

**LOWFIELD ROAD, BOLTON-UPON-DEARNE
for Gleeson Homes & Regeneration**

ARBORICULTURAL METHOD STATEMENT



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1.0 BACKGROUND

- 1.1 This Method Statement has been drawn up to assist Barnsley Metropolitan Borough Council and the developer in overseeing the construction by Gleeson Homes of a footpath through the line of a mature hedge in order to gain access to a new Toddler's Play Area.
- 1.2 The document seeks to describe the site and existing vegetation, and list those items which are proposed for removal due to the proposal, those which need to be removed for arboricultural reasons and those which are to remain.
- 1.3 It describes the proposals for ensuring that the trees that are to remain would not be adversely affected by the work process and thrive thereafter.
- 1.4 The development and timing of construction operations are described, together with materials which would be used in order to maximise tree protection.
- 1.5 The document also includes a section of useful telephone numbers and addresses.
- 1.6 This Statement will be included as part of the specification and schedule of works issued to the building contractor and will form part of the contract. The Statement will be available on site for inspection.

2.0 EXISTING SITUATION

- 2.1 The area of ground covered by this document lies along the eastern edge of an existing housing development at its interface with open ground that is proposed for a new phase of housing.
- 2.2 Vegetation within this area comprises the following items (see photographs at end of text and Appendix A for full schedule):
 - A former field hedge (H1) that has been un-maintained for a considerable period of time and which has now developed into a line of individual Hawthorn and Elder trees with varying width of gaps between these
 - An area of recently-planted mixed species native tree and shrub planting on a low mound
 - Two semi-mature Birch trees close to the rear garden boundary of adjacent dwellings.
- 2.3 All trees above 75mm girth within the first two items above are included within a Tree Preservation Order (no.5/2006).
- 2.4 Ground levels fall slightly from the adjacent road kerb to the west of the hedge line by around 300-400mm at the centre line of the hedge and remain at this lower level within the area of ground to the east.

3.0 TREES AFFECTED BY PROPOSED FOOTPATH

- 3.1 One item is recommended for removal on arboricultural grounds:

H1(j) Elder. This is a poorly formed specimen leaning heavily to the east from the main hedge line with its crown touching the ground in places. Its removal is recommended whether or not any works are proposed.
- 3.2 Two trees are proposed to be removed to enable the footpath to be constructed:

H1(c) Hawthorn. This is a small suppressed specimen of little arboricultural value. Apart from the benefit to this proposal its removal would benefit the mature tree H1(b) to the north.

H1(d) Hawthorn. This is a twin-stemmed specimen that has formerly been coppiced to ground level. Two stems have regenerated, one vertical and one leaning heavily to the north. Its crown is somewhat misshapen and biased to the north.

- 3.3 Removal of the above will create a gap wide enough to allow pedestrian access through to the play area whilst retaining the remainder of the hedge intact and providing two attractive specimens as end features to the hedge on either side of the path.

4.0 TREE REMOVAL

- 4.1 The first operation on the site will be the removal of the three trees thus scheduled.
- 4.2 These works will be undertaken with care in order to avoid damage to adjacent specimens due for retention.

5.0 REMEDIAL WORK

- 5.1 When all the felling is completed, any necessary tree surgery will be carried out.
- 5.2 This will principally involve only the general removal of deadwood from the crowns of trees and the removal of the lowest limbs (light crown lift to 2.5m) of the two trees on either side of the new gap in order to eliminate possible conflict with pedestrians.
- 5.3 All work will comply with British Standard 3998 (1989).

6.0 PROTECTIVE FENCING

- 6.1 Prior to machinery entering the site for any building, levelling or site clearance purposes, all trees to be retained will be fenced off to either side of the proposed footpath in accordance with British Standard (BS) 5837: 2012: clause 7.1 and 7.2 (see Appendix C).
- 6.2 The fencing will be constructed with a framework of scaffolding poles driven 600mm into the ground, braced together and backstays will then be added at 3m centres. Onto this will be attached a continuous line of welded mesh panels. Alternatively Ply or corrugated sheet metal panels may be used to be securely fixed to the frame with wire or scaffold clamps in accordance with BS 5837: 2012.
- 6.3 Another specification of fencing described as acceptable within the BS (see Fig.3, Appendix A) is the use of welded mesh panels ('Heras' or similar) on rubber or concrete feet supported on the inner side by stabiliser struts on a base plate secured with ground pins (or on a block tray if sitting on retained hard surfacing).

7.0 SITE INSPECTION

- 7.1 After tree felling and remedial work to trees have been completed (and following erection of the protective fencing), the developer's arboriculturist will visit the site. The reasons for this visit are firstly to check that the work to the trees is satisfactory, secondly to check the protective fencing, and thirdly to meet with the local authority's tree officer to ensure that they are also satisfied.
- 7.2 Any necessary amendments and improvements to the protective fencing agreed at this meeting will be undertaken following confirmation of the agreed changes in writing.

8.0 DEVELOPMENT PHASE

- 8.1 After all the felling, pruning and fencing has satisfactorily been completed, the developer can commence the on-site preparation works and footpath construction can begin.
- 8.2 During the development phase the developer's arboriculturist will visit the site on a regular basis to check the protective fencing and make any recommendations on any maintenance required to it.
- 8.3 The local authority's tree officer will have reasonable access to the site to report any problem areas directly to the developer's arboriculturist who will then visit the site and make recommendations to the developer on how best to rectify the situation.

9.0 DEVELOPMENT NEAR TREES

- 9.1 In the unlikely event that the tree protection fence needs to be moved during the course of the development, a meeting will be called, to which the local authority's tree officer will be invited. This is in order to agree that the methods and new position of the tree protection fencing are adequate and meet with the local authority's approval.
- 9.2 Any other process which will require the movement of the protective fence line will require the presence of the developer's arboriculturist and the local authority's tree officer throughout the process. This work will therefore require to be carried out immediately following the removal of fencing (ideally within a single working day).
- 9.3 The following procedures will be adopted where construction work is required within the canopy zone of any retained tree ('protected zone'):
 - 9.3.1 Prior to any work commencing within protected zones the contractor and developer's arboriculturist will meet on site to discuss appropriate procedures.
 - 9.3.2 Excavations within protected zones will be backfilled with subsoil and good quality topsoil as soon as possible to minimise root desiccation.

10.0 SURFACE TREATMENT BENEATH TREE CANOPIES

- 10.1 An important aspect of the construction method is that there will be minimal excavation of the existing surface. Existing ground vegetation will be killed using translocated herbicide and dead organic material removed down to a maximum of 50mm. This is in line with APN12 (2007) (see Appendix B).
- 10.2 Over this surface a geogrid (e.g. TriAx TX geogrid TX160 by Tensar or similar) will be laid as a base reinforcement layer over the whole of the footpath area where this passes beneath the crowns of adjacent trees. This is intended to spread loads and minimise compaction of the root zone.
- 10.3 A 225mm depth of sub base will be laid over the geogrid. This will consist of DoT reduced fines 'Type 3' granular sub-base as defined by the Specification for Highway Works. Type 3 material includes crushed rock, crushed slag, crushed concrete and well-burnt, non-plastic shale (no fines) but excludes sand and fine gravel.
- 10.4 The method of laying will be as the APN12 publication, the material being placed at one end of the site and pushed onto the grid so that any machinery will move on the spread sub base and not directly on the geogrid.

10.5 Footpath surface will be no-fines gravel laid to 50mm depth and rolled to a cross fall to allow dispersal of surface water once the material has been compacted.

10.6 Pressure-treated softwood timber edging will be used to provide containment for the sub base and gravel surface material.

11.0 REMOVAL OF THE PROTECTIVE FENCING

11.1 When the development is complete, all drainage and service runs are in place and the main site machinery has been removed, temporary protective fencing will be dismantled. This must be done with great care and will need to be supervised to avoid heavy machinery being used.

12.0 COMPLETION MEETING

12.1 Upon completion of all the works specified above and procedures also specified, the developer's arboriculturist will invite the local authority's tree officer to meet on site to discuss the process and to agree on any remedial works required.

13.0 USEFUL NAMES AND TELEPHONE NUMBERS

13.1 The developer – Gleeson Homes & Regeneration, Unit 6, Europa Court, Sheffield Business Park, SHEFFIELD S9 1XE
T: 0114 261 2900

13.2 The developer's landscape architect and arboriculturist – Rosetta Landscape Design, 1 Isis Court, Rosetta Way, YORK YO26 5NA
Tel: 01904 794 276

mp/ROSETTA LANDSCAPE DESIGN

27 Mar 14



Photo 1: ▲

View east from road showing, on left, twin-stemmed Hawthorn H(d) that it is proposed be removed to accommodate the new footpath. Hawthorn H1(e), on right of view, would remain as end feature to southern part of hedge.

Photo 2:

View west towards road showing poor quality Elder H1(j) on extreme left and twin-stemmed Hawthorn H(d) centre right both of which are proposed to be removed. Hawthorns H1(e) in centre of view and H1(b) on extreme right would both remain as end features to the hedge.



APPENDIX A

SCHEDULE OF VEGETATION

See drawing 2292/2 for location of items

Item No.	Species	Height (m)	DBH (cm)	Comments
H1(a)	Hawthorn	4	15	Twin-stemmed (one main and one secondary) with dense rounded crown. (Note: A line of similar hedge plants extend northwards from this specimen at 1.5-2m spacing.)
H1(b)	Hawthorn	4	10	Twin-stemmed from ground level; dense rounded crown.
H1(c)	Hawthorn	2	5	Suppressed specimen.
H1(d)	Hawthorn	4	10	Previously coppiced to ground level and two regenerating stems – one vertical and one leaning to north. Misshapen crown biased to north.
H1(e)	Hawthorn	4	15	Single stemmed tree with dense crown biased to south.
H1(f)	Hawthorn	2	5	Suppressed specimen..
H1(g)	Hawthorn	4	10	Single stemmed tree with dense rounded crown.
H1(h)	Hawthorn	4	4x10	Multi-stemmed tree with dense rounded crown.
H1(i)	Hawthorn	4	15	Single stemmed tree with dense rounded crown. (Note: A line of similar hedge plants extend northwards from this specimen at 1.5-2m spacing.)
H1(j)	Elder	2	10	Partially collapsed; stem leans heavily to east and crown is touching ground in places.
G2	Hornbeam, Beech, Cherry, Rowan, Field Maple, Ash, Willow, Whitebeam, Hawthorn, Blackthorn	>8	>20	Area of recently-planted trees and shrubs on mound. Varying quality specimens but future potential as a group.
T3	Silver Birch	12	30	Single stemmed tree with narrow delicate crown.
T4	Silver Birch	10	25	Single stemmed tree with narrow delicate crown.

APPENDIX B

BS 5837:2012 (ABSTRACT)

6.2 Barriers and ground protection

6.2.1 General

6.2.1.1 All trees that are being retained on site should be protected by barriers and/or ground protection (see 5.5) before any materials or machinery are brought onto the site, and before any demolition, development or stripping of soil commences. Where all activity can be excluded from the RPA, vertical barriers should be erected to create a construction exclusion zone. Where, due to site constraints, construction activity cannot be fully or permanently excluded in this manner from all or part of a tree's RPA, appropriate ground protection should be installed (see 6.2.3).

6.2.1.2 Areas of retained structural planting, or designated for new structural planting, should be similarly protected, based on the extent of the soft landscaping shown on the approved drawings.

6.2.1.3 The protected area should be regarded as sacrosanct, and, once installed, barriers and ground protection should not be removed or altered without prior recommendation by the project arboriculturist and, where necessary, approval from the local planning authority.

6.2.1.4 Where required, pre-development tree work may be undertaken before the installation of tree protection measures, with the agreement of the project arboriculturist or local planning authority if appropriate (see also 8.8.1).

6.2.1.5 It should be confirmed by the project arboriculturist that the barriers and ground protection have been correctly set out on site, prior to the commencement of any other operations.

6.2.2 Barriers

6.2.2.1 Barriers should be fit for the purpose of excluding construction activity and appropriate to the degree and proximity of work taking place around the retained tree(s). Barriers should be maintained to ensure that they remain rigid and complete.

6.2.2.2 The default specification should consist of a vertical and horizontal scaffold framework, well braced to resist impacts, as illustrated in Figure 2. The vertical tubes should be spaced at a maximum interval of 3 m and driven securely into the ground. Onto this framework, welded mesh panels should be securely fixed. Care should be exercised when locating the vertical poles to avoid underground services and, in the case of the bracing poles, also to avoid contact with structural roots. If the presence of underground services precludes the use of driven poles, an alternative specification should be prepared in conjunction with the project arboriculturist that provides an equal level of protection. Such alternatives could include the attachment of the panels to a free-standing scaffold support framework.

6.2.2.3 Where the site circumstances and associated risk of damaging incursion into the RPA do not necessitate the default level of protection, an alternative specification should be prepared by the project arboriculturist and, where relevant, agreed with the local planning authority. For example, 2 m tall welded mesh panels on rubber or concrete feet might provide an adequate level of protection from cars, vans, pedestrians and manually operated plant. In such cases, the fence panels should be joined together using a minimum of two anti-tamper couplers, installed so that they can only be removed from inside the fence. The distance between the fence couplers should be at least 1 m and should be uniform throughout the fence. The panels should be supported on the inner side by stabilizer 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 stabilizer struts should be mounted on a block tray (Figure 3b).

NOTE 1 Examples of configurations for steel mesh perimeter fencing systems are given in BS 1722-18.

NOTE 2 It might be feasible on some sites to use temporary site office buildings as components of the tree protection barriers, provided these can be installed and removed without damaging the retained trees or their rooting environment.

6.2.2.4 All-weather notices should be attached to the barrier with words such as: "CONSTRUCTION EXCLUSION ZONE – NO ACCESS".

Figure 2 Default specification for protective barrier

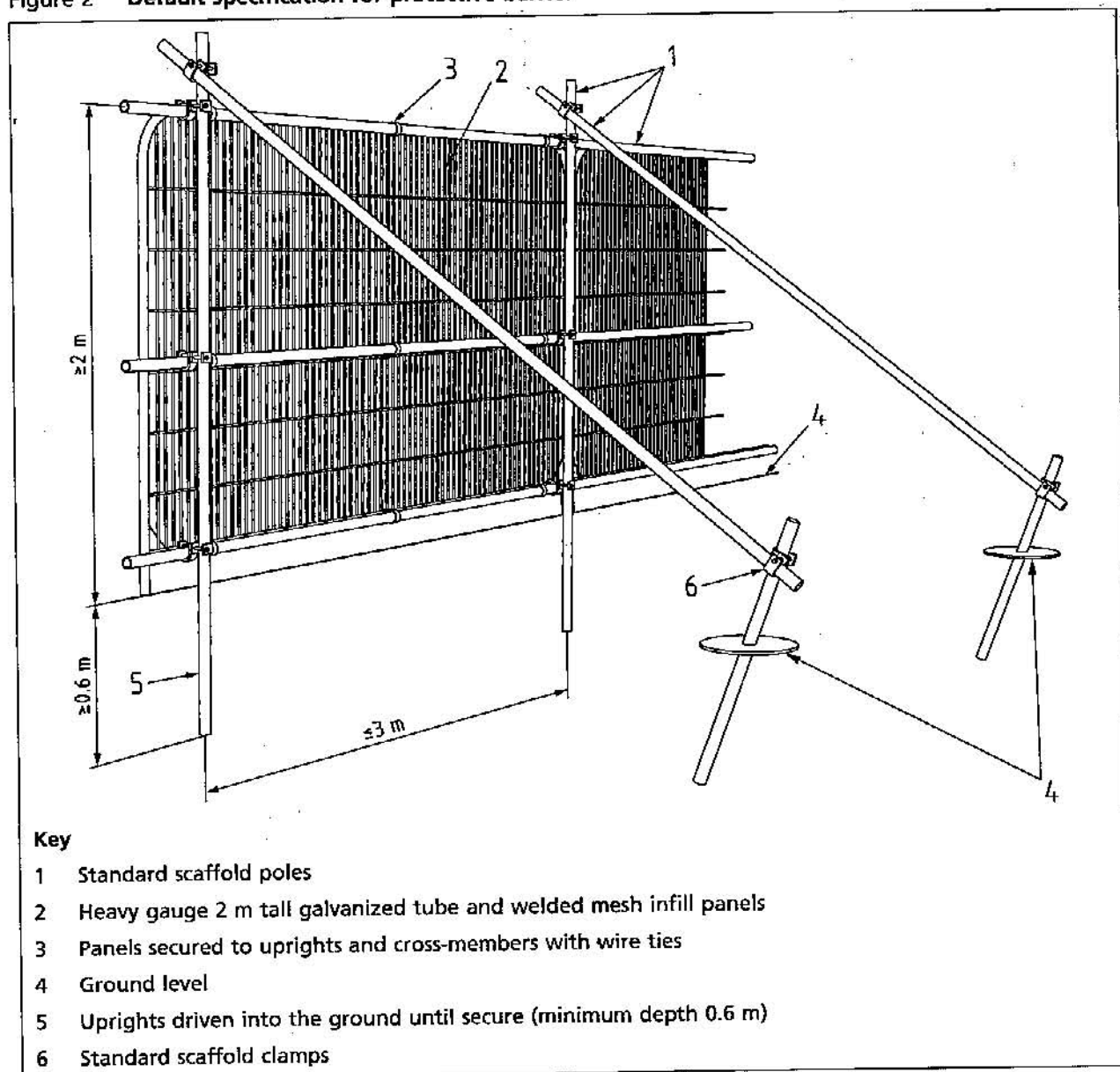
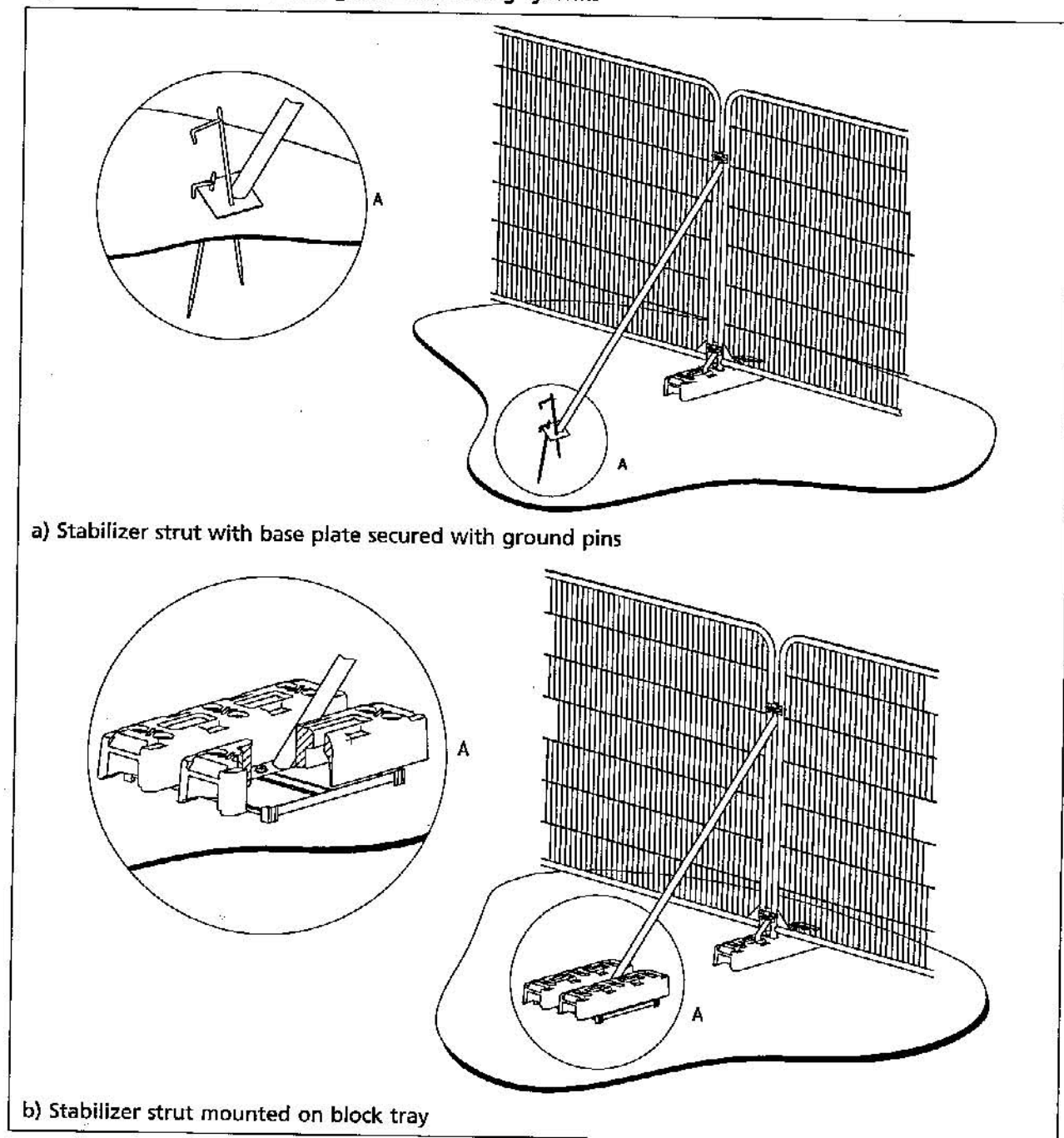


Figure 3 Examples of above-ground stabilizing systems



6.2.3 Ground protection during demolition and construction

6.2.3.1 Where construction working space or temporary construction access is justified within the RPA, this should be facilitated by a set-back in the alignment of the tree protection barrier. In such areas, suitable existing hard surfacing that is not proposed for re-use as part of the finished design should be retained to act as temporary ground protection during construction, rather than being removed during demolition. The suitability of such surfacing for this purpose should be evaluated by the project arboriculturist and an engineer as appropriate.

6.2.3.2 Where the set-back of the tree protection barrier would expose unmade ground to construction damage, new temporary ground protection should be installed as part of the implementation of physical tree protection measures prior to work starting on site.

6.2.3.3 New temporary ground protection should be capable of supporting any traffic entering or using the site without being distorted or causing compaction of underlying soil.

NOTE The ground protection might comprise one of the following:

- a) *for pedestrian movements only, a single thickness of scaffold boards placed either on top of a driven scaffold frame, so as to form a suspended walkway, or on top of a compression-resistant layer (e.g. 100 mm depth of woodchip), laid onto a geotextile membrane;*
- b) *for pedestrian-operated plant up to a gross weight of 2 t, proprietary, inter-linked ground protection boards placed on top of a compression-resistant layer (e.g. 150 mm depth of woodchip), laid onto a geotextile membrane;*
- c) *for wheeled or tracked construction traffic exceeding 2 t gross weight, an alternative system (e.g. proprietary systems or pre-cast reinforced concrete slabs) to an engineering specification designed in conjunction with arboricultural advice, to accommodate the likely loading to which it will be subjected.*

6.2.3.4 The locations of and design for temporary ground protection should be shown on the tree protection plan and detailed within the arboricultural method statement (see 6.1).

6.2.3.5 In all cases, the objective should be to avoid compaction of the soil, which can arise from the single passage of a heavy vehicle, especially in wet conditions, so that tree root functions remain unimpaired.

6.2.4 Additional precautions outside the exclusion zone

6.2.4.1 Planning of site operations should take sufficient account of wide loads, tall loads and plant with booms, jibs and counterweights (including drilling rigs), in order that they can operate without coming into contact with retained trees. Such contact can result in serious damage to the trees and might make their safe retention impossible. Consequently, any transit or traverse of plant in proximity to trees should be conducted under the supervision of a banksman, to ensure that adequate clearance from trees is maintained at all times. Access facilitation pruning should be undertaken where necessary to maintain this clearance.

NOTE In some instances, local planning authority consent for pruning might be required.

6.2.4.2 Fires on sites should be avoided if possible. Where they are unavoidable, they should not be lit in a position where heat could affect foliage or branches. The potential size of a fire and the wind direction should be taken into account when determining its location, and it should be attended at all times until safe enough to leave.

NOTE Local environmental health authorities might have specific restrictions.

6.2.4.3 Any materials whose accidental spillage would cause damage to a tree should be stored and handled well away from the outer edge of its RPA.

6.3 Site monitoring

Wherever trees on or adjacent to a site have been identified within the tree protection plan for protective measures, there should be an auditable system of arboricultural site monitoring. This should extend to arboricultural supervision whenever construction and development activity is to take place within or adjacent to any RPA.

NOTE Existing planning regulations include the provision for local authorities to enforce planning requirements. The project arboriculturist appointed by the developer can help monitor site activity, but enforcement is the responsibility of the local authority.

APPENDIX C

AAIS PRACTICE NOTE
APN 12:2007

Trees in focus

Practical Care and Management

Driveways Close to Trees

Derek Patch and Martin Dobson

Arboricultural Advisory and Information Service

Summary

The majority of tree roots are in the upper metre of soil and they may spread outwards in any direction a distance equal to the tree's height. Any disturbance of the ground within the root spread of a tree can damage its roots which may severely injure the tree. Damage to roots will interrupt the supply of water necessary to keep the tree alive and may cause decline in vigour, dieback or even death of the tree. It may also be made unstable and pose a threat to the safety of people and property. Development of a site, including construction of access routes, driveways and parking areas can result in substantial root severance of trees. Techniques for the construction of access drives, which may avoid or lessen the damage caused to trees, are described.

Trees: A Cause of Conflict

Development may sometimes be hampered or prevented because of the presence of trees on a site. Local authorities and residents may wish to see trees preserved whilst developers seek permission to build close to them - often ignorant about the damage this may cause to trees. Even developments such as access drives and parking areas can threaten existing nearby trees.

Traditional driveway construction (excavation and backfilling with a compactable load-bearing sub-base material) can seriously damage tree roots. Such damage occurs because of a lack of understanding that roots mainly grow outwards from a tree's trunk, near to the soil surface, rather than downwards. Where there is a significant risk of damage to trees by root severance during construction, local planning authorities may sometimes refuse permission for installation of an

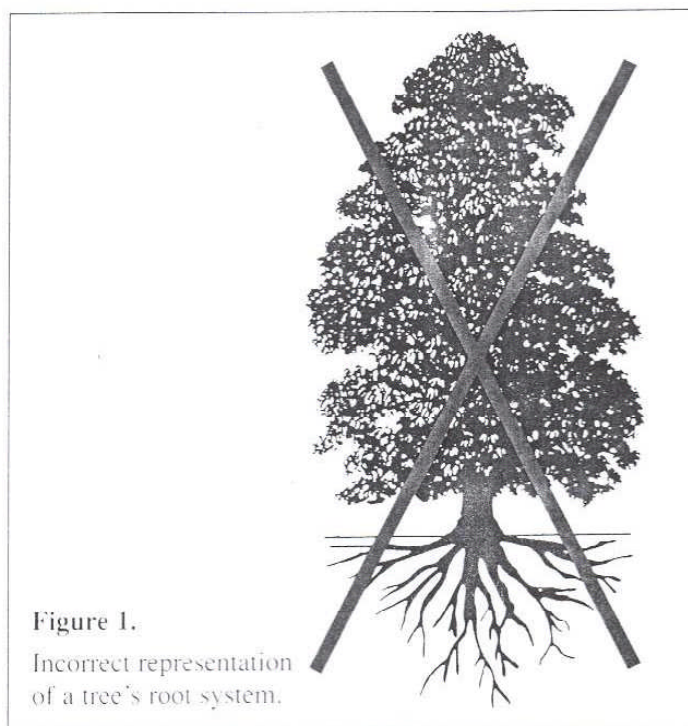


Figure 1.
Incorrect representation
of a tree's root system.

access driveway or parking area close to trees - especially if the trees are subjects of Tree Preservation Orders.

However, if root severance can be avoided during construction, development may be more easily accepted. A technique is described below which should reduce the risk of significant damage to tree roots while enabling access and parking for light vehicles to be constructed close to trees.

Where Do Tree Roots Grow?

Survival of a tree depends on its roots being able to absorb enough water from the soil to sustain the foliage (an estimated 1,000 litres per day in summer for a fully grown forest tree in a rural area) and on developing a strong root system capable of keeping the tree upright in autumn and winter gales. To achieve this the tree's roots must exploit a very large volume of soil. However, the assumption that these requirements are met by a system of roots

growing predominantly downwards (Figure 1), and that anchoring roots are very thick and descend into the soil for many metres (like the base of a lamp post) is incorrect. In reality tree roots:

- grow more or less parallel with the soil surface rather than vertically (Figure 2)
- are usually relatively shallow - most of a tree's roots are in the upper metre of soil
- usually radiate outwards from a tree for a distance equivalent to at least the tree's height (which for a mature tree may be 20 m or more)
- can be 30 cm or more in diameter at the base of the trunk
- sub-divide and taper rapidly as they extend out from the trunk
- are only 2-3 cm in diameter, and often much less at 3-4 m distance from the trunk

The small woody roots (those less than 3 cm diameter) taper very little but they may spread out for long distances. Smaller, non-woody roots (sometimes described as white, feeder, fibrous or absorbing roots) grow outwards and usually upwards from the woody roots and subdivide to exploit the better aerated surface soil. They (and the fungi associated with them - called mycorrhizas) are the principal absorbers of moisture and nutrients.

Most roots (both thick and fine) are situated close to the soil surface, forming a shallow layer less than

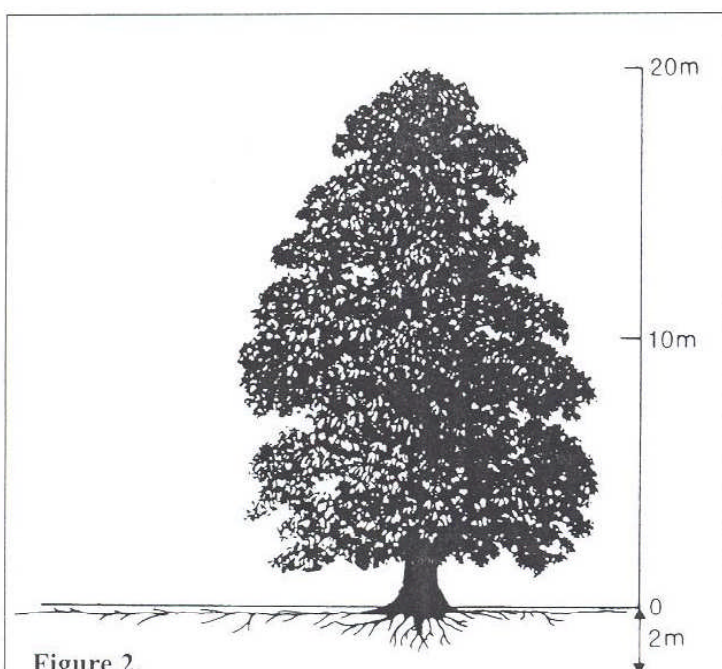


Figure 2.

Trees have a relatively shallow but wide spreading root system.

1 m deep, but some small roots (usually only a few mm in diameter) may reach 2 m or more deep.

Roots and the Soil

Roots are living and like all plants and animals must have oxygen to survive. Without oxygen roots are unable to function properly or grow, and when they are starved of oxygen for prolonged periods, they die.

Both oxygen and water are held in the pores between the soil particles. Where the pores are large (e.g. in coarse or sandy soils) the soil will generally be freely draining and well-aerated, but where the pores are small (e.g. in heavy clays or soils which have been compacted) they may be full of water and have a poor supply of oxygen.

Most trees that have been growing undisturbed on a site for many years will have developed an extensive root system with the roots growing where the soil conditions are most favourable. There will be a balance between the development of the crown (which demands water) and the roots (which supply it). Any sudden alteration of the soil conditions within the tree's rooting area (a circle of radius equal to the tree's height) will therefore upset this balance. For example, repeated passages of machinery will 'squeeze' the soil closing up the pores (causing compaction - especially in the upper levels) and so reducing the amount of oxygen available to roots and preventing them from growing through the soil. Placing soil or other materials over the roots of a tree will impede air movement into and out of the soil and consequently reduce the availability of oxygen to the roots. The effect on the tree is usually progressive shoot and branch dieback until a new balance has been reached between the reduced capacity of the damaged root system to absorb water and the demands of the leaves. If damage is progressive or so severe that such a balance cannot be achieved, the tree will ultimately die.

Excavations - even stripping the topsoil - within the rooting area will sever a large number of roots. Once the excavation is a metre deep nearly all of the roots growing in that direction will have been cut. The tree may then either be unable to absorb sufficient water to sustain the foliage and dieback will occur, or anchorage will be so reduced that the tree is unsafe and has to be severely pruned or felled. The closer these operations are to the trunk the greater the damage inflicted on the tree. Nevertheless,

healthy trees are generally able to withstand the loss of some roots (a maximum of about 20% of the rooting area) without noticeable adverse effects.

Development Near Trees

British Standard BS 5837: 1991 *Guide for Trees in Relation to Construction* recommends that on construction sites the soil around a tree should be left undisturbed for a distance from the trunk equivalent to the branch spread, or half the tree's height, whichever is the greater (Figure 3). This is a *protected zone* in which any activity which could damage roots should be avoided. This often means that construction within this area is prohibited.

However, if the guidelines set out below are followed, installation of access driveways and parking for light vehicles should be possible without significant permanent damage to adjacent trees. Nevertheless, expert arboricultural advice may need to be sought to determine whether this technique is suitable for particular sites. In addition, the health of trees should be professionally assessed, as old and declining trees may be less able to withstand even this sympathetic construction.

Engineering Needs

Roads, footpaths and parking areas must be built with a firm, stable base. Engineers usually achieve this by excavating the soil to a depth of about 0.5 m, compacting the base if necessary, and backfilling with an inert material that can be compacted. The edges of the excavation act as the supporting formation and kerbs or edging boards may be used to retain the surface material. However, such

excavations will sever roots and should be avoided, particularly within the protected zone.

It should be possible to construct an adequately supported access drive, and retain trees, if a no-dig system of construction is adopted within the protected zone.

Protection and Construction

For the roots to be retained undamaged there must be no excavation, soil stripping or site grading within the protected zone - in other words, **NO DIGGING**. This means that construction will have to be above the existing ground level. Passage of vehicles across the unprotected soil surface must also be avoided, especially when the soil is wet, as this will cause breakage of surface roots, soil compaction and consequently reduced soil aeration. Surviving roots may not be able to grow through the compacted soil. It is essential therefore that all but the immediate area of the development is protected from construction operations by fencing as recommended in BS 5837.

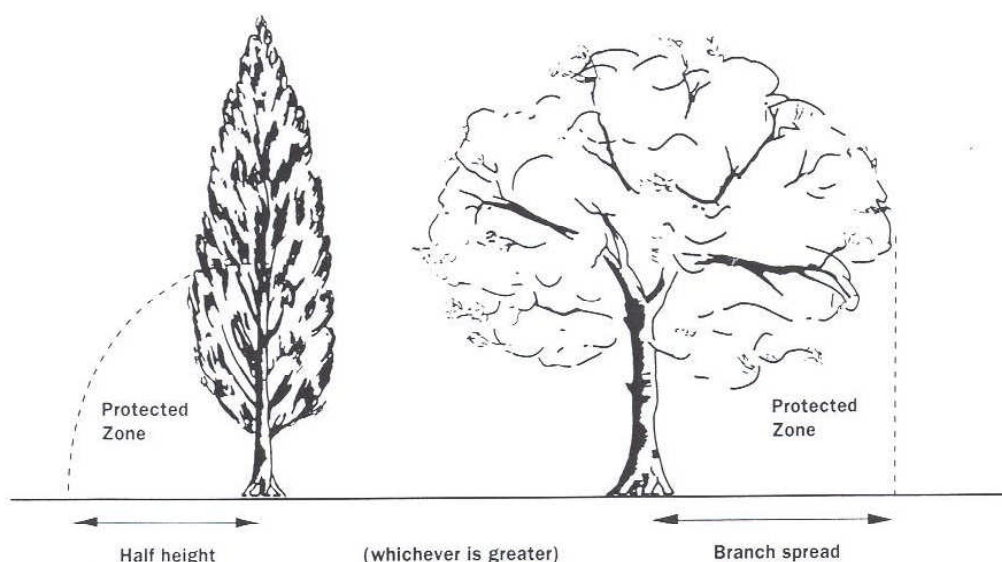
No-Dig Construction

Successful retention of trees even when adopting a no-dig method, particularly within the protected zone, depends upon the condition of the tree(s), which should be assessed by a qualified arboriculturist, and on adherence to three simple rules:

- roots must not be severed
- soil must not be compacted
- oxygen must be able to diffuse into the soil beneath the engineered surface

Figure 3.

Distance from a tree which constitutes the protected zone in which roots should be protected - i.e. no digging.



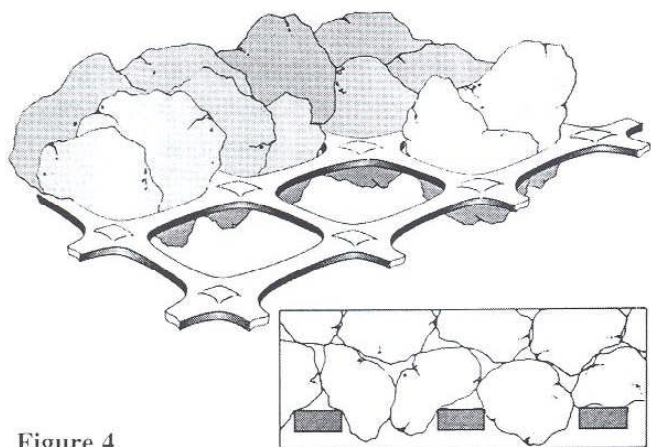


Figure 4.

The mechanism of interlock between aggregate and geogrid.

Meeting the Engineering Needs

Damage to trees can only be avoided if the construction embraces the above principles and (within the protected zone) is no more than 4m wide.

Construction should incorporate two main components: a *geogrid* and an *aggregate sub-base*. Geogrids are high tensile strength synthetic grids designed to support roads on soft ground. When placed on the geogrid, appropriate granular sub-base material penetrates the mesh, but is unable to pass through it, forming a positive interlock (Figure 4). This interlock between aggregate and geogrid provides a reinforced platform and efficient load

spread into the underlying ground. A suitable geogrid*/aggregate combination will prevent rutting of the ground beneath the construction.

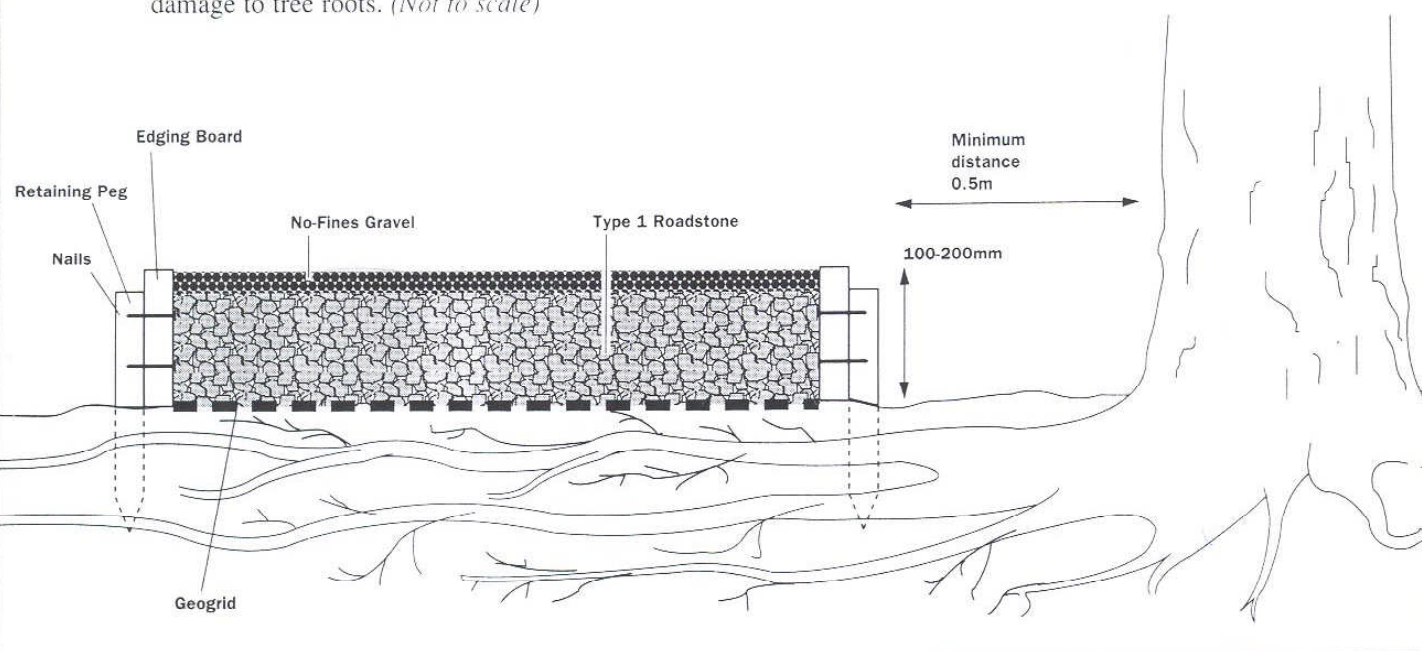
Granular sub-base material Type 1, as specified by the Department of Transport (Department of Transport, 1991; clause 803) is the recommended aggregate. This has a relatively low fines content which means that even when it is compacted it should be freely draining and will allow oxygen to diffuse into the soil.

For site-specific prescriptions and materials specifications advice may be sought from a qualified geotechnical or civil engineer.

Putting the Principles into Practice

- Construction should ideally be undertaken between May and October when the ground is driest and least prone to compaction, and in dry weather.
- Kill ground vegetation using a translocated herbicide such as glyphosate†. Gather up the dead organic material - this will prevent the build up of anaerobic conditions beneath the construction which might otherwise occur as vegetation begins to decompose.
- Remove major protrusions such as rocks and tree or shrub stumps (stumps should be ground out rather than excavated to minimise soil disturbance).

Figure 5. Diagram of a 'no-dig' method for constructing access drives and parking near to trees in order to minimise damage to tree roots. (Not to scale)



* For example, Tensar SS30, manufactured by Netlon Ltd, New Wellington Street, Blackburn, BB2 4PJ, UK.

† Care must be taken to select a herbicide which does not damage the roots of desirable vegetation that may be in the treated area. Always read the product label before use.

- Fill major hollows with sharp sand.
- Lay the geogrid directly onto the soil over the whole of the driveway/parking area.
- If necessary, construct an edging with boards attached to pegs driven into the ground through the geogrid. Pegs should be long enough to give sufficient support for the construction.
- Cover the geogrid with a minimum of 100 mm of aggregate. This should not be tipped straight onto the geogrid, but should be placed at one end and then pushed onto the grid so that machinery moves on the spread sub-base, not directly on the geogrid and not on the ground either side of it.
- Compact the sub-base to ensure binding with the geogrid and to minimise future rutting.
- Place the final surface. In the main it is likely that this will consist of gravel or tarmac, although paving slabs and brick pavements may be acceptable provided they are dry bedded on the sub-base and the joints are not sealed with grout, to allow for infiltration of water and gaseous diffusion*.

Final Remarks

Adoption of this no-dig method for creating access and parking for light vehicles near to trees which avoids root severance should help to overcome concerns about possible adverse effects on trees.

Nevertheless, successful retention of a tree will depend upon strict adherence to the above principles, and upon the tree's condition - indicative of its ability to withstand changes in its rooting environment. This should be assessed by a qualified arboriculturist.

References and Further Reading

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* For drives less than 3m width the finished surface may be constructed of a less permeable material such as asphalt/or reinforced mass concrete.