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ARBORICULTURAL IMPLICATIONS ASSESSMENT AND METHOD STATEMENT

PROPOSED DEVELOPMENT

AT

HOUGH END LEISURE CENTRE
PRINCESS ROAD
MANCHESTER

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Date: 5th December 2013
Ref: PM/05/12/13

BRITISH STANDARD 5837 TREE SURVEYS ARBORICULTURAL IMPLICATION STUDIES & METHOD STATEMENT TPO/PLANNING ADVICE/ PROJECT MANAGEMENT
TREE INVENTORIES AND RISK ASSESSMENTS WOODLAND MANAGEMENT PLANS TREE PLANTING SCHEMES

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1.0 ARBORICULTURAL IMPLICATIONS ASSESSMENT

1.1 The purpose of this report is to: -

a) Assess the implications, if any, the proposed development will have on the trees identified in the Tree Survey of 24th September 2013 carried out by Mulberry Tree Management.

b) Advise on arboricultural measures, which would be likely to mitigate any damage resulting from the proposed development

1.2 All background information from which this report is based has been taken from the initial survey, as stated in point 4.1 (a), by Mulberry Tree Management.

1.3 The limitations of this report are restricted to the persons, time, information made available and purpose for which this report has been prepared.

2.0 ASSESSMENT

2.1 The Site Layout Plans within Appendix Four identifies the trees in relation to the proposed development.

2.2 In order to fully assess the impact of the proposals an Implications Table has been created, which gives details of the proximity of the associated works to the trees.

2.3 The below Implications Table details the Root Protection Area (RPA) in accordance with the British Standard 5837:2012 *Trees in relation to design, demolition and construction – Recommendations*. This is an area that should be left undisturbed in order to provide adequate rooting area for retained trees. This is also illustrated on the Site Plan of Appendix Four.

2.4 This information can then be used in accordance with BS 5837:2012 to determine whether the development will have a detrimental impact on the health of the tree. Once this has been determined remedial measures can be detailed to reduce the impact the proposals will have.

2.5 Implications Table: -

Tree No.	Root Protection Area (m^2)	Circle Radius (m)	Distance to any proposed construction or surfacing (m)	Can the Tree be Successfully Retained
T1	162.86	7.20	2.6	See 4.0
T2	49.27	3.96	Fell for development	
T3	117.67	6.12	1.5	See 4.0
T4	191.13	7.80	2.0	See 4.0
T5	122.33	6.24	2.1	See 4.0
T6	141.87	6.72	5.8	See 4.0
T7	152.18	6.96	2.9	See 4.0
G1	<72.38	<4.80	Fell 60% for development	
G2	72.38av	4.80av	n/a	Yes
G3	35.47av	3.36av	n/a	Yes
T8	162.86	7.20	n/a	Yes
T9	203.08	8.04	n/a	Yes
T10	209.18	8.16	1.0	See 4.0
T11	65.33	4.56	n/a	Yes
T12	87.58	5.28	Fell for development	
T13	14.66	2.16	Fell for condition	
T14	209.18	8.16	2.2	See 4.0
T15	191.13	7.80	5.1	See 4.0
T16	203.08	8.04	4.6	See 4.0
T17	28.27	3.00	1.4	See 4.0

Tree No.	Root Protection Area (m^2)	Circle Radius (m)	Distance to any proposed construction or surfacing (m)	Can the Tree be Successfully Retained
G4	<14.66	<2.16	Fell for development	
G5	113.10av	6.00av	n/a	Yes
G6	<113.10	<6.00	n/a	Yes
G7	<113.10	<6.00	Fell 30% for development	
T18	162.86	7.20	6.7	See 4.0
T19	65.33	4.56	1.2	See 4.0

3.0 IMPACT ASSESSMENT

3.1 To assess the implications of the proposed development each tree can be categorised in the following way: -

	Trees to be Retained		Trees to be removed	
	With No Impact	With detailed methodology	Due to Condition	Due to Development
Tree No.	G2, G3, T8, T9, T11, G5 & G6	T1, T3, T4, T5, T6, T7, T10, T14, T15, T16, T17, T18 & T19	T13	T2, G1 (60%), T12, G4 & G7 (30%)

4.0 MITIGATING PROPOSALS

4.1 Development

4.1.1 As shown above, the Implications Table identifies the potential for the proposed development to have an impact on the long term retention of T1, T3, T4, T5, T6, T7, T10, T14, T15, T16, T17, T18 & T19 due to the proximity of the proposed development being within their Root Protection Area's (RPA's).

4.1.2 However, with regard to T1, T3, T4, T5, T6, T7, T15, T16, T17 & T18 there is existing surfacing within these areas. Therefore, any root damage should be minimal.

4.1.3 There is proposed surfacing within the RPA's of T10 & T14. However, with regard to the driveway access it is now possible with the use of geo-textile materials, such as 'Geoweb' and 'Cellweb' to construct a temporary or permanent 'no dig' surfacing within the RPA's of trees. An example of this can be found in Appendix Three of this report.

4.1.4 A clear tree works specification and details of all tree protective measures can be found in the following Arboricultural Method Statement (Section 6.0).

5.0 DISCUSSION

5.1 The majority of the root system, of a tree, is in the surface 600mm of the soil, extending radically for distances frequently in excess of the trees height. Beyond the main structural roots (close to the base of the trunk), the root system rapidly sub-divides into smaller diameter roots: off this main system, a mass of fine roots develops.

5.2 The shape of the main structural roots develops in response to the need for the tree to have physical stability. Beyond these major roots, root growth and development is influenced by the availability of water and nutrients. Unless conditions are uniform around the tree, which would be unusual, the extent of the root system will be very irregular and difficult to predict. It will not generally show the symmetry seen in the branch system.

5.3 The parts of the root system, which are active in water and nutrient uptake, are very fine, typically less than 0.5mm diameter. They are short lived, developing in response to the needs of the tree, with the majority dying each winter. It is *essential* that conditions in the soil remain conducive to the healthy growth of these fine roots so that the water and nutrients necessary for healthy tree growth can be absorbed.

5.4 All parts of the root system, but especially the fine roots, are vulnerable to damage. Once they are damaged, water and nutrient uptake will be restricted until new roots have regenerated. Vigorous young trees will be capable of rapid regeneration but over mature trees will respond slowly, *if at all*.

5.5 In order to live and grow, roots need oxygen from the soil. Respiration by the roots and other soil organisms depletes this oxygen and increases carbon dioxide levels in the soil; a correct balance of these gases is normally maintained by diffusion between the soil and the atmosphere. Anything, which disturbs this balance, will affect the condition of the root system.

5.6 The factors that most commonly affect this diffusion adversely, and therefore damage roots, are the following: -

a) Compaction of the ground, which reduces the space between soil particles. This is particularly important on clay soils. A single passage by heavy equipment on clay soils or storage of heavy materials can cause significant damage.
b) Changing soil levels, even for a few weeks.
c) Covering the root area with impervious surfaces.
d) A rise in the level of the water table. Roots can tolerate submersion for short periods. But a permanent rise will deplete the soil of oxygen.

5.7 Serious damage is often caused during preliminary site works by stripping the topsoil. For this reason, such works should be avoided until protective fencing has been erected.

5.8 Excavations in the rooting area can sever roots. As the majority of roots are in the surface 600mm, even shallow excavations can cause damage.

5.9 Excavations for foundations, landscaping or service trenches are usually sufficiently deep to sever most of the roots, and it should therefore be assumed that all parts of the root system beyond the excavation would no longer serve the tree.

5.10 Excavation or soil stripping which sever or damage the roots may impair the stability of the tree and make it dangerous.

6.0 METHOD STATEMENT

Before any form of development commences on the site the following works should be undertaken: -

6.1 Tree Works

Tree No.	Proposed Works
T2, G1 (60%), T12, T13, G4 & G7 (30%)	Fell to ground level.

Recommended works should be carried out to the *British Standard Recommendations for Tree Work, BS 3998:2010*

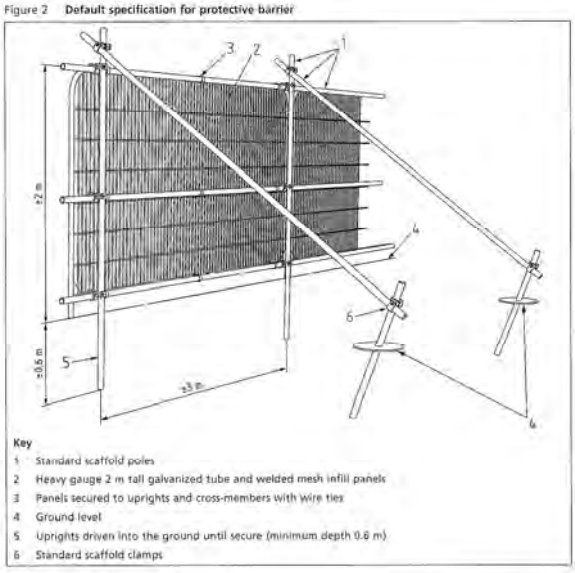
6.2 Protective Fencing

6.2.1 All fencing used on the site should fully comply with *BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations*.

6.2.2 The fencing should be strong and suitable for local conditions. It should also take into account the degree of construction activity on the site.

6.2.3 In this circumstance the location for the protective fencing should be as shown on the Tree Protection Plan of Appendix Four and of the following specification:

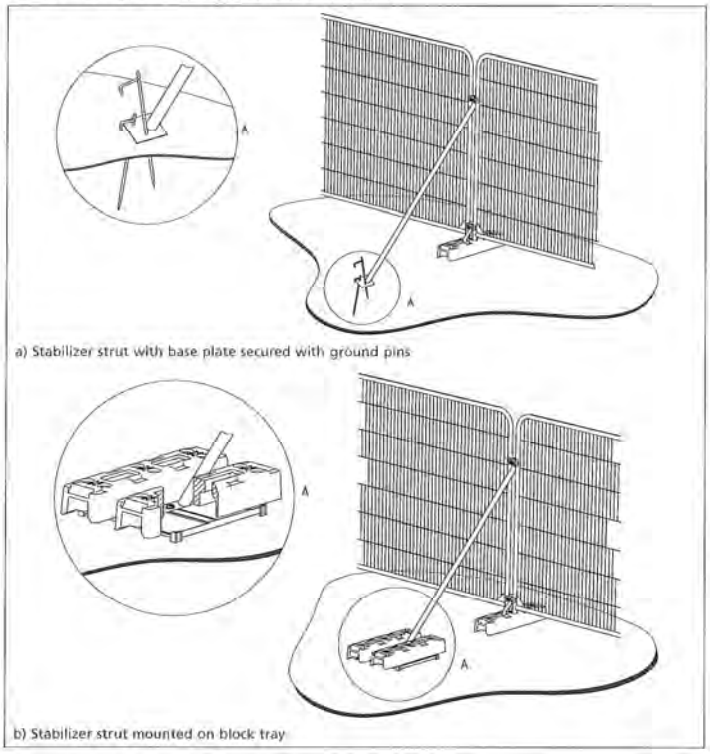
Figure 2 Default specification for protective barrier



Or

Heras type temporary fencing can sometimes be acceptable with the bases pinned to the ground securely. This needs be checked with the Local Planning Authority.

Figure 3 **Examples of above-ground stabilizing systems**



6.2.4 No storage of materials or any construction operations should occur within the fenced area. Additionally, when designing the site layout, account should be taken of the route/installation method of underground services/drains and, the route/construction method of new access roads/driveways in relation to the retained trees. It would be advisable to mark out the optimum position of the protective fencing on the ground prior to finalisation of any design proposal.

6.2.5 Notices should also be erected on the fencing stating ‘Protected Area - No operations within fenced area’. An example can be found in Appendix Two, which should be laminated and attached to the fencing at regular intervals.

6.2.6 The positioning of the protective fencing is also very important and should be erected in the proposed location identified on the site plan of Appendix Four. Once the fence has been erected it should never be crossed and particular care should be taken not to store any materials or soil within the protected area.

6.3 Additional Precautions Outside Fenced Areas

6.3.1 Oil, bitumen, cement or other material likely to cause damage to the tree will not be stacked or discharged within 10m of the trees stem or within the protective area. Also materials in general will not be stacked or discharged within the exclusion zone.

6.3.2 Concrete mixing and washing will not be carried out within 10m of any retained trees.

6.3.3 Fires will not be lit beneath the foliage or in a position where the flames could extend to within 5m of the foliage, branches or trunk. If the fire is large then this may necessitate a distance of at least 20m.

6.3.4 Trees that are to be retained will not be used as anchorage for equipment.

6.3.5 Notice boards, telephone cables, or other services will not be attached to any part of the retained tree.

6.3.6 Care should be taken when using cranes or other equipment near the canopy of the retained trees. Also any trees to be felled in proximity to the retained trees should be done so with particular care.

6.4 Services

6.4.1 Where possible all service trenches should be dug outside of the Root Protection Area.

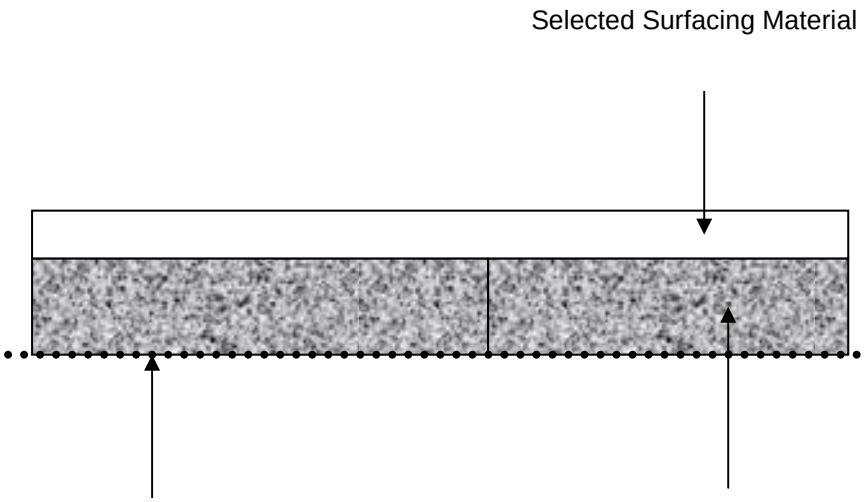
6.4.2 Should this not be possible then the guidelines within 'NJUG 10' *Guidelines for the Planning, Installation and Maintenance of Utility Services in Proximity to Trees* should be adopted, in particular Section 4.0, which is included within Appendix One of this report.

6.5 **Methodology for the Construction of Permanent and Temporary Hard Surfaces within Root Protection Area's**

The following methodology supports the below drawing indicating the construction of the proposed 'no dig' surfaced area as mentioned in section 4.1.3 above with regard to T10 & T14 (see Appendix Three and Four). The methodology is prepared on the basis of the sequence of operations necessary to complete the construction of the hard surfaces with the minimum damage to the trees proposed for retention.

- Surface layer to be scrapped off by no more than 100mm. This can be done either by hand or by very small machinery but may not be needed at all in this instance.
- Spread a sub grade material over the areas to fill any small ruts.
- Lay G4 Geotextile over area to be surfaced.
- Position wood or metal edging supported by pins. This may also not be necessary for a temporary surface.
- Extend the Geoweb <200mm perforated tree root protection system over the area to be surfaced.
- Fill the voids within the Geoweb with reduced fines Type 1 material working into the site over the top of the Geoweb.
- Surface over the Geoweb such that the construction binds itself together.

GEOWEB BASED SPECIAL SURFACE CONSTRUCTION – (INDICATIVE ONLY)



6.6 Summary of Methodology for the Protection Trees

1. **Remedial tree works.**

2. **Erection of Protective Fencing in accordance with this Method Statement and plan of Appendix Four and to be checked by a competent arboriculturalist before commencement of works.**

3. **The installation of the 'no dig' surfacing adjacent to T10 & T14 as outlined above and within Appendix Four.**

4. **Construction of Development.**

5. **The removal of Protective Fencing and Ground Protection is only to be done with the agreement of a competent arborist or the LPA.**

APPENDIX ONE

NJUG 10
Section 4.0

NJUG Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees Telecommunications Code (Schedule 2). Paragraph 19 of the Telecommunications Code enables operators to require the lopping of trees which overhang the street and obstruct or interfere with the working of their lines.

4. HOW TO AVOID DAMAGE TO TREES

This section gives general guidance on methods of work to minimise damage to trees. The local authority (or for privately owned trees, the owner or their agent), should be consulted at an early stage prior to the commencement of any works. This will reduce the potential for future conflict between trees and apparatus.

4.1 Below Ground

Wherever trees are present, precautions should be taken to minimise damage to their root systems. As the shape of the root system is unpredictable, there should be control and supervision of any works, particularly if this involves excavating through the surface 600mm, where the majority of roots develop.

4.1.1 Fine Roots

Fine roots are vulnerable to desiccation once they are exposed to the air. Larger roots have a bark layer which provides some protection against desiccation and temperature change. The greatest risk to these roots occurs when there are rapid fluctuations in air temperature around them e.g. frost and extremes of heat. It is therefore important to protect exposed roots where a trench is to be left open overnight where there is a risk of frost. In winter, before leaving the site at the end of the day, the exposed roots should be wrapped with dry sacking. This sacking must be removed before the trench is backfilled.

4.1.2 Precautions

The precautions referred to in this section are applicable to any excavations or other works occurring within the Prohibited or Precautionary Zones as illustrated in Figure 1 – ‘Tree Protection Zone’.

4.1.3 Realignment

Whenever possible apparatus should always be diverted or re-aligned outside the Prohibited or Precautionary Zones. Under no circumstances can machinery be used to excavate open trenches within the Prohibited Zone.

The appropriate method of working within the Precautionary Zone should be determined in consultation with the local authority (or for privately owned trees the owner or their agent) and may depend on the following circumstances;

- the scope of the works (e.g. one-off repair or part of an extensive operation)
- degree of urgency (e.g. for restoration of supplies)
- knowledge of location of other apparatus
- soil conditions
- age, condition, quality and life expectancy of the tree

Where works are required for the laying or maintenance of any apparatus within the Prohibited or Precautionary Zones there are various techniques available to minimise damage.

Acceptable techniques in order of preference are;

a) Trenchless
Wherever possible trenchless techniques should be used. The launch and reception pits should be located outside the Prohibited or Precautionary Zones.
In order to avoid damage to roots by percussive boring techniques it is recommended that the depth of run should be below 600mm. Techniques involving external lubrication of the equipment with materials other than water (e.g. oil, bentonite, etc.) must not be used when working within the Prohibited Zone. Lubricating materials other than water may be used within the Precautionary Zone following consultation and by agreement.

b) Broken Trench - Hand-dug
This technique combines hand dug trench sections with trenchless techniques if excavation is unavoidable. Excavation should be limited to where there is clear access around and below the roots. The trench is excavated by hand with precautions taken as for continuous trenching as in (c) below. Open sections of the trench should only be long enough to allow access for linking to the next section. The length of sections will be determined by local conditions, especially soil texture and cohesiveness, as well as the practical needs for access. In all cases the open sections should be kept as short as possible and outside of the Prohibited Zone.

c) Continuous Trench - Hand-dug
The use of this method must be considered only as a last resort if works are to be undertaken by agreement within the Prohibited Zone. The objective being to retain as many undamaged roots as possible.

Hand digging within the Prohibited or Precautionary zones must be undertaken with great care requiring closer supervision than normal operations.

After careful removal of the hard surface material digging must proceed with hand tools. Clumps of roots less than 25mm in diameter (including fibrous roots) should be retained in situ without damage. Throughout the excavation works great care should be taken to protect the bark around the roots.

All roots greater than 25mm diameter should be preserved and worked around.
These roots must not be severed without first consulting the owner of the tree or the local authority tree officer / arboriculturist. If after consultation severance is unavoidable, roots must be cut back using a sharp tool to leave the smallest wound.

4.1.5 **Backfilling**
Any reinstatement of street works in the United Kingdom must comply with the relevant national legislation (see: **Volume 6 – 'Legislation and Bibliography'**). In England this relates to the requirements of the code of practice – 'Specification for the Reinstatement of Openings in Highways' approved under the New Roads and Street Works Act 1991. Without prejudice to the requirements relating to the specification of materials and the standards of workmanship, backfilling should be carefully carried out to avoid direct damage to roots and excessive compaction of the soil around them.

The backfill should, where possible, include the placement of an inert granular material mixed with top soil or sharp sand (not builder's sand) around the roots. This should allow the soil to be compacted for resurfacing without damage to the roots securing a local aerated zone enabling the root to survive in the longer term.

Backfilling outside the constructed highway limits should be carried out using the excavated soil. This should not be compacted but lightly "tamped" and usually left slightly proud of the surrounding surface to allow natural settlement. Other materials should not be incorporated into the backfill.

4.1.6 **Additional Precautions near Trees**

Movement of heavy mechanical plant (excavators etc.) must not be undertaken within the Prohibited Zone and should be avoided within the Precautionary Zone, except on existing hard surfaces, in order to prevent unnecessary compaction of the soil. This is particularly important on soils with a high proportion of clay. Spoil or material must not be stored within the Prohibited Zone and should be avoided within the Precautionary Zone.

Where it is absolutely necessary to use mechanical plant within the Precautionary Zone care should be taken to avoid impact damage to the trunk and branches. A tree must not be used as an end-stop for paving slabs or other materials nor for security chaining of mechanical plant. If the trunk or branches of a tree are damaged in any way advice should be sought from the local authority tree officer / arboriculturist.

See TABLE 1 –'Prevention of Damage to Trees Below Ground' below for summary details regarding causes and types of damage to trees and the implications of the damage and the necessary precautions to be taken to avoid damage.

APPENDIX TWO

Site Notice for Protective Fencing



TREE PROTECTION AREA
KEEP OUT!

TREES ENCLOSED BY THIS FENCE ARE PROTECTED BY PLANNING CONDITIONS AND ARE SUBJECTS OF A TREE PRESERVATION ORDER
(TOWN & COUNTRY PLANNING ACT 1990)

CONTRAVENTION OF TREE PRESERVATION ORDER MAY LEAD TO **CRIMINAL PROSECUTION**

THE FOLLOWING **MUST** BE OBSERVED BY ALL PERSONS:-

- THE PROTECTIVE FENCING MUST NOT BE REMOVED
- NO PERSON SHALL ENTER THE PROTECTED AREA
- NO MACHINE OR PLANT SHALL ENTER THE PROTECTED AREA
- NO MATERIALS SHALL BE STORED IN THE PROTECTED AREA
- NO SPOIL SHALL BE DEPOSITED IN THE PROTECTED AREA
- NO EXCAVATION SHALL OCCUR IN THE PROTECTED AREA

ANY INCURSION INTO THE PROTECTED AREA MUST BE WITH THE WRITTEN PERMISSION OF THE LOCAL PLANNING AUTHORITY

APPENDIX THREE

Example of Special Surfacing

TREE ROOT PROTECTION

Trees are an important part of the environment. They bring not only an aesthetic value in the form of visually softening and screening buildings, but also absorb pollution, noise and provide a viable habitat for wildlife. The preservation of healthy trees in a local amenity is therefore beneficial to both residents and the local community.

THE PROBLEM



With increased urbanisation, the requirement to build access roads, house driveways, overspill car parks and vehicle hard standings near to mature trees is ever present. Traditional methods of construction are not acceptable in these situations due to the damage which can be caused to the tree feeder roots, weakening or killing the tree. Most tree roots are present within the first 600mm of soil depth and extend from the tree a distance equal to 60-75% of the tree's height. 80% of the crushing damage caused to these roots can be done in the first construction vehicle pass over the site.

Most tree roots... extend from the tree a distance equal to 60-75% of the tree's height.

Damage to tree feeder roots is mainly caused by:



- Severance of roots during site excavations.
- Compaction of surface soils by vehicular traffic, causing reduced oxygen and nutrient exchange between the roots and surrounding soils.
- The installation of impermeable wearing courses such as concrete or tarmacadam, preventing surface water permeating to the root system below.
- Changes in water table or ground level due the installation of structural foundations.

TREE PRESERVATION ORDERS

To ensure the protection of mature trees, the majority of those located within established areas of urban development will already be subject to Tree Preservation Orders (TPOs). The principal effect of a TPO is to prohibit the;

"cutting down, uprooting, topping, lopping, wilful damage or wilful destruction of trees without the LPAs [local planning authority's] consent. The cutting of roots, although not expressly covered above, is potentially damaging and so, in the Secretary of State's view, requires the LPAs consent".

"Tree Preservation Orders: a guide to the law and good practice"
Office of the Deputy Prime Minister

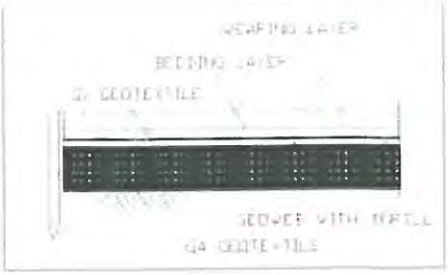
Trees may also be protected if they are within a designated Conservation Area. TPOs are administered by Arboricultural Officers within local councils, who have the responsibility for approving any proposed works. Involvement of the Arboricultural Officer at an early stage is strongly advised as failure to comply with TPOs can result in fines of up to £20,000 for each tree destroyed.

Failure to comply with TPOs may result in fines of up to £20,000 for each tree destroyed

THE SOLUTION

Where access driveways or vehicle hard standing areas are planned in areas adjacent to trees, Arboricultural Officers will normally specify a 'no dig' construction to eliminate the damage associated with normal construction methods. With this method no removal of surface soils is allowed. Instead, a permeable structural sub-base is laid directly onto the existing ground level with a permeable wearing course, such as grass reinforcement, low tack resin coated gravels or block paving, laid on top.

'No dig' construction may be accommodated with the use of perforated Geoweb in the sub-base layer. Geoweb reduces the overall depth of construction by introducing a cellular structure which dissipates downward loads by a horizontal transfer through the cell structure. This process in conjunction with the perforated cell wall also imports structural integrity to free draining aggregates which would otherwise be unacceptable in road construction. Therefore, a robust, shallow and free-draining sub-base is achieved, which allows vehicular access whilst allowing water and oxygen to permeate down to the tree roots.





Expanding and staking Geoweb panels



Infilling the Geoweb

In accordance with British Standard BS5837: 1991 - Guide for Trees in Relation to Construction and APN 1:1996 – Driveways Close to Trees, Geoweb acts to protect tree roots in three main ways;

1. **Used with the correct infill, Geoweb allows the construction of a permeable sub-base.**
2. **Geoweb enables 'no dig' construction to be used, avoiding any severance of tree roots.**
3. **Geoweb prevents the compaction of soil surrounding roots.**

The permeable wearing course to complete the system can be accommodated through Ecoblock, a grass protection or gravel retention system. The cellular construction of Ecoblock provides a fully permeable, attractive wearing course which is capable of accommodating heavy vehicle loads, whilst allowing the exchange of oxygen and free drainage of water to the sub-base.

The Geoweb system has been used in tree root protection applications with great success for the following clients:

- **Node House - North Dorset District Council**
  A number of mature beech trees have been protected during the construction of a large residential property. This site has been closely monitored for the past 30 months by local tree officers. There have been no noticeable problems.

- **Woodfield School - Wigan Metropolitan Borough Council**
  Geoweb was used to protect the roots of trees lining an access road and in an extended car parking area.

KEY BENEFITS OF THE GEOWEB SYSTEM:

- ***'No-dig' solution***
- ***Cost effective***
- ***Fast and simple to install***
- ***Design flexibility***
- ***Environmentally-friendly***
- ***Tried and tested product***

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July 2004
A member of the Heiton Group

We can provide comprehensive technical support for our range of ground engineering products. If you have a particular application which you would like to discuss in more detail, please contact our Specification Sales Team on 01204 862222, who will be pleased to arrange for one of our representatives to contact you.

APPENDIX FOUR

Tree Layout & Protection Plans

KEY

- TREE LOCATION AND CONDITION
- GROUP LOCATION AND CONDITION
- RPA
- CROWN SPREADS

SEE INSERT ABOVE

HOUGH END LEISURE CENTRE, MANCHESTER

TREE LOCATION PLAN (PROPOSED)

SCALE: 1/1000@A3 **DATE:** DEC 13

DRAWING: M354/HE/TREE/02

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KEY

TREE LOCATION AND CONDITION

GROUP LOCATION AND CONDITION

RPA

CROWN SPREADS

AREAS OF SPECIAL SURFACING

TREE PROTECTION FENCING

G1 G2 G3 G4 G5 G6 G7

T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13 T14 T15 T16 T17 T18 T19

Red Lion Brook

PRINCESS ROAD

GOLBORNE AVENUE

NEW ACCESS JUNCTION, ENTRANCE & EXIT

El Sub Sta

34.5m

32.1m

31.4m

31.3m

31.2m

SEE INSERT ABOVE

HOUGH END LEISURE CENTRE, MANCHESTER

TREE PROTECTION PLAN

SCALE: 1/1000@A3 **DATE:** DEC 13

DRAWING: M354/HE/TREE/03

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