

The English Tree Company Ltd

Arboricultural Consultant's Report

The Meadows, off Blanche Lane, South Mimms
Potters Bar, Herts. EN6 3PB

Tel: 01707 654069 Fax: 01707 649814

Tree Protection Methodology

at

BAM ESTATES

Cannon Hill & Finchley Road

Ref: 1125

17 February 2017

1.0 INTRODUCTION

- 1.1 At the request of the landowner, BAM Estates, I have been commissioned to provide tree protection methodology in relation to proposed construction at the property relating to the demolition of existing boundary walls and the construction of new walls with railings.

I confirm that I am a Fellow of the Arboricultural Association, and have attained the Royal Forestry Society Professional Diploma in Arboriculture.

I have over 30 years of experience in tree inspection and arboricultural reporting. I devised and managed basic and advanced tree inspection courses whilst section head of Arboriculture at Capel Manor College. I have provided expert witness services and given expert evidence in Planning Inquiries, Magistrates, County and the High Courts. I was a “significant contributor” to the publication “Lonsdale L (1999) Principles of Tree Hazard Assessment and Management HMSO”.

I have been supplied with a copy of plans of the proposals which are included within this report.

- 1.2 The purpose of this report is to assess any impact on the trees within the property and neighbour’s (Council) trees based in the context of the current proposals.

Tree Constraints– trees on and adjacent to the site will have below ground constraints, represented by the Root Protection area (RPA) and this area is defined within the tables and plans within the appendices, and the above ground constraints the trees pose by virtue of their size and position. In addition, design details of the proposed physical means of protection are given.

Tree Protection – this includes the following information:

The precise location for the erection of protective barriers and any other relevant physical protection for trees.

I have been supplied with the following information:

- Fenton Associates Drawing MM 2017/1 indicating the new wall proposals
- Site Plan dated 2016 indicating land ownership and wall locations (BAM Estates)
- Site history from residents association member (verbal)
- Camden Council comments and requirements for tree protection methodology

2. Proposals

The proposal is to demolish the existing boundary walls that were installed after the removal of the original wall and railings during WW2. The plan supplied indicates the extent and locations of the walls that are to be replaced.

There are trees (mainly recently planted Cherries) within the land belonging to BAM Estates, these have been planted in raised soil at or near pavement level between the boundary and the drop to the light wells. The more recently planted specimens could easily be temporarily lifted and then subsequently transplanted if their locations conflict with the proposals. Others would tolerate a degree of root pruning, however the extent of rooting will not be known until excavations occur. Some crown pruning to the older trees (trees A & B) may be required to compensate for any subsequent root loss.

There are street trees that require consideration regarding the proposals. The early mature and mature trees are likely to have extended roots as far as the boundary wall, however the recently planted trees are unlikely to have extended roots much beyond the extent of the planting pits.

There is likely to be a clay subsoil, with the pavement slabs having been laid on a more permeable substrate. There is only minor disruption of the paving in limited areas near trees, extensive rooting is not apparent from observations above ground level. It is likely that excavations have occurred within the pavement in the past and root severance would have occurred in relation to such activities, this would further limit the root spread from trees towards the wall.

The proposed removal of the existing boundary wall and its replacement with a deeper founded wall with railings is unlikely to cause damage to the street trees if the precautions described later in this report are followed.

The hedges and shrubs within the BAM land are to be removed to facilitate the proposals and then replaced, mainly with privet hedging.

2.1 Constraints

There are constraints in respect of the locations of trees and the extent of their roots. Roots will normally be deflected by the foundations of a wall and the majority of roots occur in the upper 600mm of soil. Precautions are required to protect the tree root systems beneath the pavement but roots that have extended beneath the wall and into BAM land are trespassing.

The new foundations for the reconstruction of the wall are to be at least 750mm below ground level, deeper than where most roots are likely to extend.

The risks to the nearby trees are as follows:

1. Direct impact damage to stems by machinery, hand tools, barrows
2. Damage to roots by compaction, spillage and severance relating to works, storage
3. Damage to crowns by machinery and deliveries, skip lorries etc.

These risks can be mitigated by the following measures, as described in detail within this report:

1. Stems to be protected by physical barriers prior to demolition and construction activities and throughout the period of works for each section of wall
2. Ground protection and methodology to avoid compaction, spillage, and root severance beneath the pavement surface throughout the period of works for each section of wall
3. All deliveries/collections to be in locations between the trees, as far as possible from each tree.

Tree Root Protection

There is a direct proportional relationship between a tree's roots and its aerial parts and since the majority of tree roots occur in the upper 600mm of the soil horizon this balance can easily be upset by even shallow excavation and/or soil compaction. Root damage can result in instability or premature decline which may not manifest for a number of years, often long after development has been completed.

Tree Roots are dynamic structures which constantly 'seek' new soil horizons which are conducive to their function and development; new roots can develop in these horizons whilst roots in less productive horizons might be aborted.

Consequently, in general terms, trees will tolerate some construction related root disturbance if:

- The tree has sufficient vigour/vitality to sustain the disturbance in the short term,
- Any disturbance is kept to a minimum and special techniques are adopted to ensure such

Access for demolition, collection of debris, delivery of new materials, cement mixing and wall construction activities has been considered and ground protection to avoid root damage will be required on the pavement adjacent the boundary wall as each section is worked on.

Some of the trees have canopies that overhang the wall, however this growth is at a sufficient height to avoid any damage and crown protection for these trees is not required. Care must be taken to avoid impact damage by delivery hoists etc. and the tree protection methodology within this report describes how damage to the trees can be avoided.

2.2 Legal Considerations

Highways Act 1980

Under the Highways Act 1990 The Highways Authority has the following rights in respect of trees and verges:

Section 96, Powers of highway and local authorities to plant trees, lay out grass verges, etc.

(1) Subject to the provisions of this section, a highway authority may, in a highway maintainable at the public expense by them, plant trees and shrubs and lay out grass verges, and may erect and maintain guards or fences and otherwise do anything expedient for the maintenance or protection of trees, shrubs and grass verges planted or laid out, whether or not by them, in such a highway.

Section 96, Subsections (6) and (7) of the 1980 Highways Act.

(6) No tree, shrub, grass verge, guard or fence shall be planted, laid out or erected under this section, or, if planted, laid out or erected under this section, allowed to remain, in such a situation as to hinder the reasonable use of the highway by any person entitled to use it, or so as to be a nuisance or injurious to the owner or occupier of premises adjacent to the highway.

(7) If damage is caused to the property of any person by anything done in exercise of the powers conferred by this section, that person is entitled, subject to subsection (8) below, to recover compensation for it from the authority or parish or community council by whom the powers were exercised.

(8) A person is not entitled to compensation under subsection (7) above if his negligence caused the damage; and if his negligence contributed to the damage the compensation under that subsection shall be reduced accordingly.

Based on the above, it is clear that any roots that have trespassed into BAM land can be severed, providing the tree is not destabilised by such action. As there is only minor cracking to limited parts of the boundary wall, it is unlikely that any of the trees rely on trespassing roots for anchorage.

The mechanical forces that can be exerted by tree roots arise from either: their expansion due to growth; or loading, for example by wind acting on the tree crown, the forces of which are then transmitted through the tree stem to the roots and on into the soil or other objects with which the roots are in contact, e.g. drains, etc.

The forces that can be generated due to tree growth have been reviewed and quantified by R D MacLeod and W J Cram ("Forces Exerted by Tree Roots", Arboriculture Research and Information Note 134/96/EXT, Arboricultural Advisory and Information Service, 1996), however there is currently no evidence that extensive rooting has occurred beneath the boundary walls

Common Law and Tree Roots.

Regarding tree works concerning boundary or neighbouring trees, there are clear precedents in Case Law which illustrate the neighbour's and tree owners rights and responsibilities.

Briefly the relevant references are as follows;

"If branches grow over the property line, the owner of the adjoining property may cut them back to the boundary line" (**Lonsdale v Nelson, 1823**)

“The adjoining owner may not enter the property on which the tree is growing without first giving notice to the tree owner” (**Lemmon v Webb, 1894**)

“Branches that are removed are the property of the owner of the tree and should be offered back unconverted.” (**Mills v Brooker, 1919**)

Also, it would normally be considered that any damage caused as a direct or indirect result of any pruning would be the responsibility of the tree pruner rather than the tree owner, in such circumstances.

It should also be noted that any damage caused to your own property by neighbouring trees would be the responsibility of the tree owner, particularly if they had already been put on notice that their trees are potentially hazardous or a nuisance.

(See: **Rylands v Fletcher, 1868**; **Smith v Giddy, 1904** and **Leakey v National Trust, 1978.**)

As with tree branches that encroach over a boundary, tree roots may be severed at the point at which they enter the property boundary (providing there is no Tree Preservation Order and the trees are not within a Conservation Area, in which cases an application to the Council must be made and consent granted prior to any root cutting taking place). Full Planning Consent effectively over-rides this legislation as such matters would have been considered by the Planning Authority prior to consent being granted.

The root cutting must not harm or destabilise the tree, therefore professional advice should be obtained by any property owner before considering root cutting.

NOTE: it is an offence to carry out work on a tree protected by a Tree Preservation Order (TPO), without written permission from the local planning authority (LPA). If you wish to cut a tree protected by a TPO, (or if the tree is within a Conservation Area) you should first consult with your Local Planning Authority tree officer before undertaking any work. However, in this case the issues regarding trees are being dealt with as part of a planning application and a separate application under any TPO or Conservation Area would appear to be unnecessary.

Nuisance

Private Nuisance is defined as “The interference with the plaintiff’s use or enjoyment of land or disturbance of some legal interest over land”.

Encroaching roots from neighbouring property may cause damage to house foundations, drains, or lightly loaded structures such as walls, drives and garages. However, if roots cause damage to built structures, an action in nuisance for an injunction and damages against the owner or occupier will depend on the extent to which damage was foreseeable.

If no damage has occurred, the encroaching roots and overhanging branches could be (in theory) cut back to the boundary. **Note** however: pruning branches, and more especially roots, back to the boundary may render the tree dangerous in the future. As such, the neighbour whose garden was being encroached may be liable for any damage that occurs as a result of such pruning.

In relation to any damage to a neighbouring building, In respect of legal precedents, I would refer you to the following:

Butler -v- Standard Telephones & Cables (1940): If tree roots trespass and cause a nuisance then the owner of the trees will be liable for any damages.

Davey -v- Harrow Corporation (1957): It is no defence to claim that the trees were selfsown.

Patterson -v- Humberside County Council (1995): It is no defence to claim that the damaged structure was in poor repair or had design faults by modern standards.

Further to this, '**Sturges - vs. – Bridgeman**' (1879) set the precedent that "*you cannot come to a nuisance*", therefore the owner of the tree has a duty to abate the nuisance at their own cost.

Solloway –v- Hampshire Country Council established the following to be necessary for legal liability to arise:

- (1) Tree roots must have encroached onto the Plaintiff's land;
- (2) Damage to the Plaintiff's property must have resulted from that encroachment. This requires the roots to be in such proximity to the foundations that moisture extraction causes clay shrinkage with consequent foundation movements.
- (3) The Defendant ought to have foreseen the risk of damage resulting from encroachment.

The argument in this regard has been reinforced by the House of Lords' recent decision in **Delaware Mansions Ltd – v – City of Westminster Council**. Their Lordships considered that the actionable nuisance was not the consequential damage to the buildings but the continuing damage to the land: its loadbearing qualities were being impaired by encroaching roots that were dehydrating the clay and inhibiting rehydration.

In the case of the subject highways trees, any root trespass should be dealt with under the statute and common law precedents listed above.

Other Legal Considerations

Legislation relating to works beside a highway footpath / pavement (This list is not exhaustive)

- Highways Act 1980

Under the Highways Act 1980, you must protect the public from building work, maintain free passage for pedestrians and vehicles around their work sites, and get permission from the Highway Authority before the public highway can be excavated or built on. You must get licences; in particular, permission for excavations, hoardings, storage areas, scaffolding, gantries and skips on the public highway.

- Traffic Signs Manual Chapter 8
 - Health, Safety and Welfare at Work Act 1974 and any Statutory Instruments
 - New Roads and Street Works Act 1991
 - Control of Pollution Act 1974 - Under Section 60 of the COPA, local authorities have powers to control noise (and vibration) on or from building sites.
-
- Town & Country Planning Act

Planning permission does not include highway consent. Before carrying out any work affecting the public highway (road/pavement), you must contact:

Highways Management
Culture and Environment Directorate
Town Hall
Argyle Street
London WC1H 8EQ
Tel: 020 7974 6956
Fax: 020 7974 5585
Email: highwaysmanagement@camden.gov.uk

Before any machinery, compressor, cement mixer, tar pot or other machinery can be stored or used on the highway, you must get permission from Highways Management Team.

A temporary traffic restriction is a legal order made by the Council under the Road Traffic (Temporary Restrictions) Act 1991.

Temporary traffic restrictions could involve closing a road to traffic, amending the parking restrictions in a road, making a road which is normally one way open to two way traffic flow or imposing a one way restriction on a road that normally accommodates two way traffic flow. Restrictions can be placed on a road, cycle lane or footpath.

The Network Management Team process all applications for temporary traffic restrictions in Camden except those that are required on a Red Route.

Note: Finchley Road is a Red Route and Transport for London would be the point of contact for temporary highway footpath diversions / closures and Parking Permissions.

Site Access

Parking Permission – As there are Residents Only parking bays parking permission is intended to be used by builders and other trades people engaged in work for local residents who require an on-street parking space for their vehicle.

Parking bay suspension - A parking bay suspension is used when works need to be carried out or when the bay is needed for access. Normal parking controls may be suspended for a period of up to 6 months – (a temporary traffic order is required for longer periods).

Trees

All the trees that are either on or surrounding the site must be fully protected according to the guidelines and specifications set out in BS5837: 2012: Trees in relation to construction. You must take steps to protect the trees before work starts on the site.

3. Tree Protection

All the trees would have roots within the BS5837 defined Root Protection Areas (nominally 12x stem diameter, apart from very recently planted specimens). Therefore all the trees will require precautions to protect them from damage during demolition and construction activities relating to the wall and railings.

Tree roots can be deflected by a wall and its foundations. Due to the respective distances of the subject trees from the wall, even the most mature specimens are unlikely to have roots of this size extend as far as the wall.

Spread of roots, (1.5 times tree height for example), roots can be deflected by the wall and foundations, some roots may have grown deeper than the normal 600mm depth and extended beneath the wall as a legal “trespass”, under common law a landowner has the right to sever these roots where they enter the land.

Regarding the stability of trees following root pruning beyond property boundary, there is a low risk of instability as the many of the trees have been pruned in the past and are a fraction of their species’ normal height (e.g. up to 25% or normal height for the Plane trees)

Physical protection for the stems of all but the young trees within the pavement will be required. Wooden hoarding 1.8m high will be attached to a wooden frame with no attachments to the trees around the stems of all but the young trees to protect the stems from direct impact damage. Young trees should have stem protection by means of, for example, bamboo bundles attached around the stem by cable ties (see image in the Appendices).

Temporary ground protection is to be capable of supporting any traffic entering or using the site without being distorted or causing compaction of underlying soil.

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 2t, 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 2t 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.

Approved excavations within the Root Protection Zone of those trees to be retained are to be excavated by hand-held tools and preferably by compressed air soil displacement in accordance with clause 7.2 of BS 5837:2012.

- a) Exposed roots are to be immediately wrapped or covered to prevent desiccation and to protect them from rapid temperature changes. Any wrapping are to be removed prior to backfilling, which is to take place as soon as possible.
- b) Roots smaller than 25 mm diameter may be pruned back, making a clean cut with a suitable sharp tool (e.g. bypass secateurs or handsaw), except where they occur in clumps.
- c) Roots occurring in clumps or of 25 mm diameter and over are to be severed only following consultation with an arboriculturist.
- d) Prior to backfilling, retained roots are to be surrounded with topsoil or uncompacted sharp sand (builders' sand is not to be used), or other loose inert granular fill.
- e) Soils or other suitable material are then to be replaced. This material should be free of contaminants and other foreign objects potentially injurious to tree roots and approved by the project arboriculturist.

3.1 Ground Protection see Appendix 2 Fig.1

To be installed adjacent areas of wall that are being demolished / constructed and beneath cement mixers, generators and other machinery that is liable to leakage or spillage. Ground protection to be installed over a sufficient area to prevent spillage of, for example, cement mixer washings from permeating through the pavement surface to tree roots below.

Demolition – ideally “top down, pull back” demolition of the existing walls working from within the land of the mansion blocks. The wall can be demolished from the pavement side down to pavement level and then the majority of excavations for the demolition of the wall beneath pavement level would be undertaken from within the site, minimising activities on the pavement side. If the paving slabs adjacent the wall need to be removed to allow demolition & construction to occur, then the roots should be protected as described in Appendix 2 Fig.3 with a deep enough layer of sand to cover the exposed roots prior to the installation of the temporary top surface of scaffold boards or wood/ply hoarding sheets.

Trees must be protected from damage during the demolition / construction activities.

This means the exclusion of **all** of the following:

NO:

Storage of bricks, sand, aggregate or other materials including debris, rubbish and supplies.

Storage of oil/derv/petrol tanks paints or solvents;

Location of site offices, mess rooms, sanitation etc;

Mixing of cement, mortar or other adhesives;

Fires within 10m of any total exclusion zone;

Parking of machines, vehicles or site traffic;

Storage of topsoil or any other soils, sands etc.

Within (or near as appropriate) these exclusion zones, under any circumstances.

Tree Protection Methodology

Development Stage	Action	
Stage 1	<p>Prior to any demolition/construction works:</p> <p>Remove hedges and shrubs within the properties as required for access to demolish and construct the walls.</p> <p>Install any pavement diversions and signage</p> <p>Temporary ground protection for pedestrian construction access (barrows etc.) Install ground protection to BS5837 S 6.2.3.3. (see further details below). Appendix 2 Fig. 1</p> <p>Temporary ground protection is to be capable of supporting any traffic entering or using the site without being distorted or causing compaction of underlying soil.</p> <p>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;</p> <p>b) for pedestrian-operated plant up to a gross weight of 2t, 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;</p> <p>c) for wheeled or tracked construction traffic exceeding 2t 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.</p> <p>Proprietary ground protection is available (E.G. "Ground Guards") see Appendix 2.</p> <p>Stem Protection</p> <p>Install wooden hoarding 1.8m high attached to a wooden frame with no attachments to the trees around the stems of all but the young trees to protect the stems from direct impact damage. Appendix 2 Fig.2</p> <p>The trees requiring hoarding stem protection are trees numbered 1,2,3,5,10,11,12,13,14,15,16,17,18,19,22,24,25,27,28,29,31,32.</p> <p>Young trees require a lesser degree of stem protection such as bamboo or wooden slats supported by cable ties to encompass the stems. Appendix 2 Fig.3</p>	

	<p>Stationing and Storage.</p> <p>Maintain all tree protection measures during demolition activities.</p> <ol style="list-style-type: none"> 1. Within root protection areas, stationing of temporary cabins on unprotected ground will require the prior placement of load-spreading slabs or timber baulks (railway sleepers or similar) beneath the legs or corner supports of the cabin, as appropriate. 2. Where the stationing of cabins or parking of vehicles or mechanical plant (other than private cars or light vans) is to take place within 2m of any tree trunk, the lower trunk of the tree concerned shall be protected by means of cladding with 1.2m chestnut paling fencing, securely tied or fixed around the tree's base. 3. Storage of building materials (bricks, slabs, stone) on unprotected ground within root protection areas will be on wooden pallets only. Bulk materials (soil, gravel, sand etc.) if stored loose, must be stored on minimum 20mm exterior grade plywood sheets, or must be bagged and stored on sheets or on pallets. No storage of loose materials directly on unprotected ground will be permitted within root protection areas. 4. No storage of petrol, diesel or any liquid or non-liquid phytotoxic materials shall take place within root protection areas. <p>All deliveries and collections of materials to be made as far away as possible from trees, using gaps so that conflicts with the trees are avoided.</p>	
Stage 2	<p>Demolition Phase:</p> <p>Undertake demolition/excavations within the site whilst undertaking precautions to protect the trees and maintain the temporary ground protection and physical stem protection in the areas of demolition activities.</p> <p>No vehicular traffic to pass within the RPAs of the trees without appropriate ground protection being installed.</p> <p>Retain existing hard surfaces to act as ground protection for construction access.</p> <p>NO:</p> <p>Storage of bricks, sand, aggregate or other materials including debris, rubbish and supplies.</p> <p>Storage of oil/derv/petrol tanks paints or solvents;</p> <p>Location of site offices, mess rooms, sanitation etc;</p> <p>Mixing of cement, mortar or other adhesives;</p> <p>Fires within 10m of any total exclusion zone;</p>	

	<p>Parking of machines, vehicles or site traffic;</p> <p>Storage of topsoil or any other soils, sands etc.</p> <p>Within (or near as appropriate) these exclusion zones</p>	
Stage 3	<p>Construction Phase</p> <p>Undertake construction of the new wall whilst undertaking precautions to protect the trees. Care to be taken to avoid damage. Observe tree protection measures during the entire process until completion of the new walls. If required, install vertical root barrier between new wall foundations and edge of pavement.</p> <p>NO:</p> <p>Storage of bricks, sand, aggregate or other materials including debris, rubbish and supplies.</p> <p>Storage of oil/derv/petrol tanks paints or solvents;</p> <p>Location of site offices, mess rooms, sanitation etc;</p> <p>Mixing of cement, mortar or other adhesives;</p> <p>Fires within 10m of any total exclusion zone;</p> <p>Parking of machines, vehicles or site traffic;</p> <p>Storage of topsoil or any other soils, sands etc.</p> <p>Within (or near as appropriate) these exclusion zones under any circumstances.</p>	
Stage 4	<p>Landscape Works</p> <p>Plant new hedges / shrubs within front gardens</p> <p>Reinstate any damaged paving in footpath.</p>	

Site Supervision

Special considerations:

The techniques described for the retention of the trees are the most up-to-date available and are, for the most part, in accordance with or in advance of the requirements of the British Standard BS 5837 (2012), *"Trees in Relation to Design, Demolition & Construction - Recommendations"*.

A suitably qualified arboriculturalist should be appointed to oversee development works and undertake liaison with the council and the developer and contractors during the construction phase in order to ensure compliance with these guidelines.

Note: Failure to fulfil planning conditions or breaches of statutory legislation can lead to delays due to "stop" notices" and can lead to the prosecution of contractors and company directors.

Adequate site supervision can protect the developer from delays, wasted expense and criminal prosecution.

Site Supervision Timetable

Visit	Description	Date(s)
1	Site visit to check installation of tree and ground protection measures for first section of demolition of existing walls. Determine any root spreads into the property/under the existing wall and root treatments/pruning.	TBC
2	Interim or ad-hoc visits if any issues are encountered	TBC
3	Periodic checks on tree protection and root treatments as required. (likely to be at two-weekly intervals)	TBC
4	Final sign-off of tree protection.	TBC

Contacts:

Council	Regeneration and Planning Supporting Communities London Borough of Camden Telephone: 020 7974 5961 Fax: 020 7974 1680 Web: camden.gov.uk 2th Floor 5 Pancras Square London N1C 4AG
Arborists	The English Garden Company Ltd The English Tree Company The Meadows, Off Blanche Lane South Mimms Hertfordshire EN6 3PB Tel: 01707 645069 Fax: 01707 649814 www.englishgardencompany.co.uk
Architects	Fenton Associates 246 - 248 Great Portland Street London W1W 5QY Tel: 020 3214 5000 Fax: 020 3214 5001 email: info@fentonassociates.co.uk
Contractor	TBC

Appendix 1

TREE SURVEY DATA

Tree – As numbered on plan

Species – Common Name

Age Class –Young, Semi Mature, early Mature, Mature, Over-mature

Young tree; <1/3 of normal life expectancy

Early Mature aged tree; between 1/3 & 2/3 normal life expectancy

Mature tree; has attained optimum stature

Over Mature tree; declining

DBH – Diameter at breast height in millimetres

Distance to wall – Measured in metres from base of stem

BS Cat – BS5837 Category of tree quality

Note: For the purpose of this exercise, the BS5837 (2012) defined Root Protection Areas for the trees have not been included as all the trees would have roots within that defined area (apart from very recently planted specimens). Therefore all the trees will require precautions to protect them from damage during demolition and construction activities relating to the wall and railings. The BS5837 defined Root protection Area basically refers to an exclusion zone within 12x the stem diameter at breast height of all trees.

Trees within footpath

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
1	Birch	Semi Mature	270	2.4	B1
Comments	Stem wound roadside				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
2	Plane	Mature	750	1.8	B1
Comments	Recently pollarded at 10-11m				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
3	Plane	Young	40	2.1	A2
Comments	Recently planted				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
4	Maple	Young	40	2.1	A2
Comments	Recently planted				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
5	Plane	Mature	600	2	B1
Comments	Recently pollarded at 7-8m, fungal bracket at base on building side of stem, crack to boundary wall in line with tree.				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
6	Birch	Young	70	2.2	C1
Comments	Dieback and basal epicormic growth indicates decline, stem decay apparent, loose bark with soft wood beneath				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
7	Birch	Young	70	2.1	A2
Comments	Recently planted				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
8	Plane	Young	50	2.3	A2
Comments	Recently planted				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
9	Plane	Young	50	2.2	A2
Comments	Recently planted				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
10	Birch	Semi mature	110	2.1	B1
Comments	Inspection cover between tree and wall				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
11	Plane	Mature	720	N/A	B1
Comments	Located remote from wall to be replaced.				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
12	Plane	Mature	300	4.2 (railings)	B1
Comments	Evidence of past pruning, located to front of 489 Finchley Road				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
13	Maple	Early mature	350	1.9 (railings)	C1
Comments	Girdling root, declining with retained dead foliage				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
14	Plane	Mature	400	1.9 (railings)	B1
Comments	Re-grown from pollarding at 10-11m, adjacent paving lifted and cracked.				

Tree	Species	Age Class	DBH (mm)	Distance to wall	BS Category
------	---------	-----------	----------	------------------	-------------

				(m)	
15	Maple	Semi mature	220	2 (railings)	B1
Comments	Twin stemmed from 2m				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
16	Maple	Early mature	220	2.1 (railings)	B1
Comments	Pollarded at 8-9m, paving disrupted nearby				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
17	Maple	Early mature	420	2.2 (railings)	B1
Comments	Pollarded at 8-9m, twin stemmed from 4.2m				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
18	Plane	Mature	750	2.4 (railings)	B1
Comments	Pollarded at 10m				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
19	Birch	Early mature	260	2.2	B1
Comments	Evidence of past pruning.				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
20	Plane	Young	50	2.2	B1
Comments	Recently planted				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
21	Plane	Young	50	2.2	B1
Comments	Recently planted				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
-------------	----------------	------------------	-----------------	-----------------------------	--------------------

22	Birch	Early mature	220	2.2	C1
Comments	Pollarded at 9-10m, declining, basal epicormic growth				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
23	Plane	Young	50	2.4	A2
Comments	Recently planted				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
24	Plane	Mature	870	2	B1
Comments	Recently pollarded at 12-13m, wall cracks in line with tree.				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
25	Birch	Early mature	320	2.2	C1
Comments	Twin stemmed at 3.5m, evidence of past pruning				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
26	Plane	Young	50	2.2	A2
Comments	Recently planted				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
27	Birch	Early mature	380	2.1	C1
Comments	Basal damage and stem wounds, evidence of past pruning				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
28	Birch	Early mature	350	2.2	B1
Comments	Stem wounds, evidence of past pruning				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
29	Birch	Early mature	240	2.1	B1
Comments	Wide crown, fork at 2.2m, evidence of past pruning				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
30	Plane	Young	40	2.1	B1
Comments	Recently planted				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
31	Birch	Early mature	260	2.1	B1
Comments	Evidence of past pruning.				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
32	Plane	Mature	820	1.8	B1
Comments	Recently pollarded at 8-10m, roots exposed beside kerb down slope, wall cracks in line with tree.				

Trees within gardens

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
A	Flowering Plum	Mature	230	0.9	C1
Comments	Stem cankers and weak forks				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
B	Birch	Early mature	200	1.3	B1
Comments	Weak rootzone in limited soil volume				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
C	Flowering Plum	Early mature	250	0.7	A2
Comments	No significant defects				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
D	Cherry	Young	30	1.4	A2
Comments	Recently planted				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
E	Cherry	Young	80	1.6	A2
Comments	Recently planted				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
F	Cherry	Young	70	1.8	A2
Comments	Recently planted				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
G	Cherry	Young	50	2.2	A2
Comments	Recently planted				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
H	Cherry	Young	50	1.9	A2
Comments	Recently planted				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
I	Cherry	Young	50	1.7	A2
Comments	Recently planted				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
J	Cherry	Young	50	1.6	A2
Comments	Recently planted				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
K	Cherry	Young	50	1.8	A2
Comments	Recently planted				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
L	Cherry	Young	50	2.4	A2
Comments	Recently planted				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
M	Cherry	Young	50	1.4	A2
Comments	Recently planted				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
N	Cherry	Young	50	1.9	A2
Comments	Recently planted				

Tree	Species	Age Class	DBH (mm)	Distance to wall (m)	BS Category
O	Cherry	Young	50	1.6	A2
Comments	Recently planted.				

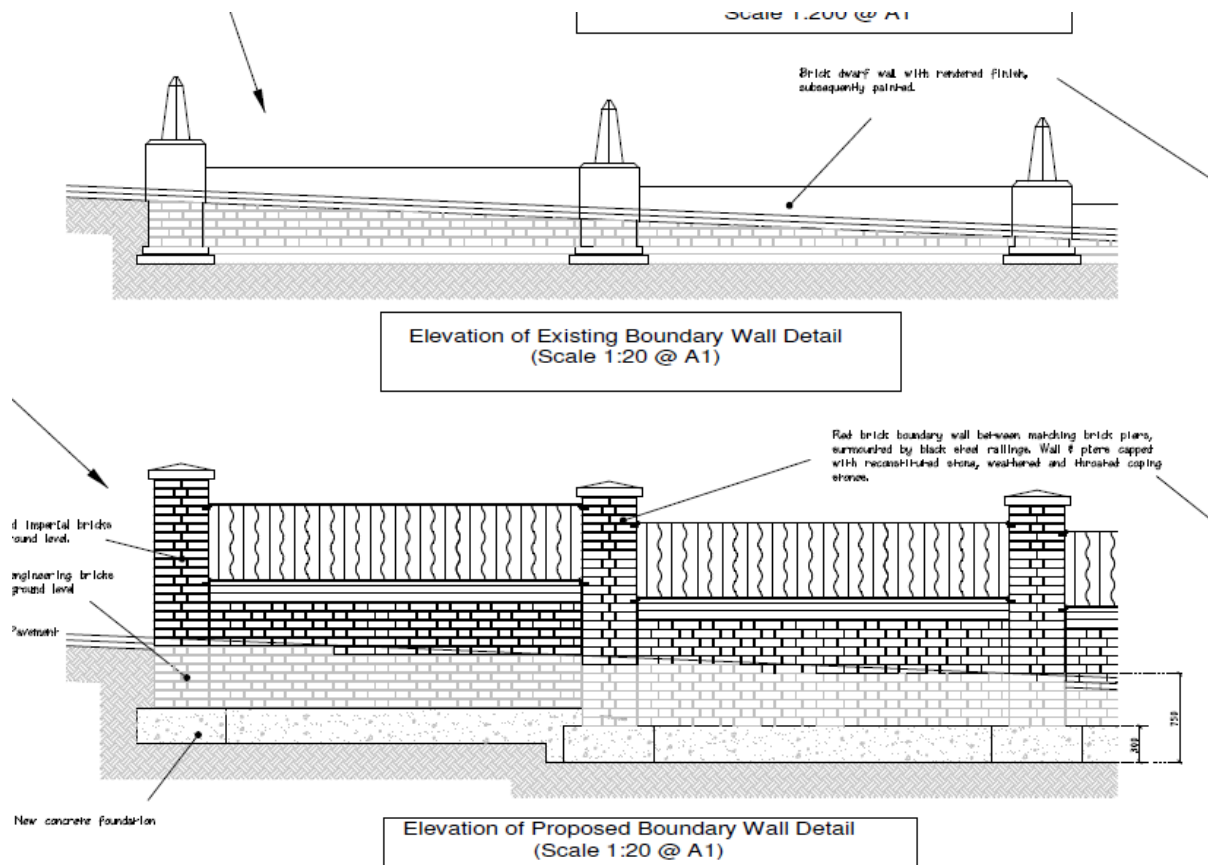
Table 1 Cascade chart for tree quality assessment

Category and definition	Criteria (including subcategories where appropriate)	Identification on plan
Trees unsuitable for retention (see Note)		
Category U Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years	<ul style="list-style-type: none"> Trees that have a serious, irreparable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees (e.g. where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning) Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline Trees infected with pathogens of significance to the health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality <p><i>NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve; see 4.5.7.</i></p>	See Table 2
Trees to be considered for retention		
Category A Trees of high quality with an estimated remaining life expectancy of at least 40 years	<p>1 Mainly arboricultural qualities</p> <p>Trees that are particularly good examples of their species, especially if rare or unusual; or those that are essential components of groups or formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue)</p> <p>2 Mainly landscape qualities</p> <p>Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features</p> <p>3 Mainly cultural values, including conservation</p> <p>Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture)</p>	See Table 2
Category B Trees of moderate quality with an estimated remaining life expectancy of at least 20 years	<p>Trees that might be included in category A, but are downgraded because of impaired condition (e.g. presence of significant though remediable defects, including unsympathetic past management and storm damage), such that they are unlikely to be suitable for retention for beyond 40 years; or trees lacking the special quality necessary to merit the category A designation</p> <p>Trees present in numbers, usually growing as groups or woodlands, such that they attract a higher collective rating than they might as individuals; or trees occurring as collectives but situated so as to make little visual contribution to the wider locality</p> <p>Trees with material conservation or other cultural value</p>	See Table 2
Category C Trees of low quality with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150 mm	<p>Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories</p> <p>Trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value; and/or trees offering low or only temporary/transient landscape benefits</p> <p>Trees with no material conservation or other cultural value</p>	See Table 2

Appendix 2

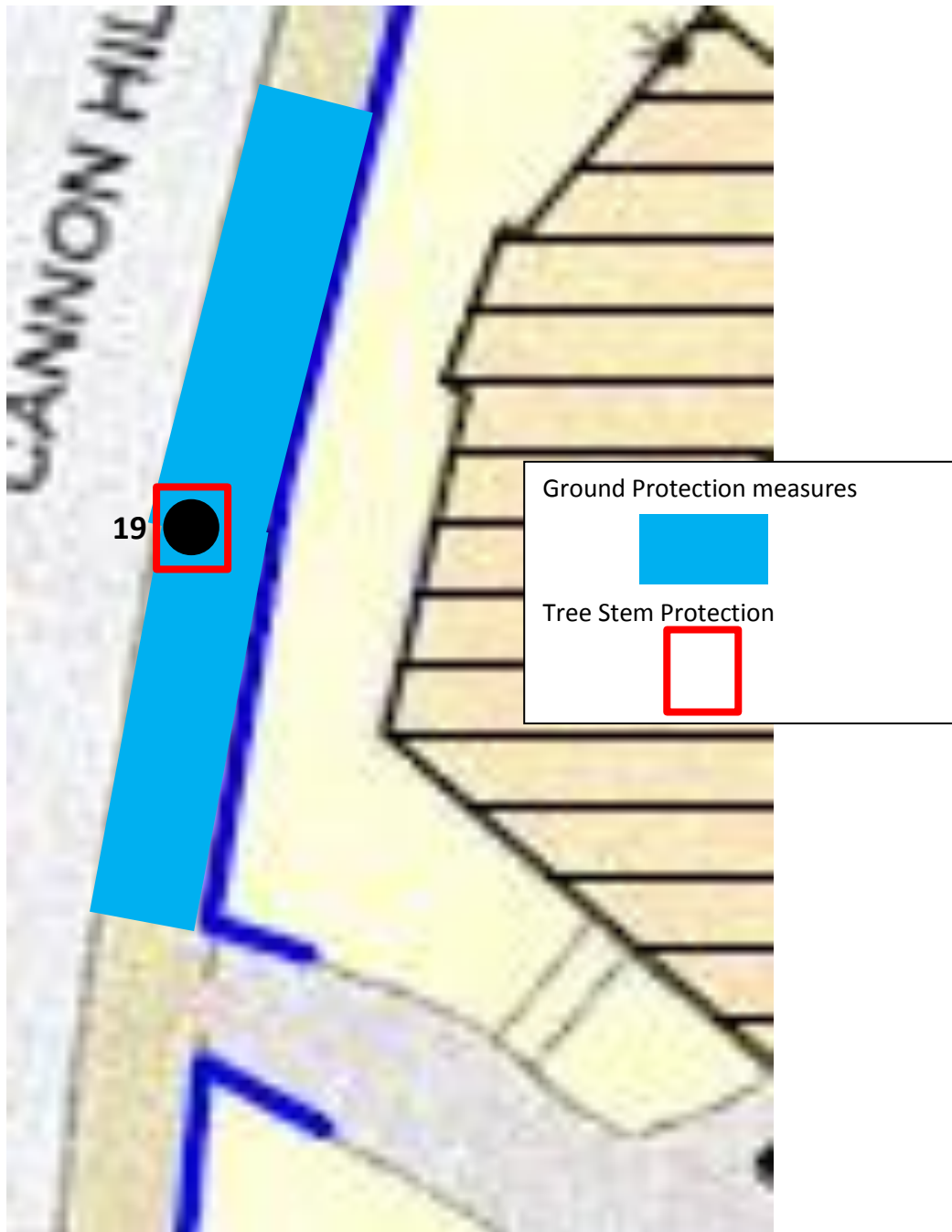
METHODS AND MATERIALS

Construction Proposals



Proposed new foundations, excavations to be a minimum of 750mm below pavement level.

.Example of Tree Protection for highways trees





Existing brick and rendered dwarf walls introduced to most parts of the Estate after the original railings were removed during WWII.



New brick boundary walls and railings, similar to those originally in place, before they were removed during WWII. These have been introduced to various parts of the Estate, along Cannon Hill over the past ten years.

Examples of tree root spread adjacent walls



Examples of tree roots deflected by a wall and its foundations. Due to the respective distances of the subject trees from the wall, even the most mature specimens are unlikely to have roots of this size extend as far as the wall. The root spreads are more likely to extend as in the image below, with roots deflected sideways and downward by the wall and its foundations.

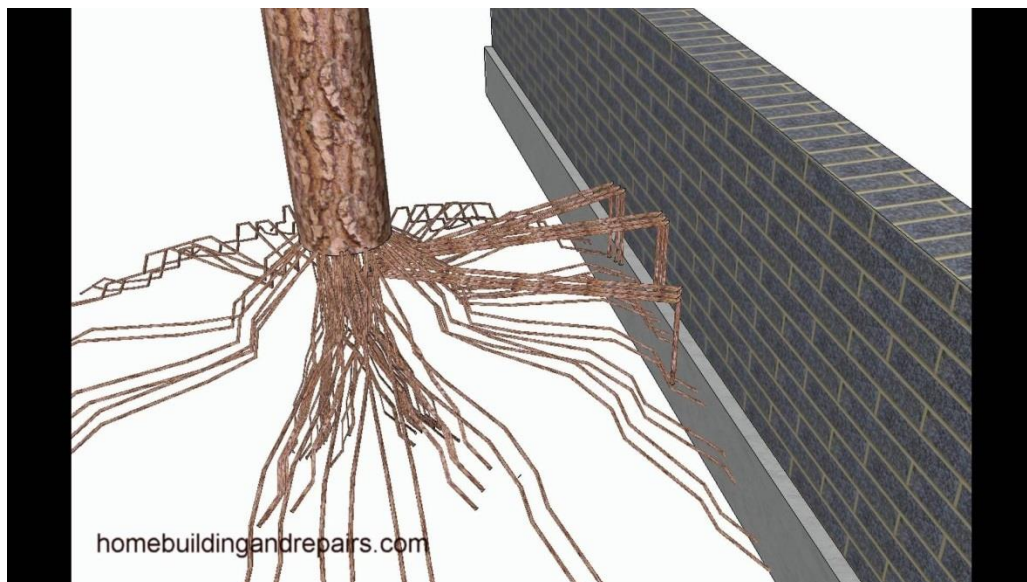


Fig. 1 Ground Protection adjacent boundary wall to be placed over pavement

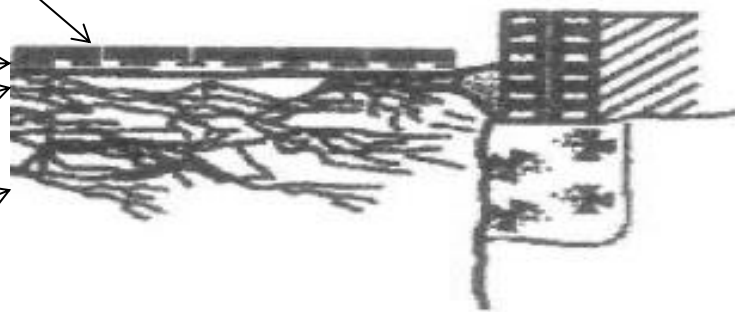
Butt jointed scaffold planks to 1.5m width or 1.5m wide wooden/ply hoarding minimum 220mm thickness

Compressible layer e.g 100mm sharp sand

Geotextile sheet

Tree Roots beneath pavement

Ground undisturbed and protected by geotextile fabric, and side butting scaffold boards on a compressible layer



Alternatively, use a proprietary interlocking ground protection sheets such as below:



Fig 2 Example of wooden hoarding protecting tree stems from damage



Fig3. Temporary stem protection for young trees

Ground Guards

Ground-Guards

GreenTek

Ground protection and site access system

Ground-Guards are an "Instant Roadway" system of lightweight plastic panels, capable of taking vehicles of up to 50 tonnes weight.

Introduction The GreenTek Ground-Guards have become established as a proven alternative to the conventional method of stripping and stoning-up access roads on construction sites. By using this roadway system, ground damage and reinstatement work are minimised. This is an ideal method to use where there are tree roots under the surface as it avoids the need for excavation.

Applications The Ground-Guards site access system is designed to form temporary roads, car parks and footpaths. It is suitable for protecting grassed areas from erosion and rutting during construction projects and for the protection of tree roots where site access routes need to pass close to trees.

Green issues Ground-Guards are a very environmentally friendly product. They:

- Protect sensitive ground from erosion
- Are made from 100% recycled plastic, which is itself fully recyclable
- Provide a sustainable alternative to using up sheets of plywood for ground protection purposes

DESCRIPTION

The Ground-Guards site access system consists of virtually indestructible, lightweight plastic boards which clip together without tools to quickly form temporary roads, car parks and footpaths. They are made from 100% HDPE recycled plastic and are guaranteed unbreakable by vehicles of up to 50 tonnes.

These track mats can be easily moved around the site by just two people, without the need for a crane lorry.

Ground-Guard mats are available with a choice of different tread patterns. The "Standard" tread pattern creates a track way with a high level of traction for vehicles, whilst the "walk" pattern is designed for pedestrian walkways and event flooring.

Ground-Guards are also available with one side smooth which is ideal for trenching and utilities work as it enables the spoil to be easily backfilled into the trench afterwards. When being used to protect tree roots, a base layer of Ground-Guard sheets should be covered by a cushioning layer of 150 mm of wood chippings. The Ground Guard



trackway is then laid over the top of this in the normal way.

Dimensions Ground-Guard mats are available in sizes ranging from 1829 mm (6') x 610 mm (2') to 2438 mm (8') x 1219 mm (4'), with a choice of different tread patterns.

SUPPLY

GreenTek both supplies and hires Ground-Guards direct to construction companies nationally.

SERVICES

Ground Guards provides technical advice to specifiers and contractors. Brochures and samples are available on request.



Ground-Guard trackways may be used with a cushion of woodchips to protect tree roots

50 mm x 50 mm x 500 mm
timber stakes

200 mm x 50 mm timber rails

Geotextile membrane

Base layer of Ground-Guards

Wood chippings

Ground-Guard trackway



Greensward Engineering
GreenTek
Manor Farm
Otley Road
Adel
Lancs
LS16 7AL

Tel: +44 (0)113 267 6000
Fax: +44 (0)113 267 2222
Email: info@ground-guards.co.uk
Website:
www.ground-guards.co.uk
Contact: Phil Ellis
rps no: 21329



Signage for Tree Protection Areas

Root Barriers

Root barriers are used to deflect tree roots deeper into the soil where they will cause less damage to walks and curbs. Barriers are also essential with the installation of soil cells. In these cases, the ideal soil installed for trees to use, is usually several inches below the paved surface and it is necessary for the roots to grow deeply.,

The use of a barrier will be different for each location based on soil type and depth, species, slope, moisture, and other soil environmental factors. Each time a root is cut, a barrier should be placed to deflect the growth of new regenerated roots from the cut end. Otherwise, the roots will grow right back to the areas that they were cut from.

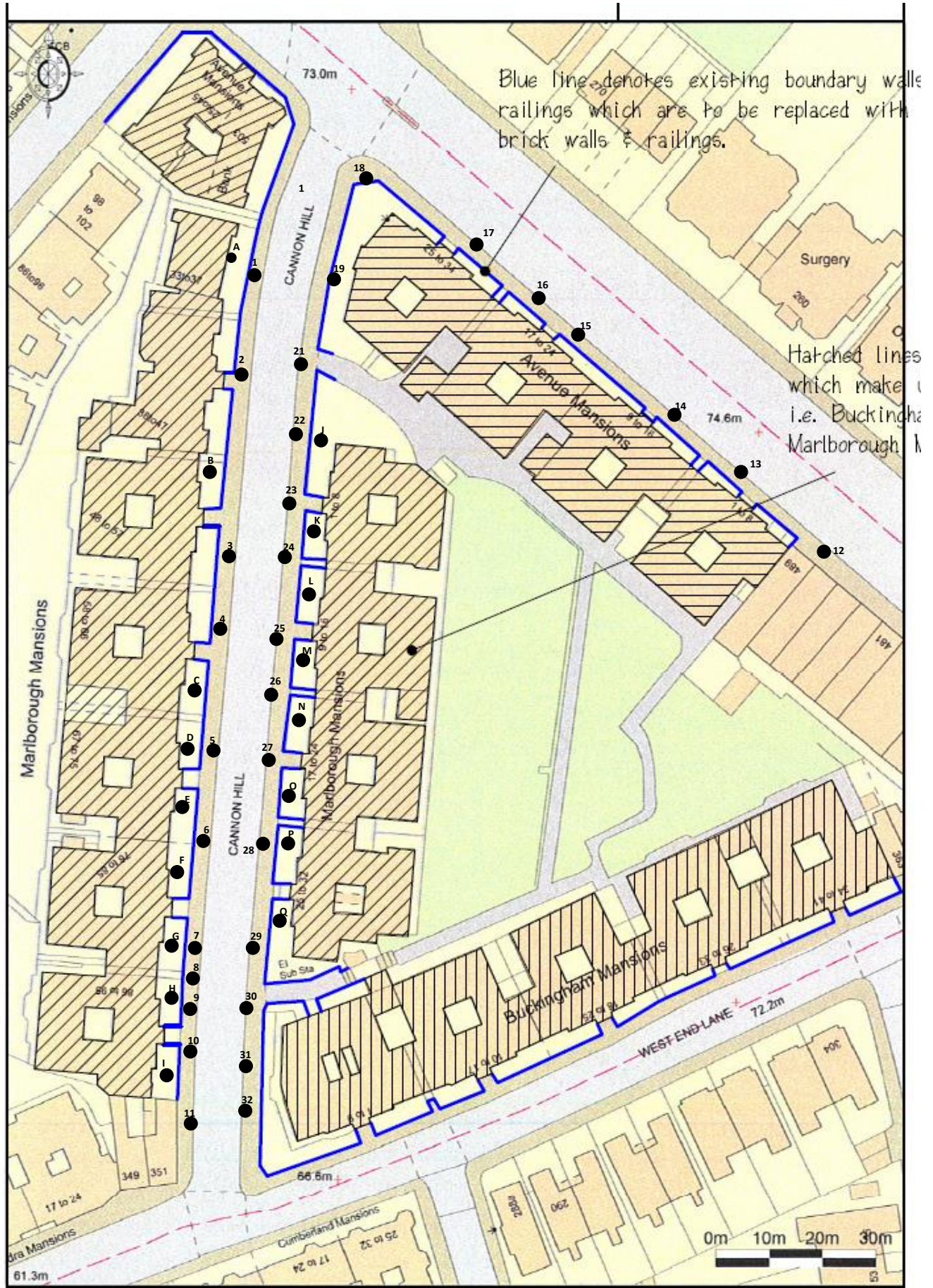
There are some basic types of barriers used to direct roots away from curbs and sidewalks and to encourage the roots to grow down and away from the surface hardscape.

Physical Barriers

One material is polyethylene, which is considered to have superior durability. Another plastic material is polypropylene, which is harder, and still another is polystyrene, which is an older product that will break down when exposed to the ultraviolet light. All of these plastic barriers are built as panels and are connected together with interlocking couplings, locking strips or are held together with bonding glue. These barriers are placed into planting holes around the tree or in a linear fashion along one side of a planting between 12 – 24 inches (30 – 60 cm) deep. The vertical ribbed panel is the most commonly purchased barrier.



Appendix 3 - Tree Location Plan



REFERENCES

Anon, British Standard BS 5837 (2012), *"Trees in Relation to Construction, Recommendations"*, British Standards Institute. London.

Anon, British Standard BS 3998 (2010), *"Tree Work Recommendations"*, British Standards Institute. London.

Biddle, P.G. (1998), *"Tree Root damage to Buildings"*, Willowmead Publishing Ltd. 2 Volumes, 376 & 299 pp.

Cutler, D.F., (1995), *"Interactions of Tree Roots & Buildings"*, In Watson, G., and Neely, D., (Eds.), *Proceedings of Trees & Buildings Conference*, Lisle, Illinois, ISA Publications.

Cutler, D.F. and I.B.K. Richardson, (1989). *Tree Roots and Buildings*. Longman Scientific and technical. 2nd Ed. 71pp.

Gasson, P.E. and Cutler, D.F. (1990) Tree root plate morphology. *Arboric. Journal* 14, 193-264

Highways Act 1980 (HMSO)

Lonsdale L (1999) *Principles of Tree Hazard Assessment and Management* HMSO

Mattheck, C. and Breloer, H. (1994) *The body language of trees*. HMSO 240 pp

Matheny N.P & J.R.Clarke, (1994), *"A photographic guide to the Evaluation of hazard trees in urban areas"*, 2nd Edition, International Society of Arboriculture.

National House Building Council, (1992) **Building near trees**. NHBC Standards, Chapter 4.2

Phillps D.H. and Burdekin, D.A. (1982) *Diseases of forest and ornamental trees*. Macmillan Press. 435 pp

Shigo, A.L., (1986) *A new tree biology*. Shigo & trees, associates, Durham, New Hampshire, USA, 595 pp

Shigo, A.L. (1991) *Modern Arboriculture*. Shigo & trees, associates. Durham, New Hampshire, USA , 490pp

Town & Country Planning Act Part VIII (1990). Issued by the Secretary of State for the Environment, HMSO.