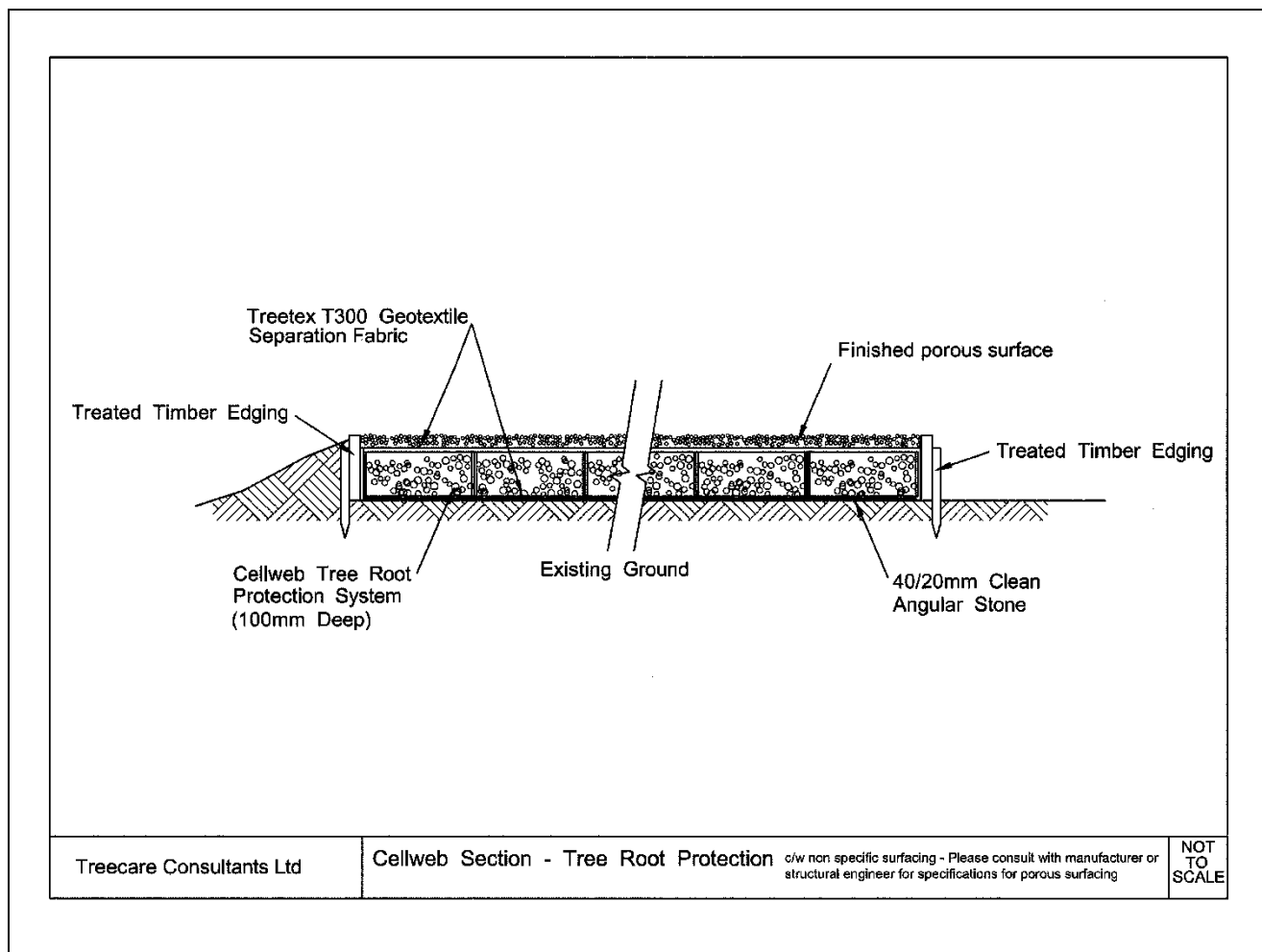
Loose Gravel:

- Place second layer of Fibretex F4M Geotextile separation fabric over the infilled Cellweb sections
- Place decorative aggregate to required depth
- NOTE: A treated timber edge should be provided to restrict gravel movement. A gravel confinement system can also be incorporated to retain the gravel.

Grass Blocks:

- Place second layer of Fibretex F4M Geotextile separation fabric over the infilled Cellweb sections
- Place 50/50 rootzone bedding layer to the required depth
- Lay recycled Duo Block 500 Grass Protection System infilled with 50/50 rootzone mix.
- Seed as per architects' instructions.
- (Alternatively, the Grass Blocks may be infilled with gravel.)

2.17 The edges of the trackway can be banked from the top of the edging boards to existing ground levels using a good quality top soil to recommendations in BS3882 "Specifications for Top Soil" 1994.





3.



MATERIALS

Cellweb 100 Cellular Confinement System and Treetex T300 Geotextile Separation Layer

Contact:	Geosynthetics Ltd Fleming Road Harrowbrook Industrial Estate Hinckly Leicestershire LE10 3DU
Tel:	01455 617139
Fax:	01455 617140
Web Address	www.geosyn.co.uk
Email:	sales@geosyn.co.uk

5. PROGRAMME FOR ARBORICULTURAL MONITORING INPUT

FINALISING TREE MANAGEMENT PRIOR TO CONSTRUCTION	
ACTION	ARBORICULTURAL INPUT
Review of tree protection with construction team and any issues that arise that may affect trees	• Discussions/meetings with relevant construction personnel to discuss extent of tree constraints • Review working space requirements to discuss any adjustments to barrier or ground protection • Review drainage proposals and any RPA conflicts • Review any post consent layout changes affecting trees • Review all works within RPAs • Identify potential conflicts and means of reducing impact • Prepare working drawings as required
Review consented tree protection proposals for discussion at pre commencement meeting	• Revise plans if necessary • Discuss and agree revisions with LAPD
	•
Pre commencement site meeting with developer and LAPD representative	• Meeting on site • Agree details of supervision requirements • Review updated proposals • Review tree protection if already installed

SITE OPERATIONS BEFORE WORK STARTS ON SITE	
ACTION	ARBORICULTURAL INPUT
Tree works	• Review site requirements with tree work contractor
Installation of tree protection as agreed by LAPD	• Revise plans and specification if required for agreement with LAPD • Photograph relevant aspects of installed tree protection • Liaise with contractor installing protection until compliance
Demolition / site clearance	• Liaise with contractor to discuss tree protection requirements on site

OPERATIONS THAT COULD AFFECT TREES DURING CONSTRUCTION	
ACTION	ARBORICULTURAL INPUT
Installation of new services	Meeting with contractor to discuss relevant method statement and any alterations and to supervise operation as required
Removal of barriers and ground protection	- Meeting with contractor for briefing prior to works - NB This should only occur once all operations likely to impact on trees have been completed.

6. ARBORICULTURAL METHOD STATEMENTS

The function of the Arboricultural Method Statements and Tree Protection Plan is to provide the construction contractors with a clear and concise instruction on how to carry out tree related work. This includes the type and position of protective fencing and ground protection. General good practice and excavation close to trees. The method statements have been attached to this report as appendices so they can readily be reproduced as work sheets for the contractors.

7. FUTURE CONSIDERATIONS

If the proposed development goes ahead there are several factors that should be considered.

Implementation of works

We advise that any tree works be carried out by Qualified Arboricultural Contractors. The contractor should carry out all tree works to BS 3998 *Recommendations for Tree Work (2010)* and as modified by research that is more recent.

Trees subject to statutory controls

Most works to trees covered by a preservation order or within a conservation order require consent to remove or prune. This can be obtained by writing to the local authority tree protection team. Note also restriction on tree works under the Wildlife and conservation act 1981 in respect of mammals, birds and bats as well as protected plant species.

- Maintenance – Retained trees within a garden situation will require regular maintenance for hazard risk, size control and good husbandry reasons.
- A full soft landscaping schedule and re planting scheme along with soil resource plan and soil analysis should be undertaken to accompany this report

APPENDIX 3

QUALIFICATIONS AND PROFESSIONAL DEVELOPMENT

Mr G.M. Ayres BSc (Hons) M. Arbor A. NDArb

1. **QUALIFICATIONS**

- BSc (Hons) Biological Sciences & Environmental studies
- Diploma in Biological Sciences
- Surrey County Diploma in Arboriculture 1981 – Merrist Wood College
- Ordinary National Diploma in Arboriculture – 1981 Merrist Wood College, Surrey
- M.Arbor A Professional membership of The Arboricultural Association

Mr T.A.SEYMOUR BA.(Hons) M.Arbor A.

QUALIFICATIONS

- BA (Hons) Human geography & Environmental studies
- Diploma in Environment and Geography
- Surrey County Diploma in Arboriculture 1981 – Merrist Wood Coll
- Ordinary National Diploma in Arboriculture – 1981 Merrist Wood (Surrey
- M.Arbor A Professional membership of The Arboricultural Associa

2. **AREAS OF EXPERTISE**

- Tree hazard risk assessments for tree owners
- Mortgage and Insurance reports to assess the influence of trees on buildings
- Pre-development site surveys and arboricultural implication studies
- Tree management reports to prioritise maintenance programs
- Tree related insurance claims
- Diagnosis of tree disorders

- General arboricultural advice

3. **CONTINUAL PROFESSIONAL DEVELOPMENT**

- **Some recent courses attended:**
- Seminar Prof. Dr Claus Mattheck VTA update.
- A new branch attachment model starting from Alex Shigo's model
- A new unpredictable lateral grain failure mode of branches which look absolutely safe
- Possible symptoms for the new failure mode and related risks of misinterpretation
- Relationship between topping, root decay and branch failure due to lateral grain
- Slenderness failures of lion-tail branches versus failures due to vigour and compactness – the unbelievable comes true!
- The life-long fight between branch and trunk
- Conclusions for decay propagation from trunk to branch and vice versa
- Truth and lies in the body language of the 'Chinese moustache' (branch bark ridge) – common errors May 2014
- Seminar Prof. Dr Claus Mattheck VTA update
- The current state of VTA and related failure criteria including the t/R debate. Thinking tools after nature, Crown mechanics, Root mechanics and graftings. May 2012
- Seminar Prof. Dr Claus Mattheck VTA update, Shear square method, tensile triangles & force cones. Sac fungi. Age determination of perennial fungal fruiting bodies. How broadleaf trees fight spiral cracks & the biomechanical similarities between the hazard beam crack and spiral crack. May 2010.
- Management of veteran trees in historic gardens (N.Fay & T. Green) Nov 2008
- Seminar XII TEP Trees, Roots, Fungi, Soil Nov. 2008
- Picus masterclass July 2008
- Mattheck VTA update May 2008
- Seminar IX TEP Fungal Decay Process & Applied Engineering Nov. 2007
- Seminar V11 TEP Tree Morphology 2 June 2007
- Seminar VI TEP The future of Tree risk management September 2006
- Seminar V TEP Tree morphology March 2006
- Decay Detection Master class (Picus Sonic Tomograph) May 2005
- Principles of Tree Risk Assessment & Management Silwood Park 2002
- Principles of Tree Risk Assessment – July 2002
- Tree Mechanics with Dr Claus Mattheck – 2002
- Biology of Decay in Trees – Hatfield Forest – November 2001
- Trees and the Law Leicester Racecourse 2001
- Modern Arboriculture – a system approach to practical tree care – Dr Alex Shigo – 1992

5. **PROFESSIONAL AFFILIATIONS**

- Arboricultural Association