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 <p>Institute of Chartered Foresters Registered Consultant</p>	 <p>AA Registered CONSULTANT trees.org.uk</p>	 <p>MEMBER INTERNATIONAL SOCIETY OF ARBORICULTURE ISA</p>

Ref: 18th December 2020 - BJU/mmi

To: **Mr and Mrs Cornelius.**
 c/o: Robert Leach – RLA Architectes,
 email: rob@rla-architectes.co.uk
 phone: 07807501570
 63 Bainton Road,
 Oxford,
 OX2 7AG

Dear Robert,

Land at Westmorland, Kingsmead, Stroud Gloucestershire, GL6 6US - BS5837 Tree Constraints, Tree Impacts and Tree Protection Method Statement for Garage and House Extensions, & a New Driveway and Patio.

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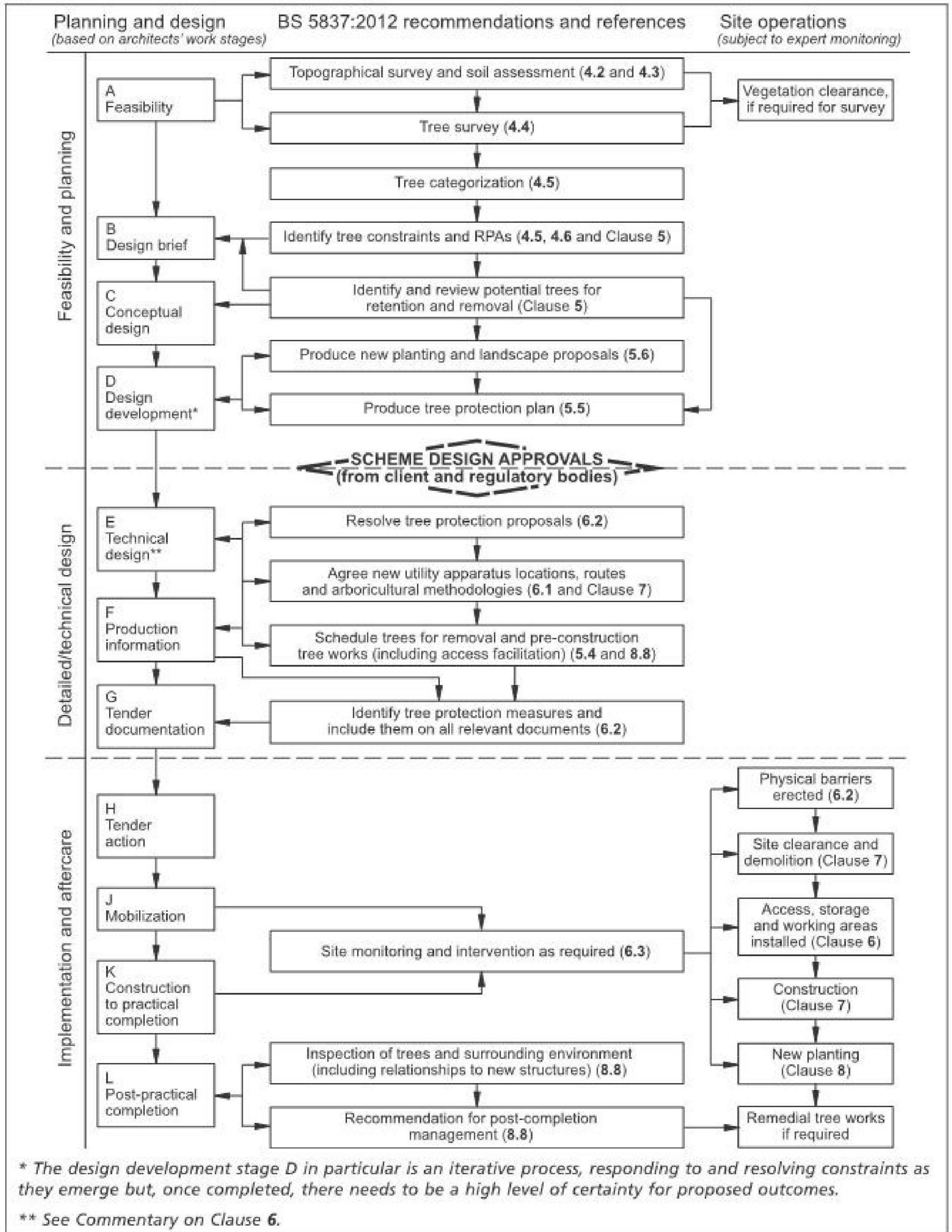
Limitation of Report:-The statements made in this Report do not take account of the effects of extremes of climate, vandalism or accident, whether physical, chemical or fire. BJUFC cannot therefore accept any liability in connection with these factors, nor where prescribed work is not carried out in a correct and professional manner in accordance with current good practice. The authority of this Report ceases at any stated time limit within it, or if none stated after two years from the date of the survey or when any site conditions change, or pruning or other works unspecified in the Report are carried out to, or affecting, the Subject Tree(s), whichever is the sooner.

Tree and Woodland Consultancy
Woodland Valuation and Timber Sales
Landscape Management

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Figure 1 The design and construction process and tree care



* The design development stage D in particular is an iterative process, responding to and resolving constraints as they emerge but, once completed, there needs to be a high level of certainty for proposed outcomes.

** See Commentary on Clause 6.

1. Instruction.

- 1.1 Mr and Mrs Cornelius wish to extend their property and re-develop the existing driveway, patio & garage at the above address. Therefore, Robert Leach has asked B J Unwin Forestry Consultancy to advise on trees for planning application purposes, subject to quote.
- 1.2 The local authority (Stroud District Council) will require a tree impact assessment and tree protection method statement for any proposal. The local authority may require mitigation by new planting for any trees lost as part of any development.
- 1.3 We have used a **topo survey by Target Surveys Ltd 4106 Rev-A/1 of August 2020** for constraints plans. **Proposed Site Plan, Drawing No 155-10b, of Dec 2020 by RLA Architects**, extract in section 5, shows the proposal, and guides our tree impact and tree protection sections 5 & 6 of this report.
- 1.4 Therefore methodology of the report below follows *BS5837:2012 Trees in Relation to Design, Demolition & Construction*.
- 1.5 BS5837 flowchart previous page. Appendices follow signature page.

2. Inspection.

- 2.1 [REDACTED] visited the property on 18th December 2020, and made an un-accompanied inspection.
- 2.2 The survey was from ground level, involving visual observation (Visual Tree Assessment: Mattheck and Breloer, 1994 and Lonsdale, 1999). We measured dbh, (estimated for off-site and inaccessible trees) and measured or estimated crown spread and height.
- 2.3 The survey and report for this project are by [REDACTED] who has >13 years' experience working with trees and has been checked [REDACTED] (professional-CV attached).

3. The Site.

- 3.1 The site inspected comprises a residential dwelling, with associated driveway, garage and landscaped gardens. It is approximately 55m x 85m at its longest and widest points. The site's eastern boundary meets Kingsmead, while Edge Road is located to the north. The southern boundary meets a neighboring residential property, while agricultural land sits to the west. Access is via Kingsmead, in the site's south-eastern corner. A rendered garage is located close to the eastern boundary and a greenhouse nearby to the north. The site drops gently from west to east, from approximately 140m aod in the east, to 135m aod in the west. Land to the west falls dramatically, exposing the site to prevailing south-westerly winds.
- 3.2 Geology from BGS website:
Superficial deposits: None recorded.
Bedrock geology: Lias Group And Inferior Oolite Group (undifferentiated) - Limestone, Argillaceous Rocks And Subordinate Sandstone, Interbedded. Sedimentary Bedrock formed approximately 168 to 210 million years ago in the Jurassic and Triassic Periods. Local environment previously dominated by shallow seas.
Therefore, natural subsoils are likely to be free-draining, with low volume-change potential. Naturally-fractured rock will be near the surface.
- 3.3 There are no public rights of way within the surveyed site.

4. The Trees.

4.1 Trees on site:-

- A large well-kept beech hedge (H1) runs the length of the site's eastern boundary.
- Two large beech trees (T2 & T3) grow within hedge H1.
- Oak T6 is located in the site's north-eastern corner. Its crown is thin for the species at its current life stage. Minor to moderate deadwood can be seen throughout the crown.
- Trees T4 and T5, T6 and T7 and G10 comprise approximately eleven apple and plum trees, along the site's northern edge.
- Copper beech trees T12 and T17 are located on the northern boundary and in the site's south-western corner. Beech T17 has been significantly crown reduced.
- The site's southern boundary is marked by Ionicera hedge H18.

4.2 Off-site trees:-

- Sycamore T11 is located on the northern side of Edge Road.
- Hazel coppice T13 sits just beyond the site's western boundary.
- Hedge H21 is a small section of beech boundary hedge to the south of the site.

4.3 Amenity: This could describe an attractive tree, a screening function, habitat potential, or historic/veteran tree.

- Beech trees T2 and T3 are large and prominent trees, which provide excellent visual amenity.
- Oak T6, copper beech T12 and off-site sycamore T11, provide excellent visual amenity for users of Edge Road.
- Copper beech T17 is an attractive tree of considerable age.
- We have not checked for presence of TPOs.

4.4 Photos below:



4.4.1 View north along Kingsmead. Beech hedge T1 and beech trees T2 and T3 to the left.



4.4.2 View west along northern boundary. Off-site sycamore T11 to the right, with copper beech T12 beyond. Conifer group T9 and fruit tree group G10 in the foreground.



4.4.3 View into site's north-eastern corner. From right to left: beeches T2 and T3 and Oak T6.



4.4.4 View of site's south-western corner. Copper beech T17 and field maple T16 beyond. Both crown reduced.

4.5 Detailed Tree Descriptions

4.5.1 Trees **on, or potentially influencing** the site, are individually described in the table below, and shown on the plans in Appendices.

Age class is described as:-

- Sap: Very young tree, or sapling, one-five years old.
- Y: Young tree less than fifteen years old and <1/3 fully grown.
- Sm: Semi-mature tree having attained 1/3 to 2/3 full stature and 1/3 to 1/2 estimated lifespan.
- Em: Early mature: tree at 2/3 to virtually full size, and halfway through its safe life.
- M: Mature: fully-grown tree with useful life expectancy.
- Lm: Late-mature: fully grown, of declining vigour, but still healthy.
- Om: Overmature tree: fully grown and starting to decline in health (but may still have years of safe life).
- Vet: Veteran: usually very old; of significant historic, habitat or cultural value.

Health & Structural condition:- Self-explanatory:- **Good, Fair, Poor or Dead.**

Remaining Safe Useful Life

Prediction of safe life in its location, estimated as:-
<5 years, <10 years, 10-20 years, 20-40 years, >40 years.

Retention categories, based on BS 5837 Section 4.5, are:-

Retain:

- A =** High quality or value >40yrs safe life:
- B =** Moderate quality or value >20yrs safe life:
- C =** Low quality or value >10yrs safe life
or young trees <150mm stem diameter:

Light Green*

Mid Blue*

Grey*

Remove:

- U =** <10yrs safe life or should be removed for
sound arboricultural reasons:

Dark Red*

(*Colour marking on relevant Tree plan)

Sub-category for retention:-

- 1 = Arboricultural Value
- 2 = Landscape Value
- 3 = Cultural and/or Habitat Conservation Value

BS 5837:2012 Root Protection Area:

The estimated volume of soil 1m deep required to sustain the tree, usually expressed as a disc 1m deep, centred on the tree's trunk.

**THE RPA CAN BE A VARIED SHAPE ENCLOSING THE CORRECT ROOTABLE AREA:
but SHOWN AS A CIRCLE FOR CONVENIENCE.**

Calculated as:-

Single-stem tree, radial distance = 12 x stem diameter at 1.5m ht.

Multi-stem trees 1-5 stems = Square root of (sum of individual stem diameters squared).
> 5 stems = Square root of (average dbh squared x number of stems).

- Denotes estimated DBH.

4.5.2 Westmorland, Kingsmead, Stroud, GL6 6US – BJUFC BS5837 inspection – 18 th December 2020																	
No. T=tree S=shrub H=hedge G=group	Species	Dbh (stem diam @ 1.5m ht) mm.	Total height. Ht to base of crown. Est Ht in 10 yrs. m.			Crown radii m.				Age class	Health	Structural Condition	SULE	Comment (All are in average to good health and condition, unless stated otherwise.)	Retention category A (best) to C. U = (remove) Sub-category 1, 2 or 3	BS 5837 Root Protection Area radius. m.	Recommended WORK excluding development.
						N	E	S	W								
H1	Beech	100 # Ave.	4	0	4	1	1	1	1	M	F	F	>40	Large and well-maintained beech boundary hedge.	C2	1.2	Trim annually to maintain size and shape.
T2	Beech	900 #	18	5	20	6	8	8	8	M	F	F	>40	Attractive and prominent tree growing within H1. Ivy up main stem and scaffold branches.	A2	10.8	Sever ivy at base.
T3	Beech	900 #	18	5	20	9	8	6	8	M	F	F	>40	Attractive and prominent tree growing within H1. Ivy up main stem and scaffold branches.	A2	10.8	Sever ivy at base.
T4	Plum	180	7	2	8	3.5	4	3	1.5	Em	F/P	F/P	10-20	<i>Phellinus pomaceus</i> on branches in western canopy.	C2	1.8	

T5	Plum	90	5	2	6	2	2	1	1	Sm	F/ P	F/ P	10- 20	Supressed and leans north east.	C2	1.0	
T6	Oak	750 #	16	5	18	7	9	7	7	M	F/ P	F/ P	20- 40	Slightly thin crown, with deadwood throughout.	B2	9.0	Remove deadwood over road.
T7	Apple	150	4	1.8	6	3	2.5	3	2	Sm / Em	F	F	>40	Slight lean north.	C2	1.8	Prune annually for fruit production.
T8	Apple	200, 200	5	1.8	7	4	3	4	4	M	F	F	>40	Two stems at 1m. Crossing branches and crowded crown.	C2	2.8	Thin by removing crossing branches. Prune annually for fruit production.
G9	Leyland and Lawson cypress	300 # Ave.	3	0	3	1.5	1.5	1.5	1.5	Em	F	F/ P	20- 40	Cypress group topped at 4m.	C2	3.6	Trim annually to maintain size and shape.
G10	Mixed species	250 # Ave.	3-5	1.8	4-6	2	3	4	4	Sm · M	F	F	>40	Group of seven apple and plum trees.	C2	3.0	Prune annually for fruit production.
T11	Sycamore	1100 #	24	6	25	10	10	10	10	M	F	F	>40	Impressive off-site tree, located on the roadside. Ivy up main stem and scaffold branches.	A1, A2	13.2	Sever ivy at base.

T12	Copper beech	1000 #	16	6	18	10	9	9	10	M	F	F	>40	Attractive tree, growing within roadside hedge.	A2	12.0	
T13	Hazel	150 Ave.	7	2	9	5	5	5	5	M	F	F	>40	Off-site hazel coppice, comprising approximately 10 stems.	C2	4.7	
H14	Mixed species	90	2-5	0	2	0.75	0.75	0.75	0.75	M	F/P	F/P	>40	Slightly scruffy roadside hedge. Comprises hawthorn, hazel, sycamore and ash pollarded at 1.3m.	C2	1.1	Reduce to a uniform height and trim annually to maintain size and shape.
H15	Beech	180 # Ave.	3	0	3	0.75	0.75	0.75	0.75	M	F	F	>40	Odd location for a hedge.	C2	2.2	Trim annually to maintain size and shape.
T16	Field maple	600	8	2	9	6	4	6	7	M	F	F	>40	Characterful off-site tree.	A2	7.2	
T17	Copper beech	1110	16	3	18	7	8.5	8	6	M	F	F	>40	Three stems at 2m. Significantly crown-reduced for no obvious reason.	B2	13.3	
H18	Lonicera	90	1.5-2	0	1.5-2	0.75	0.75	0.75	0.75	M	F	F/P	20-40	Slightly unkempt boundary hedge.	C2	1.1	Trim annually to maintain size and shape.

T19	Japanese maple	300' 350	9	2	10	4	3	3	4	M	F	F	>40	Two stems at 1m and probably an attractive tree in leaf. Canopy is asymmetric and leans north.	B2	4.6	
G20	Golden lawson cypress	180	3	0	3	1	1	1	1	Em	F	F/ P	10- 20	Topped at 3m.	C2	2.2	Trim annually to maintain size and shape.
H21	Beech	100 # Ave.	2	0	2	0.75	0.75	0.75	0.75	M	F	F	>40	Well-maintained off-site boundary hedge.	C2	1.2	Trim annually to maintain size and shape.

End of table

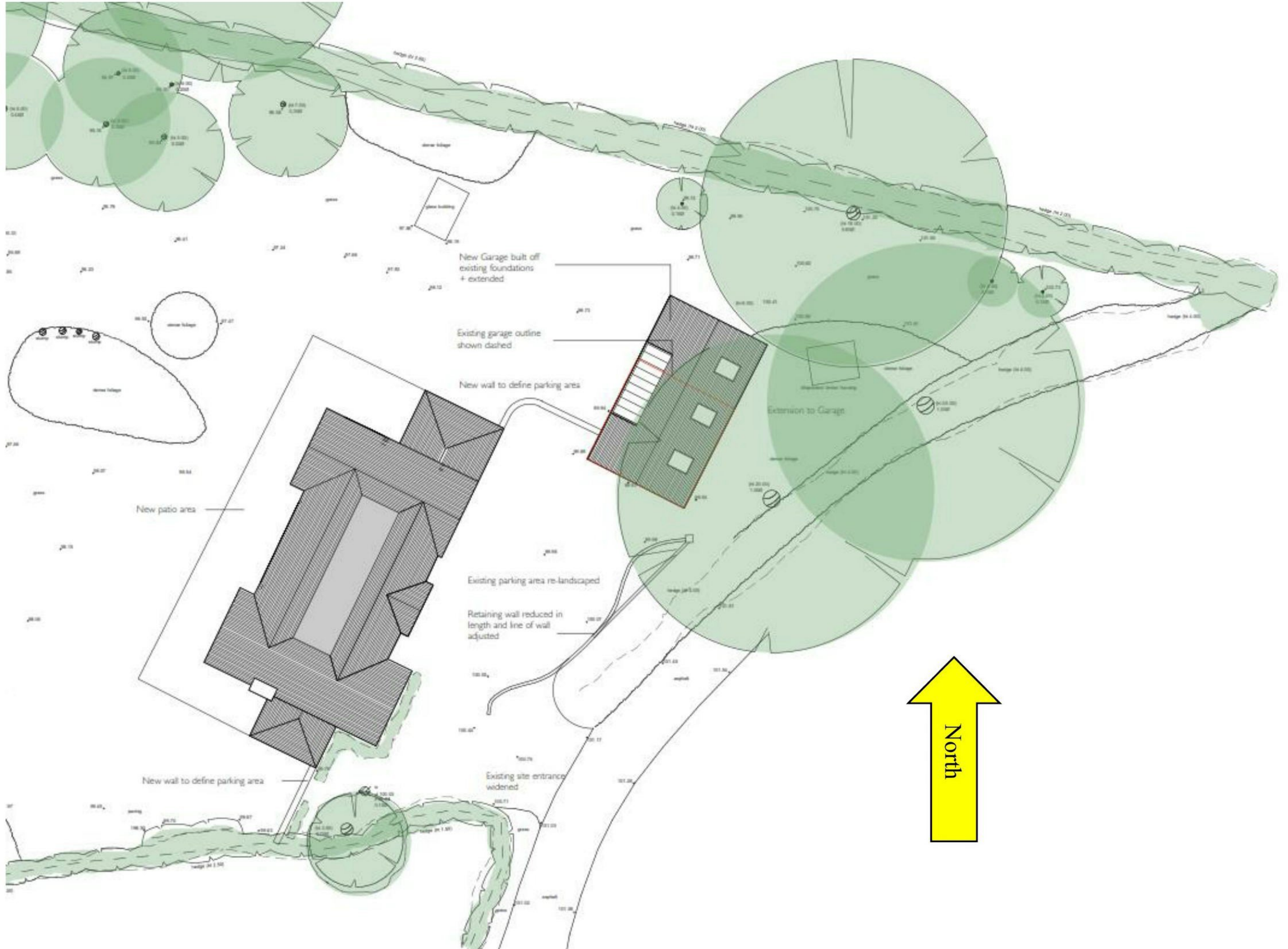
5. Proposed Development & Tree Impacts.

5.1 The proposal.

5.1.1 The proposal, RLA Architects Proposal 155-10b of Oct 20, extract below, shows the proposal.

5.1.2 The drive is widened, the garage is extended north and the house is extended.

5.1.3 The garage new roof has a higher pitch & ridge than existing.



5.2 Tree Constraints and Impacts (considered below).

5.2.1 There are six potential arboricultural constraints to the development of the site:

- **physical contact of above-ground** parts of the tree,
- **below-ground** parts,
- **shading,**
- **over-bearing, and falling material,**
- **subsidence/heave, and root growth,**
- **impact on amenity value.**

5.2.2 Trees are listed in table, and coloured on the Tree Plans, to indicate their retention categories A,B,C,U: with the colours explained in the keys of the table & plan (A = best to U = remove). This allows the site designer to plan around important trees, and ignore lesser trees.

5.3 Physical contact of above-ground parts of trees.

5.3.1 General:-

Tree Plans in Appendices shows tree locations and crown spreads. Crown dimensions: spread in four directions, base of crown and tree height, are given in Table 4.5.2.

5.3.2 Specific above-ground impacts:-

- The southern end of H1 is removed to widen the front drive.
- Minor crown lifting on beech T2 to provide 1m clearance above new garage roof.

5.4 Below-ground root spread.

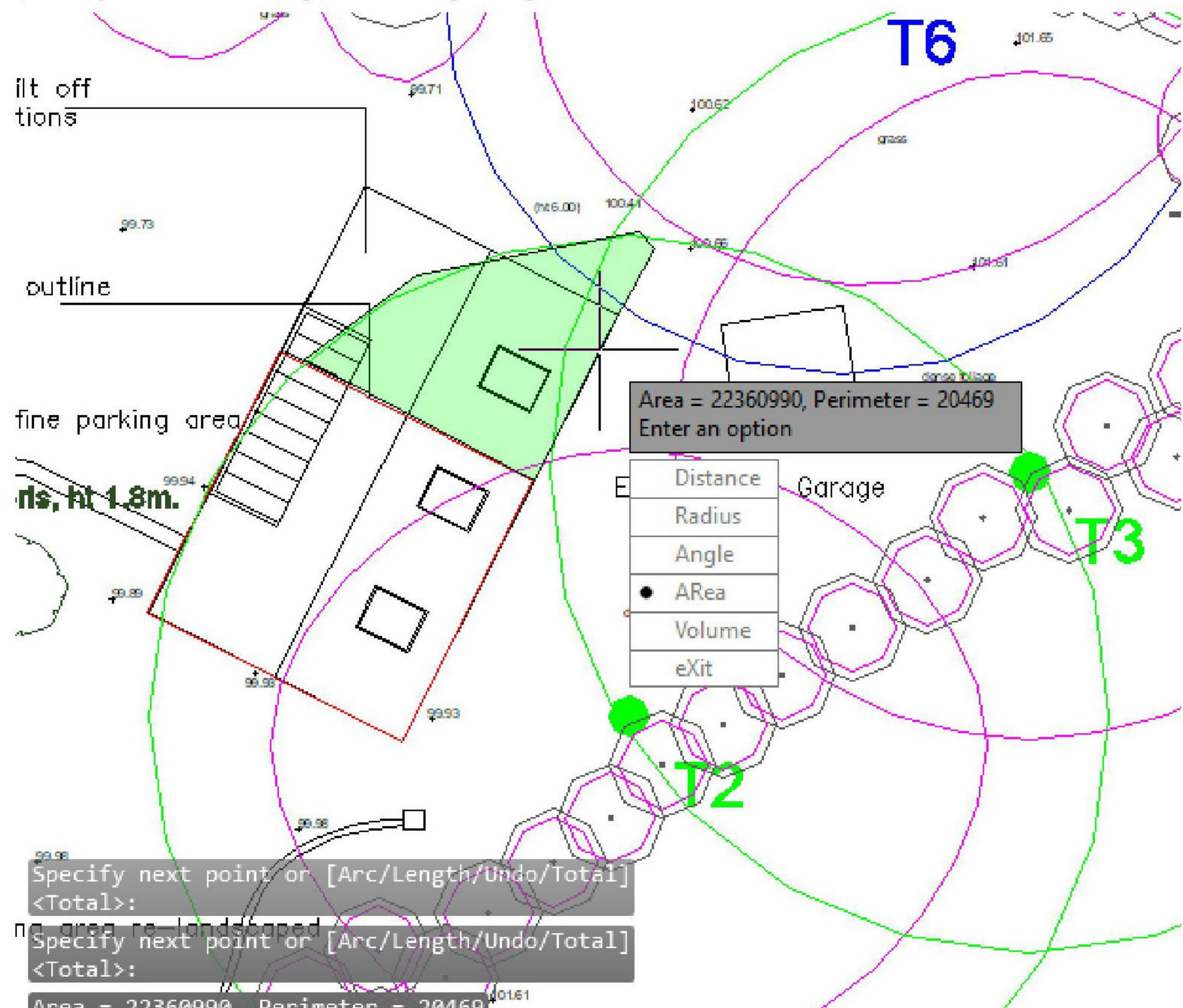
5.4.1 General:-

BS5837 defines a tree’s Root Protection Area as a circular area of 12 x stem diameter: required to maintain long-term health of a full-canopied tree. We show it as an idealised circle. We think of this as a disc of untouched ground 1m deep. Rooting areas are never symmetrical, but ideally there should be no ground disturbance within the RPA zone. At the discretion of an arboriculturalist, where rooting is restricted on one side, the RPA can be offset to provide the same protection area. This is shown on the RPA plan.

Typically the structural rootplate of a tree to resist windthrow is much smaller than the RPA. Therefore tree stability should not be affected by some disturbance within the RPA.

5.4.2 Specific Rootzone Impacts:-

- The garage extension covers 22.4m² (shown green below) of T2’s theoretical RPA of 366.5m². Further the ground drops north west, allowing shallower digging. This is not significant. Despite this we specify minimal-dig for the garage, see 6.6 below.



- Re-aligning the retaining wall under H1 is theoretically in the RPA of T2. But the wall is tangential to the tree, so any root disturbance will be minimal.
- Construction access around the garage requires temporary ground protection in tree rootzones. See 6.6.3 below.

5.5 Light Interception & Shading.

5.5.1 General:-

The sun rises to 60° at mid-day in mid-Summer when trees are in leaf (ratio of 16m vertical height to 10m horizontal distance).

The sun only rises to 12° in mid-Winter. However, in winter deciduous trees are leafless, so shading is reduced.

Theoretical shadows of arcs equal to estimated tree height in ten-years' time is recommended in BS5837. *This is the shadow pattern for a period from May to September inclusive, from 10.00hrs to 18.00hrs daily.*

5.5.2 Specific Shading Impacts:-

- Any rooflights in the garage roof will be shaded by T2 in the morning: not significant.

5.6 Over-bearing and Falling material.

5.6.1 General:-

All trees drop flower parts, leaves, twigs and fruits throughout the year. These can create a mulch layer on roads. Bird droppings and honeydew can spoil car paintwork. Big trees make adjacent dwellers nervous.

5.6.2 Specific Impacts:-

- No significant changes to existing.

5.7 Subsidence/heave & root growth.

5.7.1 To be assessed by an engineer referring to NHBC 4.2:2019.

Subsoil and drift geology suggest non-shrinkable geology. But if there is any clay in subsoil, heave could be future issue.

5.7.2 Therefore, foundations should be designed accordingly. Garage foundations may need a compressible layer under floor slab. See 6.6 below.

5.8 Amenity impact.

5.8.1 Amenity can be *visual landscape, habitat or heritage/historic.*

- The proposal requires widening of the narrow entrance.
- Impact on soft landscape and local amenity value of the proposals is negligible.

6. Arboricultural Method Statement in sequential order for proposed development at Westmorland site.

6.1 Supervision

- 6.1.1 We would recommend a pre-start site meeting between architect, building / groundwork contractor, Council Tree/Landscape Officer, and retained arboriculturalist to agree feasibility of tree retention, tree protection and working methods.
- 6.1.2 **Further** arboriculturalist inspections to supervise/check:
- **Installation of protection fencing.**
 - **Installation of temporary ground protection within RPA of T2-T6.**
 - **Hand excavation and root pruning within the RPA of T2.**
- 6.1.3 All inspections to be followed within three working days with emailed supervision log with action points and photos, copied to client and tree/landscape officer.

6.2 Tree Management

6.2.1 Tree Work prior to ground work:-

Table overleaf.....

6.2.2 Treework informatives, included for general information:-

6.2.2.1 Disturbance to wildlife.

It is essential to check for nesting birds, bat roosts, [REDACTED] and hibernating animals such as hedgehogs under trees, before pruning or removing trees, as negligent disturbance is an offence under the EC Habitats Directive 92/43/EEC, Countryside and Rights of Way Act 2000, Protection of Badgers Act 1992. The Conservation (Natural Habitats, & C) (Amendment) Regulations 2007 make **any** damage or destruction of a breeding site or resting place of a European Protected species (mainly bats in a tree context) an offence.

In general, autumn tree work: **September, October and November** is least disruptive to bats and birds. Work on very ivy-clad trees may need a formal pre-start bat assessment by a trained bat worker.

6.2.2.2 Permission

Trees may be protected by a TPO, or could lie within a Conservation Area.

Trees may be owned by third-parties.

Trees may be protected by planning conditions.

Therefore, a contractor must satisfy himself that all necessary permissions from the local planning authority or tree owners are in place before touching trees.

A Felling Licence may be needed to clear non-domestic areas.

6.2.2.3 Quality of Tree Work

All off-ground tree work should be done by insured tree surgeon with certificates in aerial chainsaw use (new designations:- NPTC 020-04, 0020-05, 0020-07, 0021-01, 0021-07; LANTRA 600/5703/8, 600/5717/8, 600/5715/5, 600/5704/X, 600/5714/2), and working to BS3998:2010, and "*Treework at Height*", the Arboricultural Association's ICoP.

(Stumps can be left to shoot again, ground out, or grubbed out, or poisoned, depending on location.)

6.2.3 Treework for development:-

No	Species	RPA radius m.	Work for landscape / tree health.	<u>ADDITIONAL WORK FOR DEVELOPMENT</u>	
				<u>Specification.</u>	<u>Reason for additional work for development.</u>
H1	Beech	1.2	Trim annually to maintain size and shape.	<u>Remove about 5m at southern end.</u>	<u>To widen drive entrance.</u>
T2	Beech	10.8	Sever ivy at base.	<u>Crown lift western side.</u>	<u>To give 1m clearance above garage.</u>
T3	Beech	10.8	Sever ivy at base.		
T4	Plum	1.8			
T5	Plum	1.0			
T6	Oak	9.0	Remove deadwood over road.		
T7	Apple	1.8	Prune annually for fruit production.		
T8	Apple	2.8	Thin by removing crossing branches. Prune annually for fruit production.		
G9	Leyland and Lawson cypress	3.6	Trim annually to maintain size and shape.		
G10	Mixed species	3.0	Prune annually for fruit production.		
T11	Sycamore	13.2	Sever ivy at base.		
T12	Copper beech	12.0			
T13	Hazel	4.7			

H14	Mixed species	1.1	Reduce to a uniform height and trim annually to maintain size and shape.		
H15	Beech	2.2	Trim annually to maintain size and shape.		
T16	Field maple	7.2			
T17	Copper Beech	13.3			
H18	Lonicera	1.1	Trim annually to maintain size and shape.		
T19	Japanese maple	4.6			
G20	Golden Lawson cypress	2.2	Trim annually to maintain size and shape.		
H21	Beech	1.2	Trim annually to maintain size and shape.		

End of table.

(Treework following development see 6.10 below.)

6.3 Tree Protection

6.3.1 Requirement

The most important tree-protection measure is effective protective fencing, erected as close as possible to the Root Protection Area (RPA) boundary before any other work starts on site including demolition in the vicinity of trees. It must be maintained until all work is completed, except final soft landscaping. Here tree protection is proposed for retained trees, and for areas of possible new planting where this is feasible: called **landscape protection zones**.

6.3.2 Vertical Tree Protection

- 6.3.2.1 Tree Protection fencing **locations** are shown on Tree Protection Plan in Appendices.
- 6.3.2.2 Two **specifications** for suitable protective fencing are given in Appendix II. **Lightweight fencing will suffice on this site.**
- 6.3.2.3 Within the fenced off **CEZ** Construction Exclusion Zone: there must be:-
- no construction access,
 - no storage of materials, including soil,
 - no ground disturbance.
- 6.3.2.4 Fencing to remain until all demolition, construction and hard landscaping work is completed, and removed only for final soft landscaping.

6.3.3 Temporary Ground Protection (TGP) within RPAs:-

- 6.3.3.1 IF work is required to be closer than the all-round protection zone, then the fenced off zone can be made smaller on that side, or entered temporarily, subject to permission from retained arboriculturalist.
Within such zones, temporary horizontal ground protection plus temporary fencing would be essential.
TGP is needed here to protect rootzone of T2, T3 & T6 during construction. TGP must be suitable to carry proposed loading and prevent soil compaction.
- 6.3.3.2 Obvious options for temporary ground protection would be:-
- **Recommend: Butted scaffold boards or 22mm plyboard laid on bearers on 150mm depth woodchip or bark mulch (pedestrian access only).**
 - Temporary ground protection plates such as aluminium "Eve Trakway" or plastic interlocking-plate ground protection, both on 150mm depth of woodchip or bark, shown in Appendix III.
 - A layer of woven geo-textile under minimum 250mm depth of graded aggregate which is lifted after work.

6.4 Construction Access.

6.4.1 General points:-

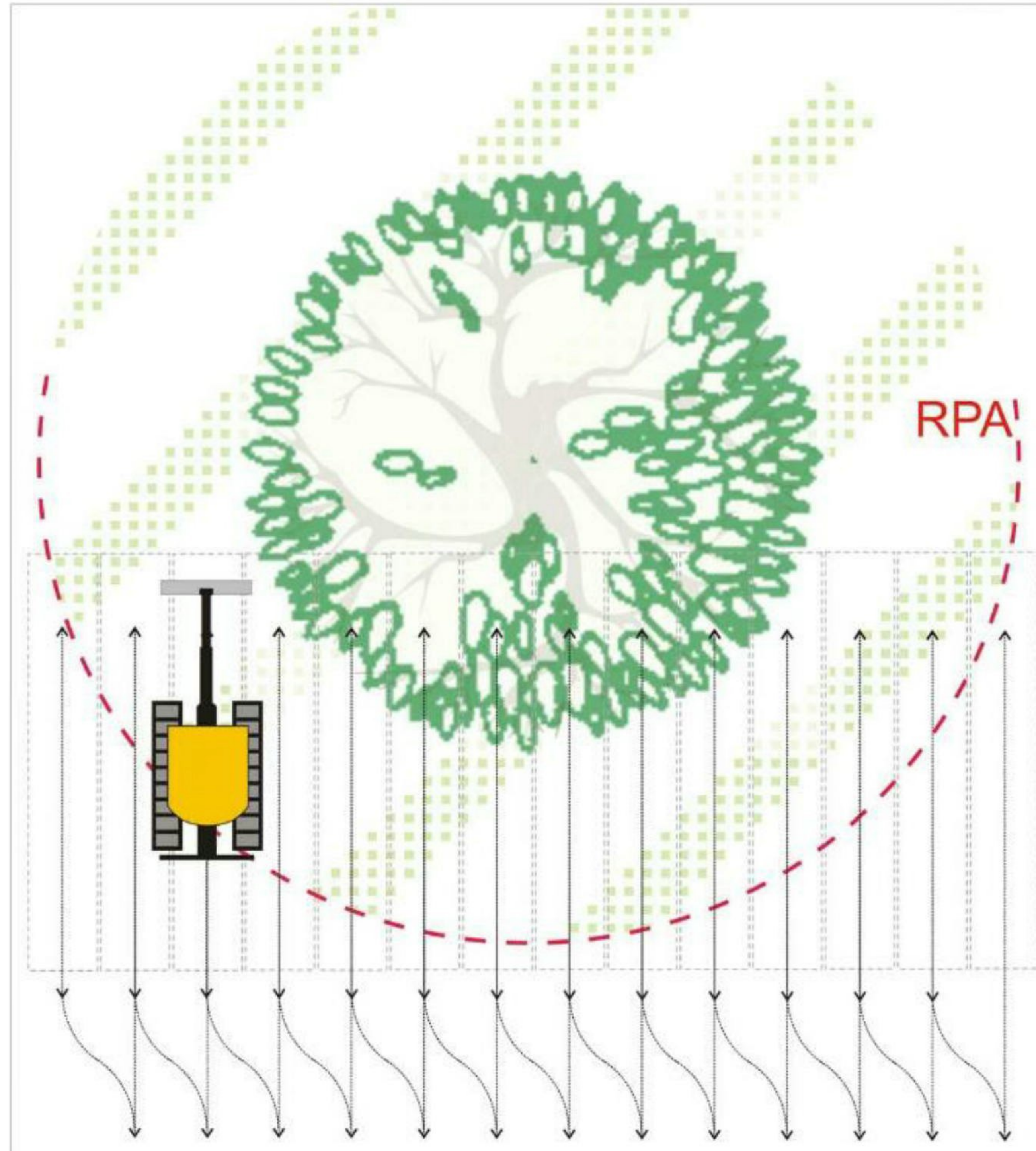
- We assume access will be via the existing (widened) gateway.
- All retained trees and hedges need protection.
- No pedestrian, vehicle, plant or machinery to enter RPAs without temporary ground protection as detailed in para 6.3.3 above.

6.4.2 Site huts could be placed within RPA of trees and hedges; provided they stand elevated on stilt feet, no excavation is required for temporary services, and pedestrian and vehicle access is ground protected as detailed in 6.3.3 above.

6.5 Demolition / Excavation within RPAs:-

6.5.1 General specification FOR EXCAVATION, required to demolish floor slab & scrape turf off extended garage:-

- Parallel tracking with slewing outside the RPA. Sketch plan below:-.
- 1.5-tonne rubber-tracked mini-digger with toothless grading bucket.
- Scrape off only turf or top layer to 100mm depth.
- Slew outside RPA.
- Heap spoil outside RPA, for dumper to collect and run outside RPA.



6.6 Foundations within RPAs:-

6.6.1 Retaining wall:-

- See blue line on TRP Plan:-
- Stand mini-digger on drive.
- Pull out retaining wall.
- Dig eastwards, stop 0.2m from final face.
- DIG LAST 0.2M HORIZONTAL X REQUIRED DEPTH BY HAND.
- CUT ROOTS WITH LOPPERS.
- Cover exposed face immediately with damp hessian to prevent slumping and root desiccation.
- Install retaining structure and backfill behind structure within two weeks of opening ground.

6.6.1 Garage:-

- See blue line on TRP Plan:-
- See brown shaded area on TRP plan:-
- Stand digger west of the garage or on existing slab.
- Lift and remove existing slab, down to hardcore level.
- Remove soil etc from new floor area as per 6.5 above.
- Dig from west edge eastwards, max dig 0.3m depth,
- Stop 0.3m from final face.
- Hand dig last 0.3m horizontal x 0.3m deep, and hand sever any roots with loppers.
- MAXIMUM DEPTH FOR EXISTING AND NEW GARAGE AREA 0.3M.
- Engineer to decide if garage slab needs piles.
- If piles, install minipiles or screw piles to support a reinforced slab no deeper than 0.3m into the ground, including compressible void former (if heave is a possibility).
- Lay floor slab on piles or ground (or compressible anti-heave layer).
- Build garage off slab.
- Make up entrance ramp as required.

6.7 Drainage.

- 6.7.1 Storm-water drainage: Any soak-away system must be designed to avoid significant increase and no decrease of ground water in trees' rooting zones. Divert into soakaways outside RPAs, or store for greywater recycling.
- 6.7.2 Foul Drainage: Keep out of RPAs. Use existing.
- 6.7.3 Sustainable Urban Drainage System: Any SUDS scheme, to reduce the load on local mains drainage, must not significantly add to, or reduce, the soil water in trees' root zones. Store for greywater re-use or allow percolation into parking areas, or gardens.

6.8 Service Trenches within RPAs.

- 6.8.1 Service trenches (electric lights, utilities, telecoms, drains etc) must be **designed** to run as far from trees as possible. **Use existing runs.**
- 6.8.2 Trenches **within RPAs must be avoided.**
- 6.8.3 Otherwise use this onerous work method:-
- Hand digging* or trench-less systems must be used.
*Use an air-spade to reveal roots (Appendix V).
 - Retain roots >15mm diameter within service trenches. Thread service pipe underneath.
 - No roots >25mm diameter must be exposed or severed without express written permission of local authority tree officer or retained arboriculturalist.
 - Any excavation within the RPA of a tree must be covered immediately after digging with damp hessian, topped by tarpaulin & plyboard, to prevent root desiccation.
 - Hole must be backfilled within five days of opening.

- Wrap exposed roots >20mm with hessian, and surround by 50mm depth sand, as part of backfill medium.
- Tamp backfill material by hand thumper or whacker plate only.

6.9 Minimal-dig construction for new access drives, parking & paths

6.9.1 If roads, footpaths, cycle-ways, yards or parking are required near trees, they can be constructed in two ways:-

Conventional construction:- If outside a tree’s RPA.

Minimal-dig construction:- If within a tree’s RPA.

6.9.2 No minimal-dig construction required following tree removal.

6.9.3 Appendix IV gives materials for minimal-dig, porous, build-up, but not needed with current proposal.

6.10 Tree work following construction.

6.10.1 Trees should be re-inspected. This inspection would reveal the need for remedial tree work for the following reasons:-

-to rectify damage occurring during construction (regrettable but possible),

-to allow additional clearance.

-or complete tree removal if trees were considered too close for safe retention.

6.10.2 All additional work subject to further local authority agreement if trees are protected by TPO or planning conditions, or stand within a Conservation Area.

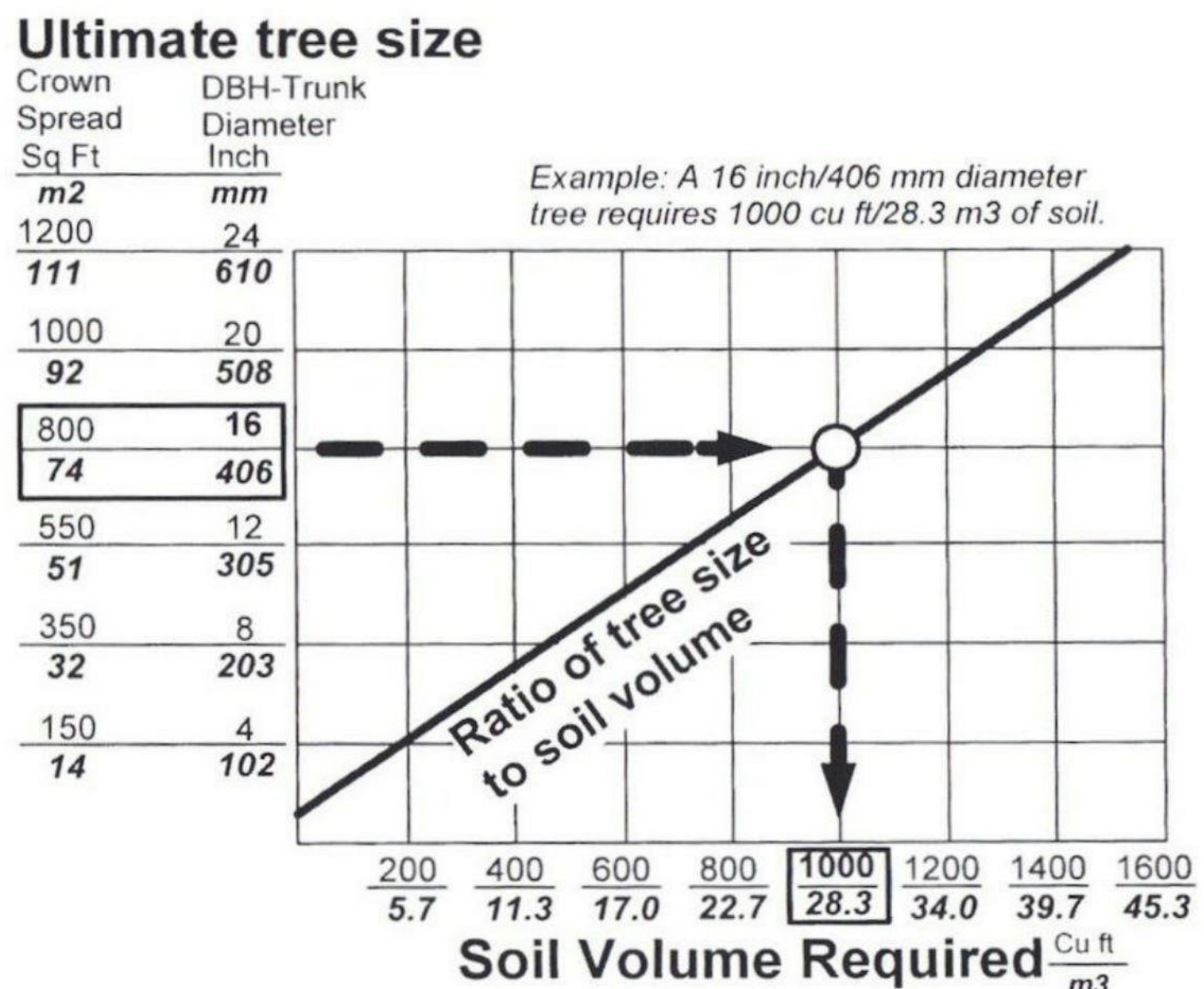
6.11 New Planting.

6.11.1 New tree planting is not needed here, because soft-landscape impact is minimal.

6.11.2 Any planting and maintenance to comply with: **BS 8545 “Trees: from nursery to independence in the landscape – Recommendations”**. BSI 2014

6.11.3 Any planting must be provides with adequate long-term soil-moisture availability: graph below from James Urban shows rootable area related to tree size (Up by Roots, ISA, 2008), to remind designers:

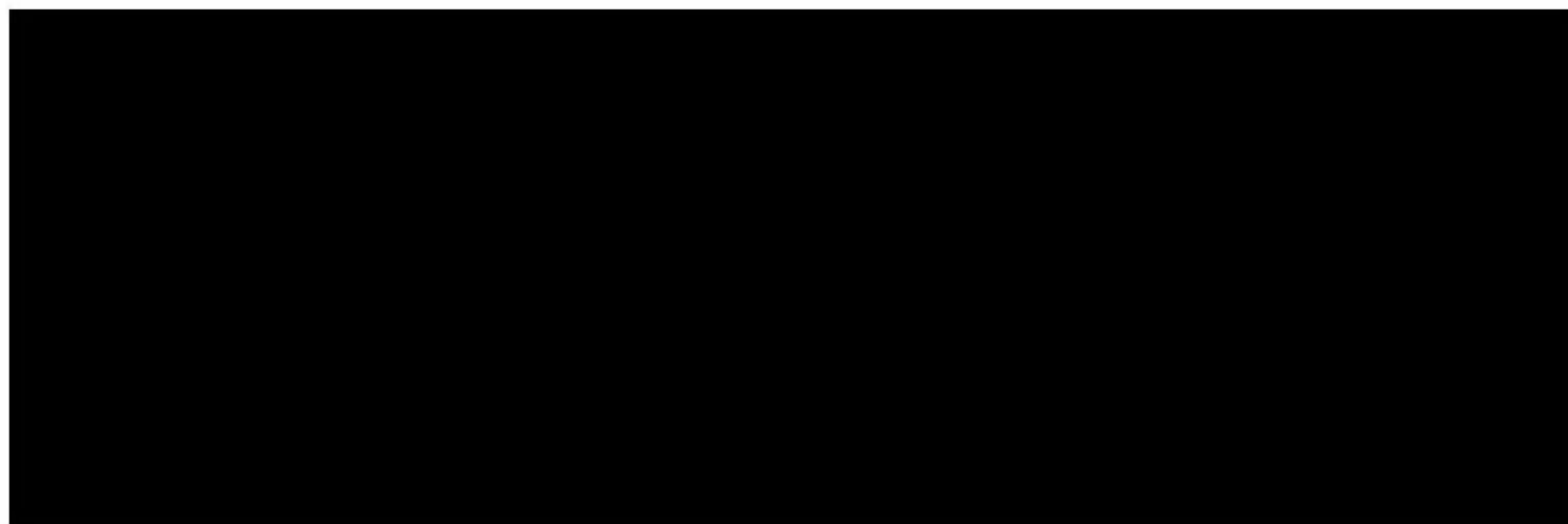
Table 2.4.1. Tree size to soil volume relationships (Urban 1992).



7.0 Conclusions

- 7.1 The proposal at Westmorland requires widening the entrance, and some crown lifting on beech T2.
- 7.2 The new garage and retaining wall can be revised with minimal damage to beech T2 by following measures specified in section 6 above.
- 7.3 New planting is not required.

Please contact us for further information.
Yours sincerely,

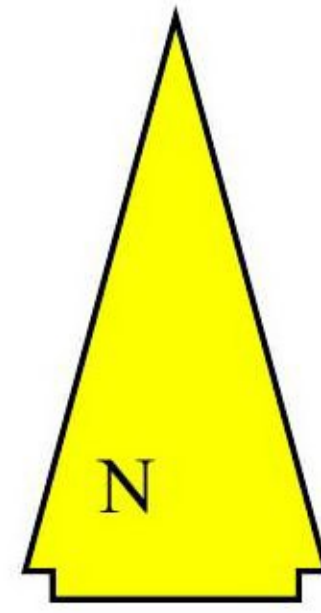


B J Unwin Forestry Consultancy.

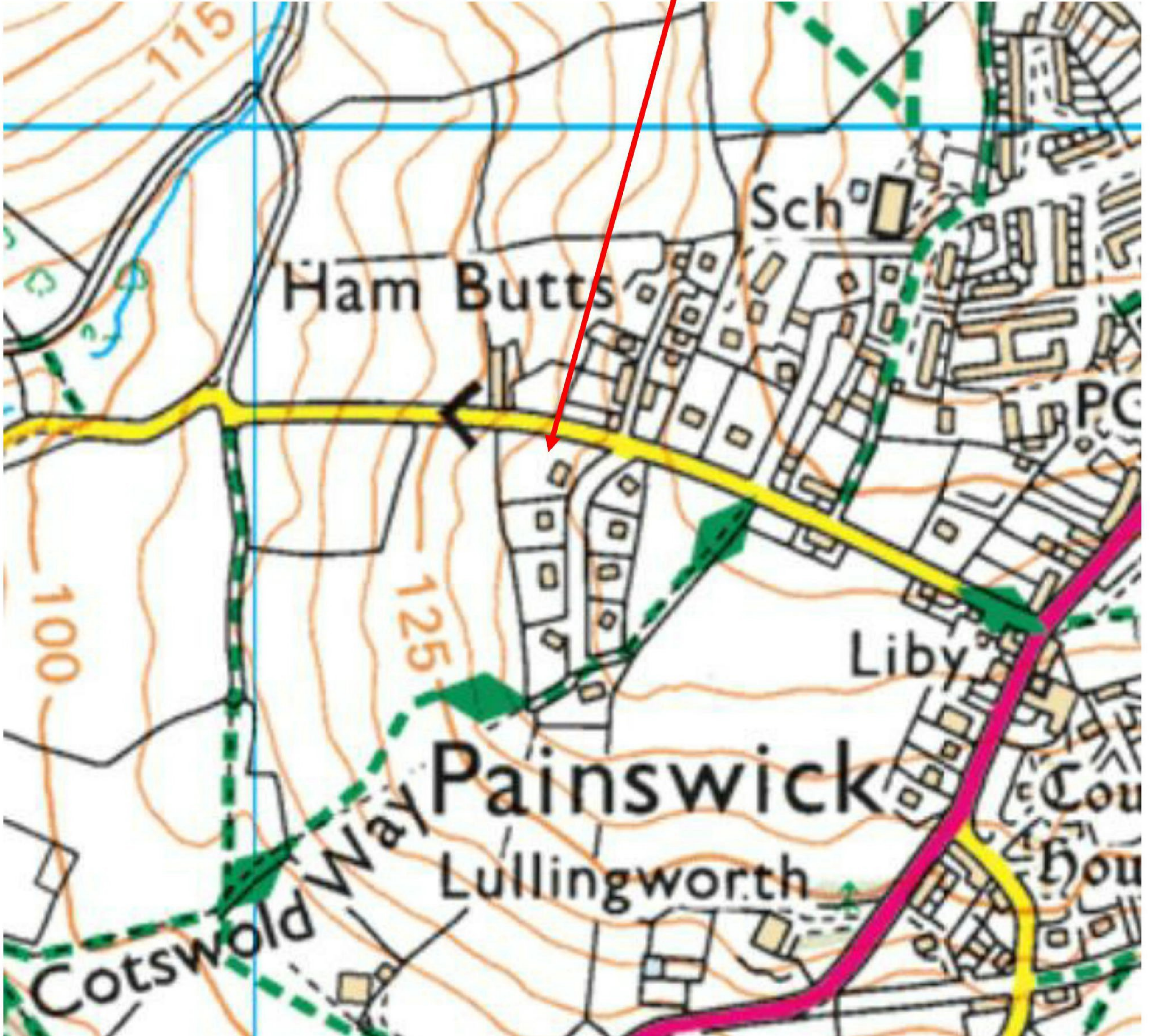
References:

- "The Body Language of Trees"*. Claus Mattheck and Helge Breloer. HMSO 1994.
- "Principles of Tree Hazard Assessment and Management"*. David Lonsdale. HMSO 1999.
- BS 3998: 2010 *"British Standard Recommendations for Treework"*.
- BS 5837: 2012 *"Trees in Relation to Design, Demolition & Construction"*.
- BS 8545 *"Trees: from nursery to independence in the landscape – Recommendations"*. BSI 2014.
- NJUG Volume 4 2007 *"Guidelines for the Planning, Installation and Maintenance of Utility Services in Proximity to Trees"*. NJUG, 30 Millbank, London, SW1P 4RD.
- "Trees and Development"*. Nelda Matheny and James R Clark. ISA. 1998.
- BS 8206:1992 *"Lighting for buildings"*.
- BRE guide 209 (2002) *"Site Layout planning for daylight and sunlight"*.
- NHBC Chapter 4.2, *Building Near Trees*. National House Building Council, 2013.
- "Tree Roots in the Built Environment"*. J Roberts, N Jackson & M Smith. R.A.T.8, TSO (The Stationary Office), London, 2006.
- "Treework at Height"* Industry Code of Practice. Arboricultural Association. 2014.

Appendix I



Location





Google Earth aerial.
Taken June 2018.



Appendix II

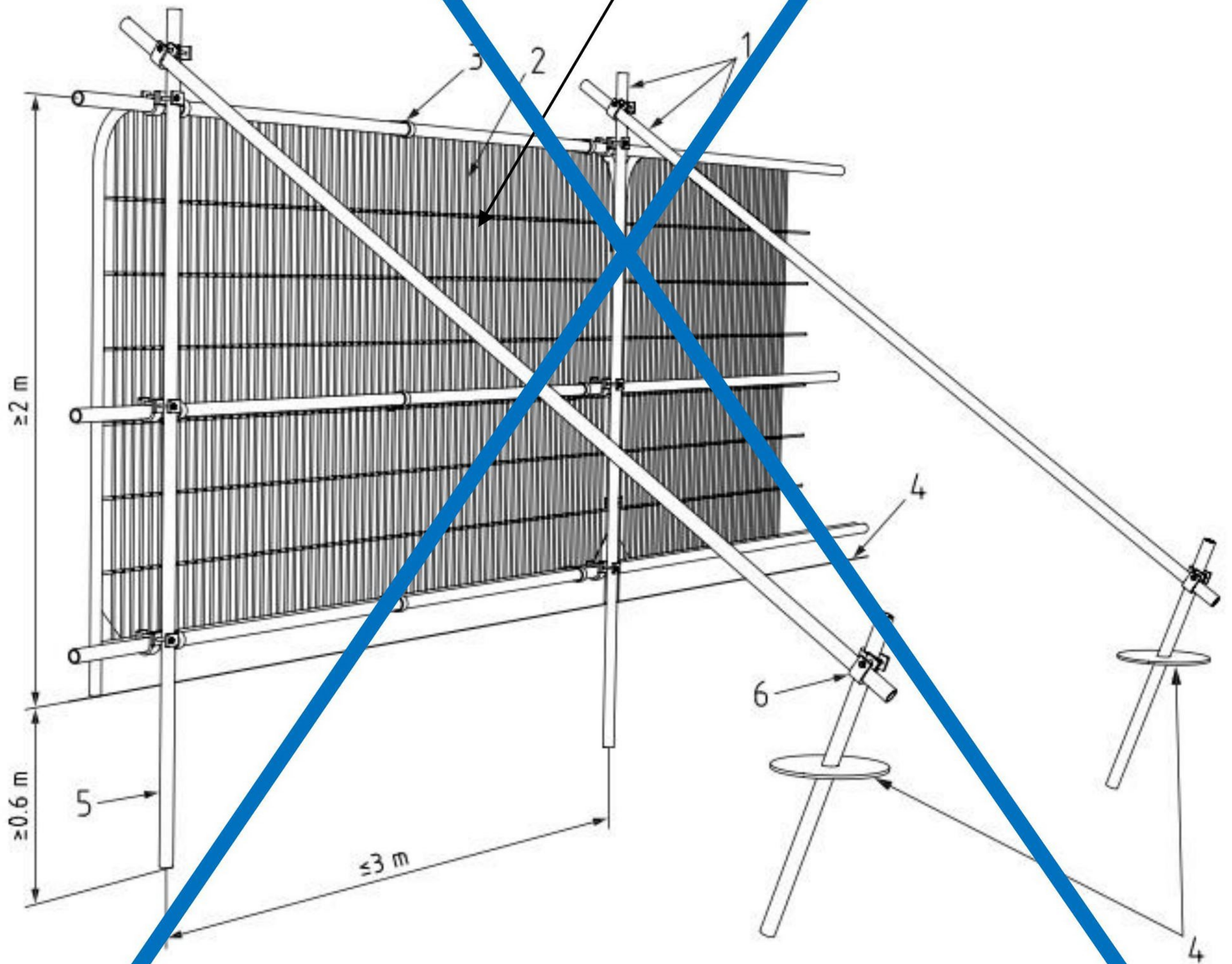
**Vertical Tree Protection Fencing, from BS5837.
Heras panels on driven poles, with driven braces**

Vertical protective fence: location on plan:

Default in situ > 3 months:-

Apply signs at MAX 10m spacing:

**TREE PROTECTION
Construction Exclusion
Zone.
NO ACCESS**



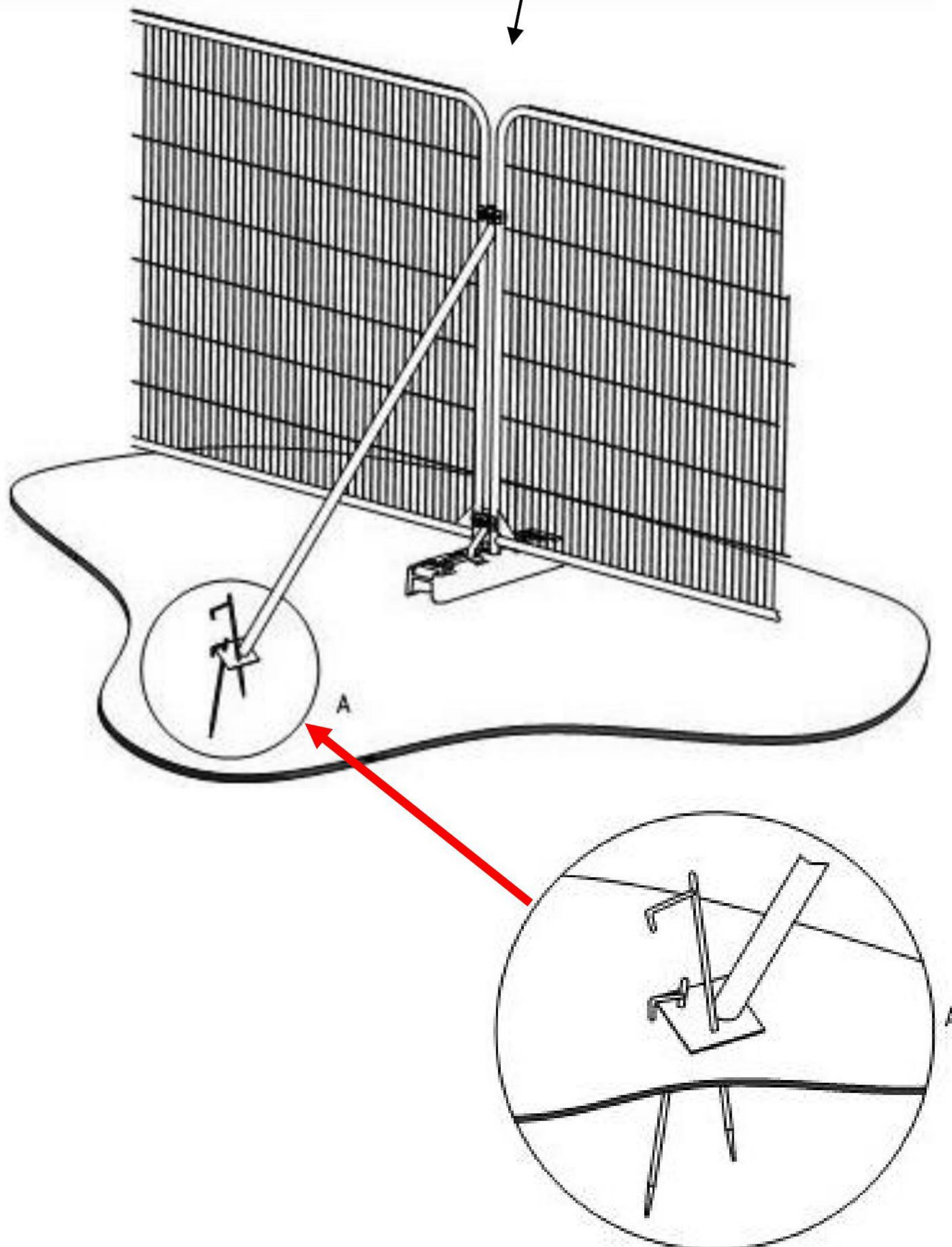
Key

- 1 Standard scaffold poles
- 2 Heavy gauge 2 m tall galvanized tube and welded mesh infill panels
- 3 Panels secured to uprights and cross-members with wire ties
- 4 Ground level
- 5 Uprights driven into the ground until secure (minimum depth 0.6 m)
- 6 Standard scaffold clamps

Lightweight: in situ for < 3 months-

Apply signs at maxm 20m spacing:

**TREE PROTECTION -
Construction Exclusion
Zone.
NO ACCESS**



Horizontal Ground Protection x 2 examples

Example of aluminium temporary ground protection.

EVE TRAKWAY



Roadways - Medium Duty Trakpanel

The Medium Duty Trakpanel, or 'Box' panel, is ideal for where both pedestrian and vehicle access is required. This versatile panel can be laid with either a smooth or corrugated surface uppermost. The smoother surface finish provides excellent support underfoot, whilst the construction of the panel maintains a high load bearing capacity. Due to the way these panels fit together, a smooth joint is created therefore reducing trip hazards.

The Benefits:-

Pedestrian friendly upper surface

Suitable for heavy vehicles Ideal for where both pedestrians and vehicles require safe passage.

Technical Specifications	
Dimensions	2.5 x 3m (when installed 2.44m x 3m due to overlap)
Weight	274.7 kg
Carrying Capacity	A more pedestrian friendly roadway, this system is capable of taking any road going loads.

The following Roadways are available.

Please select an item to view more information:

Other Roadways products:-

Heavy Duty Trakpanel-

LD20-

Roadway Ramps-

Multi-Directional Trakpanel

Example of plastic temporary ground protection.

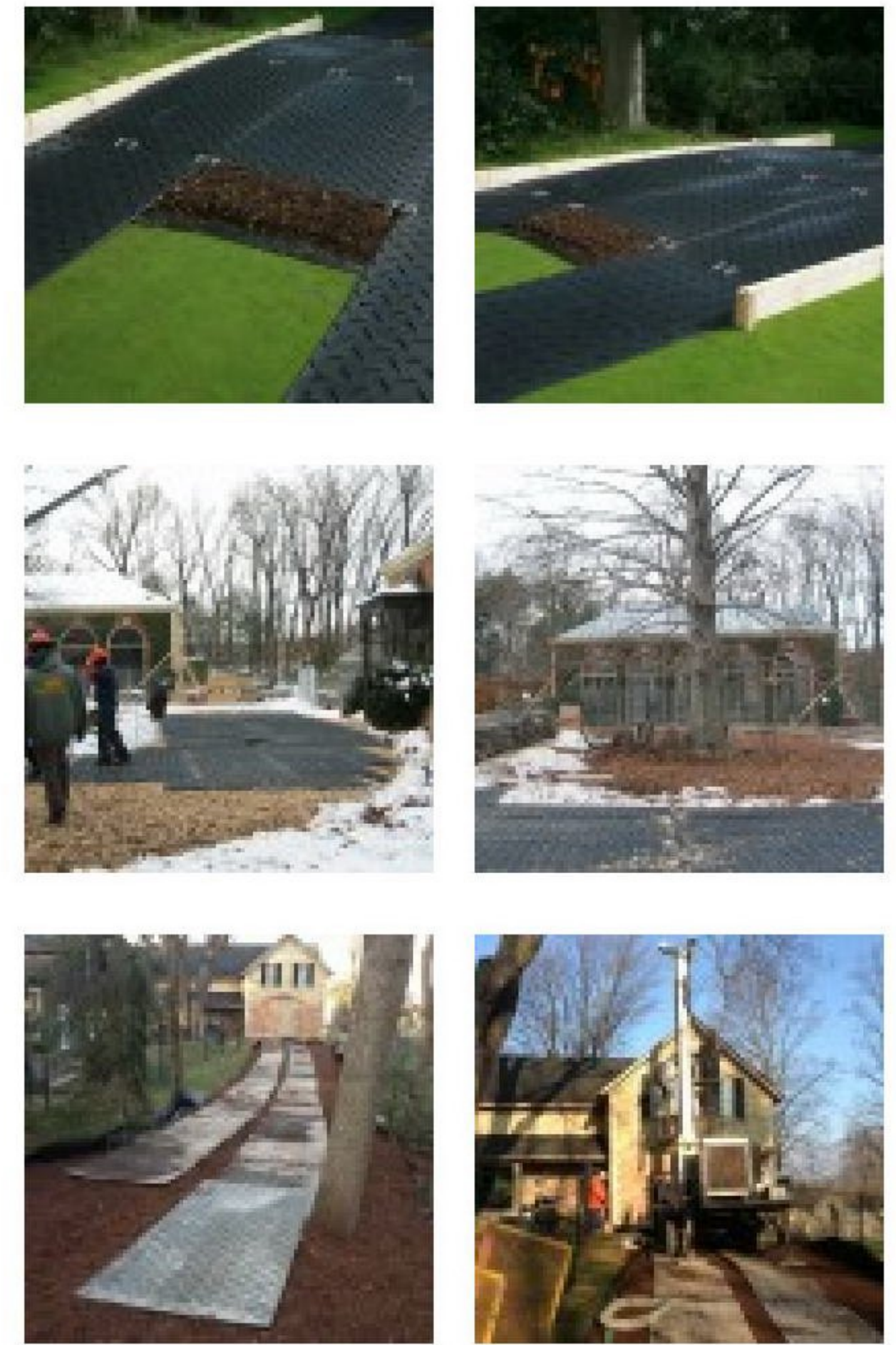
Ground-Guards Tree Root Protection

Tree root protection for construction projects

Planning Departments may often need to stipulate that site access roads will not involve any excavation because of the proximity of tree roots on the site. Furthermore, that they will also provide additional ground cushioning when passing over the immediate areas where there are tree roots beneath. This is very important to prevent compaction of the ground, and long-term damage to the soil structure, the tree roots, and ultimately, to the health of the trees themselves.

An effective means of protecting tree roots is to use a double layer of Ground-Guards. Panels with 150mm of wood chips sandwiched in-between which creates a suitably cushioned roadway for this purpose.

The Ground-Guards system is so durable and versatile that whatever your need, the team will be delighted to work with you to provide an effective solution. Please just call our team on 0113 267 6000 for friendly advice on any difficult site conditions that you need assistance with.



Appendix IV

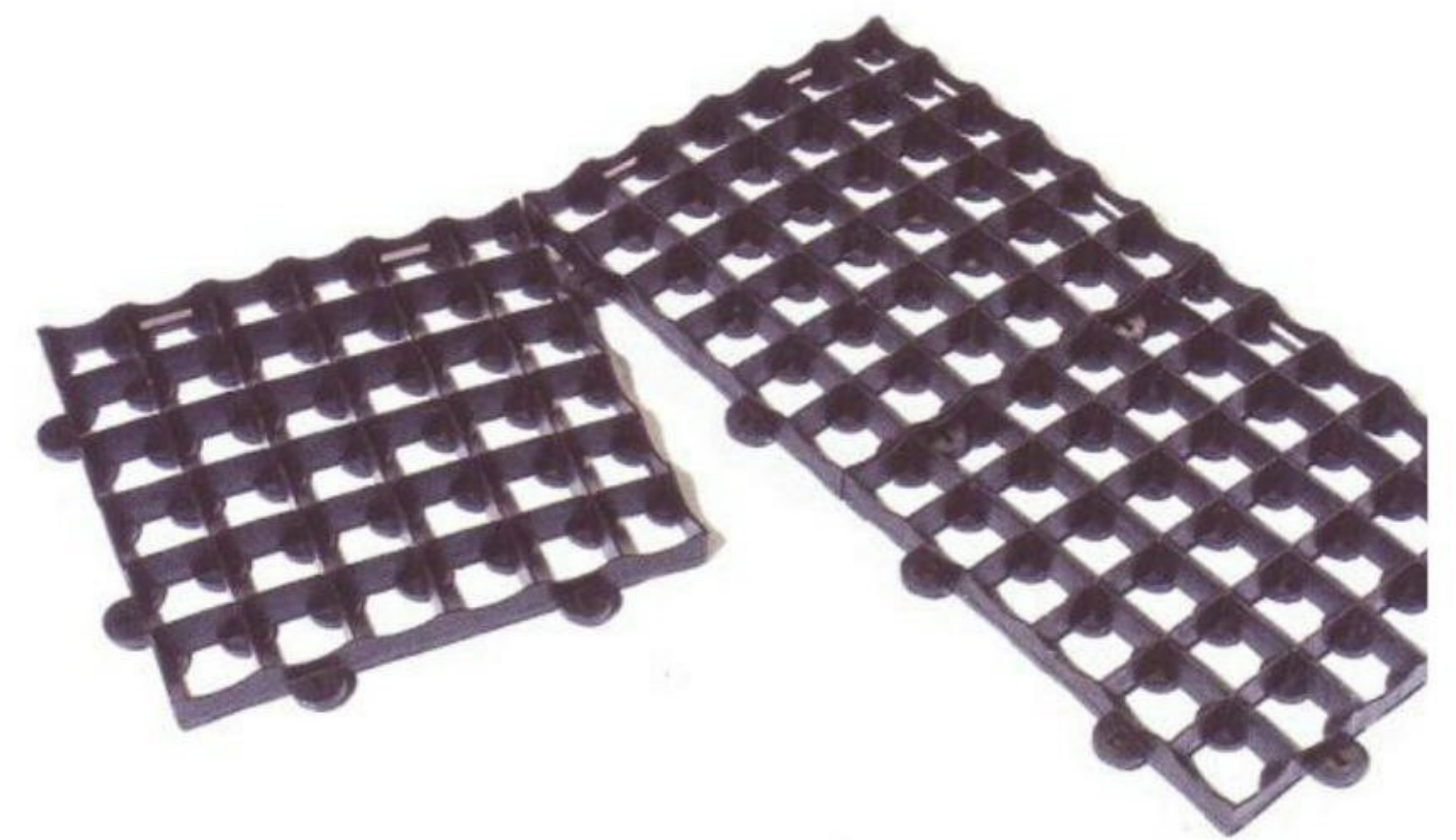
Trays for strengthening gravelled or grassed areas. (50mm or 80mm trays for strengthening gravelled or grassed areas.

DuoBlock

Grass Protection System



Using grass or gravel infill, DuoBlock 750 and 500 give architects, consulting engineers, landscape contractors and developers the ultimate in load-bearing performance combined with aesthetic appearance.



Porous paving systems have been available since the early 1990's and provide a durable yet aesthetically pleasing alternative to traditional surfacing solutions. Increased awareness of the need to manage storm water runoff in new developments and the advent of Sustainable Urban Drainage Systems (SUDS) has led to an increase in popularity.

DuoBlock is a permanent grass protection / gravel retention porous paving system. It is extremely versatile and may be used in a wide range of applications including:

Applications:

- Overspill car parking
- Emergency access and service roads
- Caravan hardstanding
- Verge hardening
- Service Roads
- Pedestrian walkways and towpaths
- Bridle ways
- Helipads
- Golf course pathways / Tee reinforcement

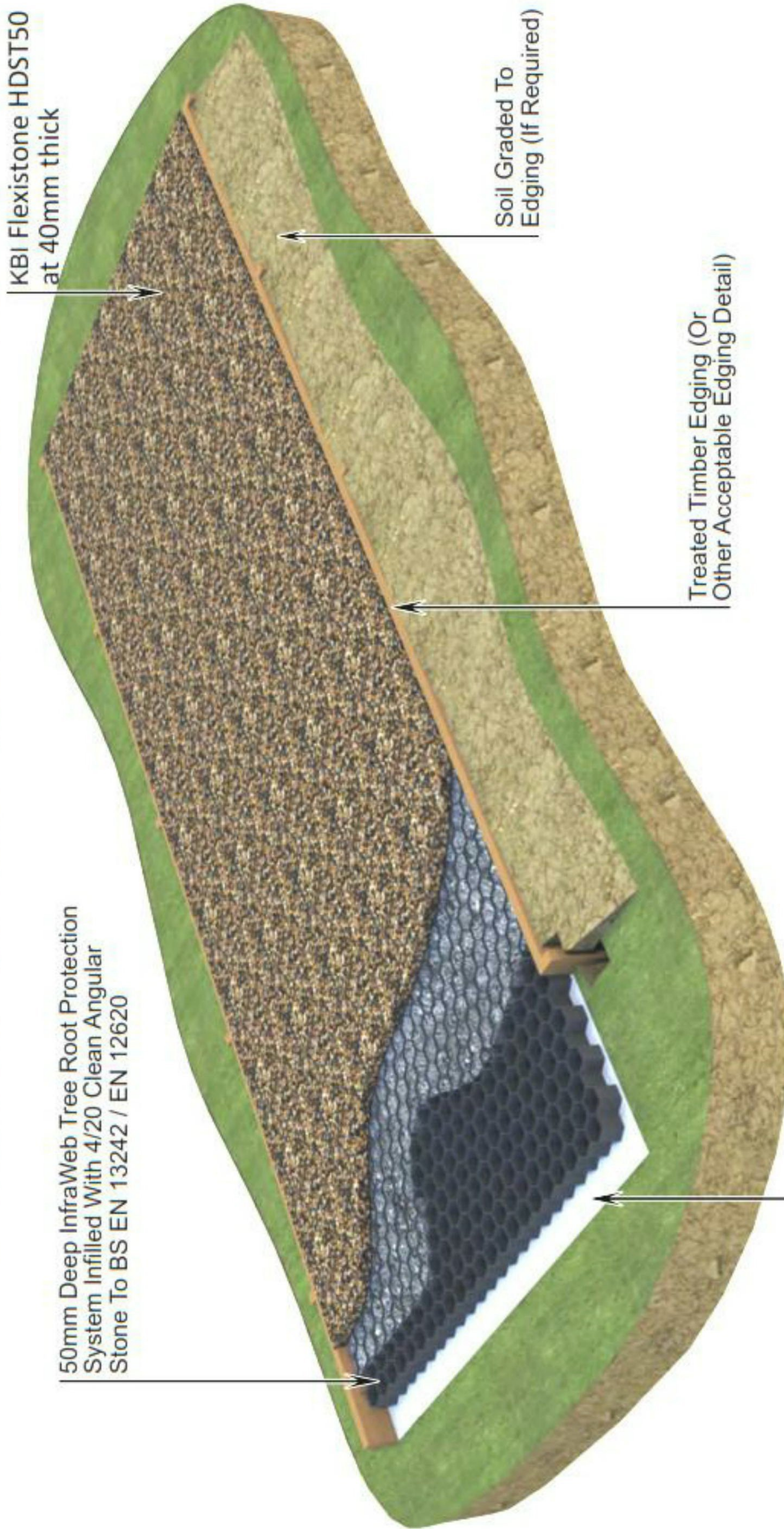
DuoBlock systems are uniquely designed to ensure the ultimate in load bearing performance and aesthetic appearance and have numerous benefits over traditional and first generation plastic systems such as:

Benefits:

- 90% surface area available for infill
- Reduces surface water runoff
- Increases water Filtration
- Interconnecting cell walls
- High Load Performance
- Unique surface design for greater aesthetic appeal
- Positive interlock System

**NEXT DAY
DELIVERY**
from stock

InfraWeb TRP 50 Section - Tree Root Protection c/w Flexistone HDST50 at 40mm thick for pedestrian and cycleway use only



KBI Flexistone HDST50 at 40mm thick

Soil Graded To Edging (If Required)

Treated Timber Edging (Or Other Acceptable Edging Detail)

50mm Deep InfraWeb Tree Root Protection System Infilled With 4/20 Clean Angular Stone To BS EN 13242 / EN 12620

ArborTex Geotextile

 <p>Sustainable Porous Paving Solutions</p>	<p>KBI Longfields Court Middlewoods Way Wharmcliffe Business Park Barnsley South Yorkshire S71 3GN +44 (0) 1422 242880 http://www.kbiuk.co.uk</p>	<p>InfraWeb TRP 50 Section - Tree Root Protection c/w Flexistone HDST50 at 40mm thick for pedestrian and cycleway use only</p>	<p>Date: 29/12/2016</p>
	<p>Drawn By: NLG Design</p>	<p>Revision: A</p>	<p>Drawing Number: TRP50HDST50</p>
	<p>ArborTex Geotextile</p>		
	<p>InfraWeb TRP 50 Section - Tree Root Protection c/w Flexistone HDST50 at 40mm thick for pedestrian and cycleway use only</p>		

Deeper Cellweb 3-D grid for strengthening tracks.

Cellweb® TRP is a 3D cellular confinement tree root protection system. The system provides a 'no dig' solution for the construction of new hard surfaces within root protection areas (RPAs). Cellweb® TRP has been designed and independently tested to comply with recommendations made in Arboricultural Practice Note 12 and BS 5837 2012 – Trees in relation to design, demolition and construction.



Cellweb® TRP Key Functions

Cellweb® is a 'no dig' solution which is constructed directly on the existing ground surface. This eliminates the requirement for excavation, preventing root severance.

Cellweb® is a completely porous system allowing continued water permeation and gas exchange between the rooting environment and atmosphere.

Cellweb® spreads point loads, minimising increases in soil compaction within the rooting environment. This maintains an open graded soil structure allowing continued root growth, water, gas and nutrient migration.

The Cellweb® TRP system comprises the following three components

Treetex™ Geotextile. Following minimal ground preparation the Treetex™ is laid onto the existing ground and top soil. This acts as a separation layer, separating the system above from the soil and rooting environment below. Treetex™ performs as a hydrocarbon pollution control measure in accordance with BS5837, holding 1.7lt of oil per square meter.

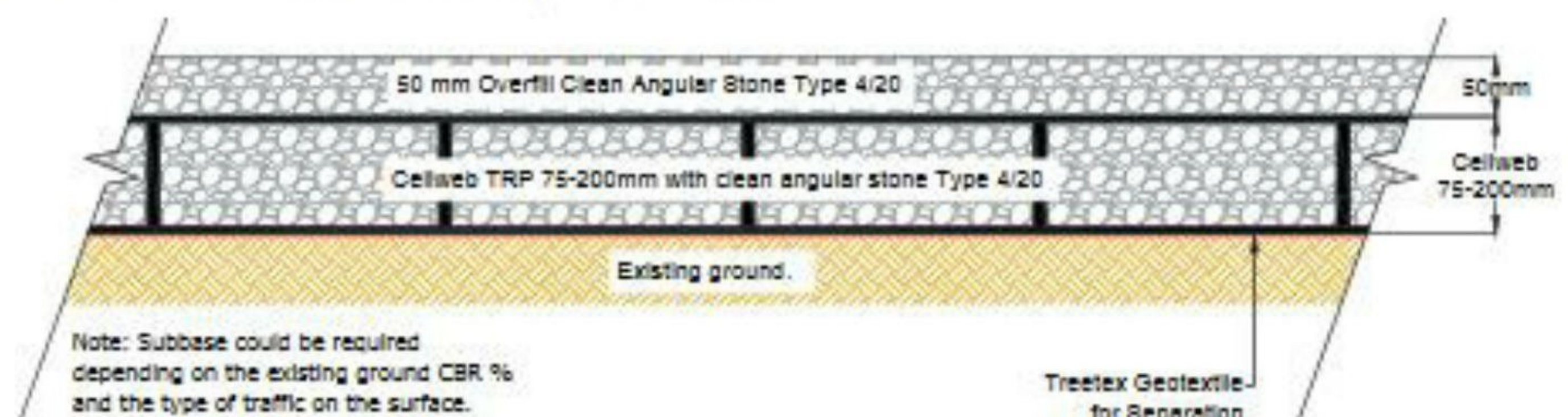
Cellweb® 3D Cellular Confinement. The Cellweb® is installed on top of the Treetex™ layer. This is fixed to the ground using ten steel J pins per panel. The panels can be cut to the required shape and adjoining panels can be connected using heavy duty staples or cell ties.

4-20mm Clean Angular Stone. The expanded Cellweb® is infilled with a 4-20mm clean angular stone. The confined angular stone locks together to produce a rigid stone mattress, while maintaining air pockets for continued water permeation and gas exchange. The low fines content of the stone prevents the Treetex™ layer from becoming blocked over time.

Which depth of Cellweb® TRP?

The Cellweb® System is provided in four different depths; 200mm, 150mm, 100mm and 75mm. The depth required is determined by the proposed traffic loadings and the site ground conditions. Geosynthetics in house engineering department can provide a free site specific technical recommendation. For free technical and engineering support please contact Geosynthetics Ltd 01455 617139 or the full installation guide can be found on our website www.geosyn.co.uk.

Indicative Cellweb with overfill



Web: www.geosyn.co.uk | Tel: 01455 617139
 Fax: 01455 617140 | Email: Sales@geosyn.co.uk



Geosynthetics
 Engineered Solutions

Example of Air-spade.

HANDLE VIBRATION TEST

Product type – MBW Soil Pick SP125

Manufacturer of testing apparatus – Castle

Accelerometer was affixed to the rear of the handle on the Soil Pick and all three axes were tested.

Accelerometer position:

X axis = 0.0M/S²

Y axis = 0.0M/S²

Z axis = 0.0M/S²

Hand/arm vibration = 0.0M/S²

TREE CARE

MBW's Soil Pick provides a multi-functional air tool for a variety of applications in the tree care industry including:

Radial Trenching

Radial trenching is a process which involves aerating the soils around a tree root in a pattern resembling a wagon wheel. The Soil Pick provides a safe and damage free means of utilizing a high air pressure to loosen tightly compacted soils.

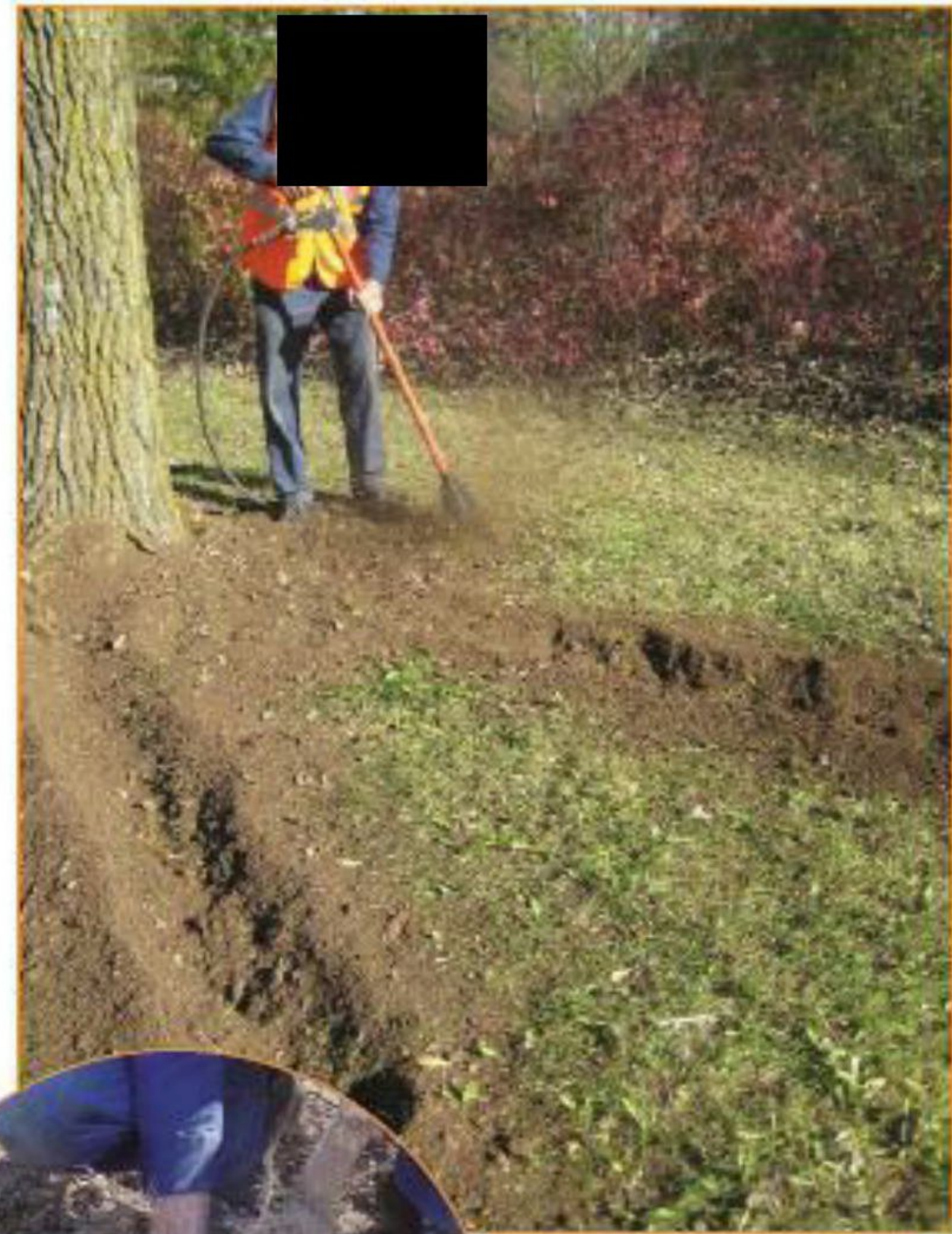
Aeration & Excavation

Root Locating for Utility Line Installation or Pruning

Investigating Root Structure and Damage

Transplanting or Bare Rooting

Reducing Soil Compaction



- Non-Conducting Barrel
Independently certified safe for 100,000 Volts/12" Barrel
- Large Deflector
protects operator from scatter of dirt and debris
- Non-Sparking Nozzle
allows safe use around leaking gas lines
- Polymer Trigger
reduces operator fatigue
- Unlike the Competition,
the Soil Pick maintains a cool temperature
- Pressure Gauges
ensure maximum performance

MBW UK Ltd.
Units 2 & 3 Cochrane Street • Bolton BL3 6BN • England UK
Ph: 44 (0) 1204 387784 • Fax: 44 (0) 1204 387797
E-mail: mbwuk@btinternet.com • Website: www.mbw.com

 1-800-878-5287

Appendix VI

- B J UNWIN FORESTRY CONSULTANCY Ltd. -

Head office: **Parsonage Farm, Longdon, Tewkesbury, Gloucestershire. GL20 6BD.**

Tel / Fax

Satellite Offices: - Haley Ridge, Highcliffe, **Nr. Wadebridge, Cornwall, PL27 6TN.**
 -105 Charfield Court, 2 Shirland Road, **London, W9 2JR.**

Associate office: - 1 Market Place Mews, **Henley-on-Thames, Oxfordshire, RG9 2AH.**

Principal: **BScFor, MICFor, FArborA, RCarborA, CEnv.**

**Chartered Forester - ICF Registered Consultant - Fellow of the Arboricultural Association -
 Arboricultural Association Registered Consultant - Chartered Environmentalist.**

From:		To:	Prospective Client
Date:	Nov 2020	No. of pages:	2
Subject:	Professional CV		

Below are set out **B J Unwin Forestry Consultancy's** competences and experience.

Insurance:-

£5m Public Liability & £2m Professional Indemnity (renewed June).

Personnel:-

B J Unwin started his forestry career as a tree surgeon and landscape contractor in 1975. He studied forestry at Aberdeen University from 1977 to 1981, worked for Unilever as a Forestry Manager in the Solomon Islands from 1981 to 1983. Since then he has been based in Gloucestershire assisting clients to manage their woodland, trees and vegetation throughout Southern Britain, and occasionally in northern England, Scotland and Northern Ireland.

In the mid-1980s to mid-1990s for a period of about ten years he taught chainsaw, tree felling and tree surgery courses at Worcestershire Agricultural College on a part-time basis. He was assessed and passed as a LANTRA assessor in these skills, and held NPTC certificates of competence in chainsaw use on the ground and up trees.

He now works as a tree consultant / manager / contract manager to a range of clients listed below. For tree decay testing we have a **PICUS II ULTRASOUND** tomograph with electronic callipers and **RESISTOGRAPH-R400** drill.

He works with two self-employed arboriculturalists of >20 years' combined experience:-

Arboricultural Association Registered Consultant - Associate Member of the Institute of Chartered Foresters - Professional member of the International Society of Arboriculture - Technicians Certificate (ArborA) 2005, now regarded as NQF "level 4" - Professional Tree Inspection Certificate (LANTRA) 2013,

BSc(Hons) Agriculture & Estate Management, Level 4 Diploma Arboriculture, LANTRA Professional Tree Inspection & working with trees since 2007.

Plus a secretary/ plan technician; calling in extra help as required (eg ecologist or arboricultural assistant). On bigger projects he regularly works as a part of a multi-disciplinary team.

Current BJUFC qualifications are:-

BSc Forestry Hons 1st Class, Aberdeen 1981.

Chartered Forester No. 0330064, 1986.

Fellow of the Arboricultural Association, 1995.

Licensed Subsidence Risk Assessor, 1997-2001 (scheme closed in 2001).

Completed Training in September 2002 to Prepare Native Woodland Plans for CCW and FC in Wales.

Arboricultural Association Registered Consultant No. 42, 2004.

LANTRA certificate for Arboriculture and Bats, BJU in 2005.

Examined and approved to submit Welsh WGS as Management Planner and PAWS Assessor, 2006.

Joined Utilities Vendor DataBase, Supplier No: 88101 in Feb 2006 (left 2010).

Training and Certification in basic CAD operation 2006.

Chartered Environmentalist April 2008.

Woodfuel Production and Supply : LANTRA Certificate of Training Dec 2008.

Training in CAVAT amenity tree asset valuation October 2010.

Company Safety Policy:- We have been successfully assessed by Safety Management Advisory Services (SMAS) as meeting CDM Regs 2015 Core Criteria Stage 1, as a **Worksafe Consultant No. 75950.** expiry 09/2020.

CITB *Health, Safety & Environment Test for Managers & Professionals* passed 22/01/2015.

First-aid at work June 2013.

Current clients and typical work include:-

English Heritage	Tree safety inspection contract 2007-2013 for East Midlands, East Anglia, London and SE England. Tree safety inspection contract for West of England & Midlands 2013-2021.
Planning Inspectorate (PINS) & Dept for Communities and Local Government. 2000-2017.	Arboricultural Inspecting Officer in South-West England, South East England, West Midlands and East Midlands; advising the First Secretary of State on TPO appeals since 2000. Contract with DCLG expired April 2008 when transferred to PINS. Contract continued with PINS, as Non-Salaried Arboricultural Inspector, determining TPO appeals and High Hedge appeals. All non-salaried inspectors released in 2017.
Architects / Developers / Planning Appeals	Complete Tree Constraints, Impact Assessment & Tree Protection advice for planning, working with other professionals to input arboriculture into more complex development schemes. Recent assignments in Liverpool to Cornwall, Kent, Norfolk & London. All using BS5837:2012. FULL CAD CAPABILITY.
Amey Mouchel Ltd	Overseeing Amey Tree Officer on motorway and trunkroad tree inspections throughout Midlands and Marches to 2012. Amey Mouchel are agents for Highways Agency.
CRH Tarmac Ltd, + Midland Quarry Products + Quarryplan (in Northern Ireland).	Since 1990 working with Estates staff, quarry managers and Landscape / ecological consultancies organising and managing contracts for tree and woodland planting both pre- and post- quarrying. Also preparing landscape restoration schemes for straightforward sites plus landscape management on sites throughout southern England, East Anglia and south and south-west Wales. (Commendations for Land Restoration and Environmental improvements from Spelthorne Borough Council 2003.) Also in England & Northern Ireland ongoing tree consultancy for Quarryplan.
Land Agents	Assisting Bruton Knowles clients' with woodland management and other tree issues since 1984. We also assist clients of Fisher German and Savills on a regular basis.
Tarmac Central now CRH Tarmac Ltd.	1988-2018 woodland management of Hopwas Hays Wood, Tamworth.
Rural estates in Herefordshire, Worcestershire and Gloucestershire, plus private woodland owners in southern England and Wales.	Since 1983 woodland management, tree management, hedgerow management. Many are Ancient woodlands and SSSI's requiring detailed ecological management plans produced in consultation with ecologists. About forty Farm Woodland Premium Schemes and about twenty Native Woodland Plans prepared to date in England and Wales. On-going EWGS grant applications. Input into Tir Gofal (and its successor) and Stewardship schemes. Better Woods for Wales (BWW) applications.
British Waterways	Ten-year Tree and Vegetation Management Plans along canals and around reservoirs in London, Hertfordshire, Berkshire, Birmingham, Staffordshire, Worcestershire, Gloucestershire, Shropshire, Llangollen Canal, etc: plus help in dispute with riparian owners. This work ceased around 2011.
Stroud District Council	Management of 49Ha woodland since 1989 on FC schemes plus grassland on DEFRA Stewardship Schemes, including HLS. Retired Nov07.
One-off clients	Since 1983 assisting tree owners, developers, lawyers etc throughout southern or midland Britain, including Wales, on a wide range of tree-related issues including planning, planning appeals, subsidence, health & safety, disputes, vegetation control, expert witness, valuation of woodlands, standing and felled timber, Christmas trees etc, and tree and landscape planting schemes. Recently High Hedge issues and BS5837 are hot topics.
Malvern Hills District Council. South Oxfordshire District Council	BJU Stand-in part-time Consultant Tree Officer Summer 2003. JF-D stand in Consultant Tree Officer summer 2009 to spring 2010.
Golf course & leisure facilities	Assistance with development of Carden Park golf course in Cheshire. Management advice for trees on other golf courses: Eg Ross Golf Club, Swindon Golf Club .
Farm management	Management of own 95Ha farmland since 1985.

Please do not hesitate to ask for further information. B J Unwin END.

Appendix VII

Constraints plan :-

- **Tree Crowns**

Retention categories, based on BS 5837 Table 1:-

A = High quality & Value (>40yrs life): Green.

B = Moderate quality & Value (>20yrs life): Blue.

****C = Low quality & Value (>10yrs life):** Grey.

U = Trees to be removed (<10yrs life): Red.

**PLEASE NOTE. FOR CLARITY, C-CATEGORY TREES MAY NOT BE COLOURED.

and

- **Root Protection Areas**

RPA = circles.

See Tree Table for dimensions.

and

- **Theoretical Shading**

= quadrant of tree height in ten years' time from north west (mid-morning) to due east (evening). This is a shadow pattern for 1 x tree height from 10.00-18.00hrs from May to September.

Plans are not included in pdf format of report.

Insert plans here in paper copy of report:-

Appendix VIII

Tree retention and Tree Protection Plan

Plans are not included in pdf format of report.

Insert plans here in paper copy of report:-

END.