ARBORICULTURAL CONSULTANTS

ARBORICULTURAL IMPACT ASSESSMENT

&

METHOD STATEMENT

AT

9 THURLOW ROAD

HAMPSTEAD, LONDON

PREPARED FOR

Mr RAMIN SEDAGHAT

SEPTEMBER 2019

SUMMARY

I have inspected all the trees on and near the site that could be affected by any proposed development and list their details in Appendix A.

The proposed development is the construction of a single storey annexe at the rear of the existing garden of 9 Thurlow Road, London and a single storey extension to the rear elevation.

The current design layout requires the removal 2 trees (T1, T7) for the single storey extension and, if necessary, tree (T10) could be removed to facilitate construction of the annexe. The vegetation to be removed is generally of low value with little visibility outside the site. One tree (T11) is recommended for removal on arboricultural grounds.

Protection measures will be required to ensure the soil structure within the RPAs of retained trees is not damaged, this is particularly important for tree T8 the subject of a tree preservation order.

Providing the guidelines in this report are followed, the development can proceed without long-term damage to retained trees.

1. Introduction

1.1. Instructions

1.1.1. We are instructed by Homes Design Limited, on behalf of their client to inspect and report on a number of trees at 9 Thurlow Road, London. We are to report on the tree stock, their current condition, amenity value, and suitability for retention. We are to assess the potential impact on the trees from a proposed development and provide guidance to prevent/minimise any impact during construction.

1.2. Drawings and Documents

1.2.1. We confirm sight of the following documents and drawings:

- Topographic plan of existing site.
- Proposed site layout.

2. Report on site visit

2.1. General

2.1.1. The site inspection was carried out on the 9th September 2019 by F Critchley of Arboricultural Solutions LLP. All arboricultural data contained in this report was recorded at that time. Weather conditions were sunny intervals, visibility was acceptable.

3. Tree inspection and methodology

3.1. Inspection

3.1.1. Trees likely to be affected by any developments were identified and inspected from ground level only and were not climbed. No invasive examination technique (such as increment boring, or internal decay detection) was carried out. As the inspection was visual only, no guarantee, either expressed or implied, of the internal condition of the wood of these trees can be given.

3.2. Marking

3.2.1. A digital site plan was converted for use in Arbortrail tree data software. The trees were plotted to the converted topographic survey using the original positions; where a tree was missing it was added by triangulation from set points (using a laser rangefinder) and a note made on the comments section of the tree schedule (Appendix A).

3.2.2. Each reference number on the plan refers to a survey sheet entry completed on site to show the following data:

- Sequential tree reference number (recorded on tree survey plan)
- Species - Common name followed by the Latin name for the first entry of each different species
- Height in metres
- Trunk diameter in millimetres, measured in accordance with Annex C of BS 5837:2012
- Crown radius measured at the four cardinal points – where only one measurement is given, the crown is symmetrical
- First significant branch height and direction of growth
- Crown clearance above ground level
- Life stage (young, semi-mature, early mature, mature, over-mature, veteran)
- General observations, particularly of structural and/or physiological condition, and/or preliminary management recommendations
- Estimated remaining contribution in years (less than 10, 10+, 20+, more than 40)
- Category U or A to C grading, to be recorded on the tree survey plan

3.2.3. Survey sheet entries are shown at Appendix A of this report.

3.3. Tree categorisation

3.3.1. Trees vary in, size, age, and landscape importance. All trees were categorised in accordance with the British Standard Trees in relation to design, demolition and construction - recommendations BS 5837: 2012. BS Categories have been entered in the tree schedule and are as follows:

U – **Trees unsuitable for retention**. Trees 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.

A - **High Category.** Trees of high quality with an estimated remaining life expectancy of at least 40 years.

B - **Moderate Category.** Trees of moderate quality with an estimated remaining life expectancy of at least 20 years.

C - **Low Category.** Trees of low quality with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150mm.

3.3.2. The topographic plan was edited to produce a Tree Constraints Plan (TCP) showing the above and belowground constraints relative to the existing site, and to inform the developer of the potential conflicts with the tree population (refer to drawing TCP_9THURLOWRD_1).

3.3.3. The root protection areas (RPAs) have been calculated using Trees in Relation to Design, Demolition and Construction - recommendations BS 5837: 2012. The RPAs of trees

implicated in the design proposal have not been adjusted in shape as they are generally open grown. Where foundations or other major structures are planned within the theoretical RPAs of retained trees it is recommended that a test trench is excavated by AirSpade to assess the actual presence of roots.

3.3.4. The trunk diameter circle and crown outline show the BS Category in the following colours:

Category U	**Dark red**
High Quality (A)	**Light green**
Moderate Quality (B)	**Mid-blue**
Low Quality (C)	**Grey**

3.3.3. Trees in Relation to Design, Demolition and Construction - Recommendations BS 5837: 2012 do not include arguments for or against development, or for the removal or retention of trees. Where development is likely to take place, the standard provides guidance on how to decide which trees are appropriate for retention.

4. Brief Site Description

4.1. General

4.1.1. The development site is a semidetached property on the west side of Thurlow Road. The site is well stocked with trees and shrub groups providing screening to and from adjacent properties.

4.1.2. The rear garden appears unmanaged resulting in a number of mutually suppressed shrub groups and self-set trees of drawn or stunted form.

4.2. Tree Preservation Orders

4.2.1. The Town and Country Planning (Tree Preservation) (England) Regulations 2012 allows for trees either as groups, or individuals, or as woodlands, to be protected by Tree Preservation Orders (TPO). These have the effect of preventing the cutting down, topping, lopping, uprooting, wilful damage or wilful destruction of trees except in certain circumstances, other than with the consent of the local planning authority.

4.2.2. A Conservation Area (CA) is an area designated by the Local Planning Authority as one of "special architectural or historic interest, the character or appearance of which it is desirable to preserve or enhance". Special controls exist regarding demolition and alteration of buildings; Listed Building Consent must also be obtained for any demolition, even if the building is not itself listed. Similarly, trees are given some protection with the requirement for the local authority to be given six weeks written notice before carrying out any work on trees; this gives the authority time to decide if a TPO is necessary.

4.2.3. The site is within the Fitzjohns/Netherhall CA and we are informed that there is a TPO on 1 ash tree (T8) in the rear garden.

5. Tree Population

5.1. Tree schedule

5.1.1. Refer to appendix A for detailed records of individual trees and drawing Tree Constraints Plan (drawing number TCP_9THURLOWRD_1) for the locations of trees and groups.

5.2. Species diversity

Species	Number
Oak species	1
Cherry species	3
Birch species	1
Holly	1
Apple	1
Sycamore	1
Poplar species	1
Pyracantha	1
Ash	2
Total:	**12**

The above table does not include shrub groups.

5.2.1. The tree population is fairly diverse although there is only 1 representative of some species.

5.3. Age distribution

Age class	Number
Semi-mature	0
Early-mature	4
Mature	7
Young	1
Total:	**12**

5.3.1. Whilst the absence of young trees would not be expected to sustain the local tree population, this is a managed site and vegetation is likely to be replaced as they reach the end of their safe remaining life. The garden is currently well stocked.

5.4. Grade classification

Tree grade	BS5837:2012 Definition	Number
A	High	0
B	Moderate	2
C	Low	9
U	Remove	1
	Total:	**12**

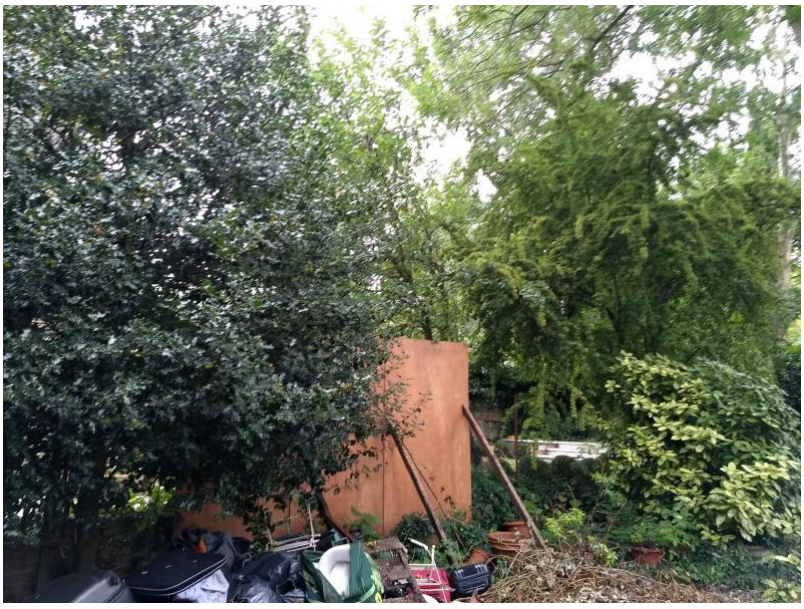
5.4.1. The tree categories are heavily weighted to the low category as a result of the general condition and visibility of the trees.

5.5. Summary of the trees implicated in the proposal.

5.5.1. Tree T1 is a weeping silver birch (Youngii) of generally poor form (refer to Appendix A and Photo 1 below). The tree has limited amenity value and does not merit a TPO.

Photograph 1: Tree T1 adjacent to scaffold with trees T2 & T3 to the left.

5.5.2. Tree T7 is a holly of generally good condition but currently of limited amenity value; branches are encroaching on the building and the tree would require ongoing management.



Photograph 2: Tree T7 (LHS).

5.2.3. Tree T11 is in poor condition with crown dieback and exudation on the trunk (see Photo's 3 & 4 below) and is recommended for removal irrespective of the development.

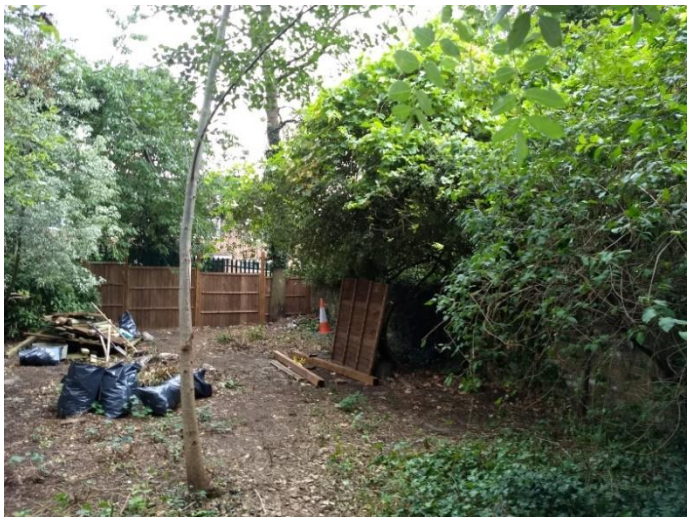
Photograph 3: Tree T11 showing sparse crown and dieback.

Photograph 4: Tree T11 showing exudation on trunk.

5.5.4. Tree T12 is a wild cherry growing in adjacent property (shown as in the garden on the topographic survey (see photo 5 below). The RPA of this tree extends into the garden and development area. There is dense ivy suppressing the crown.

Photograph 5: Tree T12, trunk originates in neighbouring property.

5.5.5. Trees T9 & T10 are close to the development but are of low value. The trees could be removed if required (particularly T10) as they would not merit a TPO (see photo 6 below).



Photograph 6: Tree T9 in the foreground with tree T10 to the RHS (with fence panel).

6. Arboricultural Impact Assessment

6.1. Summary of impact

Impact	Reason	Cat U trees	Low value (Cat C) trees	Moderate value (Cat B) trees	High value (Cat A) trees	Potential design & mitigation techniques
Trees to be removed	Building construction and/or surfacing	Tree T1, T7, T10				Trees T1 & T7 require removal for the rear extension and tree T10 could be removed if required to facilitate construction of the annexe. Retaining this tree will require some pruning to clear the elevation and roof.
	Arboricultural reasons	TreeT11				Tree of low vitality and in decline.
Retained trees to be managed	Enabling works/space for development		Trees T12, T10			Tree T12 will require crown lifting on the northeast side to clear the proposed annexe. Tree T10 (if retained) will require crown reduction on the northwest side.
Retained trees that may be damaged	Removal of existing structures					No demolition required.
	Removal of existing surfacing		Tree T10, T12	N/A	N/A	Ground clearance should not be carried out by machinery within the RPAs of retained trees.
	Material storage/washing areas/welfare areas		Potentially all retained trees	Potentially all retained trees	N/A	All material storage/washing areas/welfare areas to be located away from RPAs of retained trees. There is space adjacent to the proposed annexe to utilise. Garden areas will require ground protection.
	Temporary access to construction areas		N/A	N/A	N/A	No access is required for machinery.
	Installation of new structures		Trees T12, T10			The development is close to or within the RPA of trees and therefore hand excavation will be required
	Installation of new surfacing		Potentially all retained trees	Potentially all retained trees		There can be no excavation within the RPAs unless a trial excavation confirms no significant roots are present (<25mm diameter).
	Excavations or ground level changes		Tree T10, T12	N/A	N/A	No changes in the RPAs of retained trees.
	Installation of services*		Tree T10, T12	N/A	N/A	All new services should be routed outside the RPAs of retained trees.
	Landscaping works		All retained trees	All retained trees	All retained trees	Landscaping operations within the RPAs to be carried out using hand tools – no mechanical cultivators to operate within the RPAs.

6.2. Arboricultural Impact Assessment

6.2.1. The proposed design layout requires the removal of trees T1 & T7 for the construction of the single storey rear extension. Tree T7 is shown as 500mm from the rear elevation of the proposed extension and this would require regular management of the crown to clear the building if it could be constructed without damaging any roots that may be present. Tree T10 could be removed to facilitate construction of the annexe as it is of low value. Replacement planting can be carried out following completion of the development if required.

6.2.2. Following removal of the trees, the main impact is the encroachment into the RPA of tree T12 growing in adjacent property (refer to drawing TPP_9THURLOWRD_2). The design must consider the water demand of the trees and the proposed and potential future tree removals. It is recommended that soil investigations are carried by suitably qualified professionals to inform the foundation design. The trees close to the proposed development (T10 & T12) are considered to be of moderate to high (T10) water demand.

6.2.3. The development will require the removal of sections of shrubs to create the necessary space. These are of low value with no visibility outside the site and mitigation can be included in the proposed landscape scheme if required.

7. Development

7.1. Threats to trees during development

7.1.1. These may be listed, in general terms as:

- Compaction of ground
- Covering rooting areas with impervious surfaces
- Excavations for foundations
- Excavation for service runs
- Alterations in ground level
- Access and movement of machinery
- Need for temporary site storage
- Crown damage by passage of high-sided vehicles

7.1.2. British Standard 5837 (1991) 'Trees in relation to construction' provided useful guidance for the assessment and formulation of measures for the mitigation of such threats. Using the experience gained from this Standard, it was revised and upgraded to 'Recommendation' status as British Standard 5837 'Trees in Relation to Construction' (2005). This British Standard was withdrawn on 30th April 2012 and replaced with Trees in Relation to Design, Demolition and Construction - Recommendations BS 5837: 2012. To assist in the prediction of the likely impact of development on retained trees, a model is used. This model is based on the age, vitality and size of individual specimens.

7.1.3. The British Standard relies heavily on the creation of a protected zone (RPA) around each tree. This area should be protected from disturbance "in order to avoid unacceptable damage to the tree as a result of severance or asphyxiation of the root system." The recommended minimum area (m^2) for each tree to avoid potentially harmful disturbance have been calculated for all the trees surveyed and entered in the tree schedule (appendix A).

7.1.4. BS 5837: (2012) acknowledges that the shape of the tree root system may be affected by several factors and that the shape of the RPA should reflect this. Any deviation in the RPA from the original circular plot should take account of the following factors whilst still providing adequate protection for the root system:

a) the morphology and disposition of the roots, when influenced by past or present existing site conditions (e.g. the presence of roads, structures and underground apparatus);

b) topography and drainage;

c) likely tolerance of the tree to root disturbance or damage based on factors such as species, age, condition and past management.

7.2. Root Damage

7.2.1. Trees that are growing satisfactorily have achieved equilibrium with their surroundings. Any construction work that affects this equilibrium could be detrimental to health, future growth and the safety of the tree.

7.2.2. The part of the tree most susceptible to damage is the root system, which, because it is not immediately visible, is frequently ignored. Damage or death of the root system will affect the health, growth, life expectancy and safety of the rest of the tree. The effects of such damage may only become evident several years later.

7.2.3. The majority of a tree's root system is generally considered to be in the top 600mm of the soil, extending radially in any direction for distances frequently more than the tree's height. However, roots are adventitious and if conditions suitable for root development exist to a greater depth, the roots may extend to depths of three metres or more. Works within the root spread may damage the root system.

7.2.4. Close to the trunk are the main structural roots that develop in response to the tree's need for structural stability. Beyond these major roots, the root system rapidly subdivides into smaller diameter roots; off this main system a mass of fine roots develops.

7.2.5. Tree root systems can be damaged in several ways during construction works.
Root severance. Severing of a root will destroy all parts of the root beyond that point. Even roots less than 10mm diameter may be serving a mass of fine roots over a large area. The larger the root severed, the greater the impact on the tree.

- Damage to root bark. The bark protects the root and is essential for further root growth; it is loosely attached and easily damaged. If damage extends around the whole circumference, the root beyond that point will be killed.

- Compaction of the soil. Compaction of the ground reduces the space between soil particles, particularly in clay soils. A single passage of heavy equipment or the storage of materials can cause significant damage. Compaction can restrict or even prevent gaseous diffusion through the soil and thereby asphyxiate the roots. The roots must have oxygen for survival, growth and effective functioning.

- Alterations in ground levels. Lowering the level will strip out the mass of roots near to the surface. Raising the ground levels will have the same effect as compaction.

- Covering the rooting area with impervious surfaces. This prevents natural diffusion of gases between the soil and the atmosphere and can lead to oxygen depletion in the soil.

- Direct toxicity of some materials. For instance, petrol or diesel spillage or lime in cement can kill underlying roots.

- Wounding. Minor wounds to root bark can allow pathogens into the tree root system that can lead to a further impairment of water absorption. The general debilitation of trees due to root severance can make them more susceptible to invasion by some decay fungi such as Armillaria spp.

- Damage to the fine roots by severance of a main root, or by compaction, or by alteration of levels, will prevent the fine roots absorbing the water and nutrients essential for tree growth. The effects of damage from different causes will be cumulative.

7.2.6. The effects of tree root damage may not be immediately apparent. If the root system is capable of rapid regeneration, the tree may recover without noticeable ill effects, though usually symptoms take several years to develop. The range of symptoms varies from minor branch dieback, to deterioration and ultimate tree death depending on the severity of the damage and the ability of the roots to regenerate.

7.2.7. The default position should be that structures are **located outside the RPAs of trees that are to be retained**. The cumulative effects of incursions into the RPA e.g. from excavations for utility apparatus are damaging and should be avoided. Where there is evidence that a tree has been previously subjected to damage by construction activity this should be considered when considering the acceptability of further activity within the RPA.

8. Arboricultural Method Statement

8.1. Phase 1: Undertake Approved Tree Works.

8.1.1. All tree works should be undertaken prior to any site works commencing. Motorised vehicles will be restricted to areas of existing compacted/hard surfaces, or where ground protection is in place, and should not be taken onto un-surfaced areas within the root protection areas (as shown on drawing TPP_9THURLOWRD_2). Refer to Table 8.2 below for tree works.

8.2 Tree Works

Tree No.	Recommended Works
Trees T1, T7, T11	Fell to ground level. Remove stump
T10	*Reduce northwest side of crown by 1m and blend in with remaining crown
T12	Crown lift northeast side of crown to 4m over garden

*Recommended works if tree retained

8.2. Phase 2: Tree protection.

8.2.1. All materials storage and mixing will be confined to areas outside the RPAs of the retained trees. Where mixing of materials is undertaken close to the RPAs, this should be on an impervious surface with no run-off to prevent chemical contamination of the RPA.

8.2.2. All tree protection measures **must** be in place before any works commence or materials or machinery is brought onto site. Once installed ground protection **must** not be moved or altered without prior consultation with the arboriculturalist or Local Authority Tree Officer. Protection measures will remain in place throughout the following processes:

- Contractor occupancy
- Plant and materials delivery
- Demolition/construction works
- Installation of utilities
- Completion of development

8.2.3. Refer to drawing TPP_9THURLOWRD_2 for locations of areas requiring tree protection. If a protective fence requires temporary repositioning, ground protection must be used over the exposed RPA unless there is existing hard surfacing. The use of a proprietary ground protection system such as Eve Trakway would be suitable as temporary ground protection and provides flexibility in positioning panels.

8.3. Construction of annexe

8.3.1. The annexe will be constructed on a concrete raft and this should be set at existing ground level unless careful hand excavation confirms that tree roots >25mm diameter are not present. Any work in RPAs must be carried out with care as set out in Appendix B section 1.6. Whilst the volume of roots within the RPA may vary, the indicative RPA must be used to determine where hand tools and supervised excavation are essential. All excavations must be carried out using hand tools (spades, forks and trowels) and taking care not to damage bark and wood of the roots.

8.3.2. An impermeable membrane should be laid within the RPA of tree T12 to prevent concrete leachates from coming into contact with tree roots.

8.4. Construction of single storey extension

8.4.3. Following removal of trees T1 & T7 there is no impact on the remaining trees. The protective fencing and ground protection (as shown on drawing TPP_9THURLOWRD_2) must remain in place until all works are completed.

8.5. Changes of Surface

8.5.1. Removal of existing surfacing is a high risk to any adjacent tree roots and guidance in Appendix B section 1.7 **must** be followed. If any changes are required within the RPAs of trees close to the areas of development (refer to drawing TPP_9THURLOWRD_2) great care must be taken to ensure there is no root damage/compaction.

8.5.2. There are existing sections of concrete within the RPA of tree T12 that will require the recommended procedures noted above.

8.6. Landscaping

8.6.1. All trees near new soft landscaping may be adversely affected by this activity. All landscaping activities within the RPAs has the potential to cause significant damage and any impact must be minimised by following the guidance set out in Appendix B section 1.10.

8.7. Installation of Services

8.7.1. Where new services must be installed, they should be routed outside the RPAs of retained trees. Where, by necessity, they have to be installed in the RPAs, great care must be taken to minimise any disturbance. Trenchless installation should be the preferred option but if that is not feasible, any excavation must be carried out by hand according to the guidelines in Appendix B section 1.9.

8.8 Other tree-related site works

8.8.1. **Pre-commencement site visit:** All details of the tree protection measures should be discussed to ensure adherence by all parties during the works. Any modifications to the tree protection measures must be recorded and agreed in writing.

8.8.2. **Site supervision:** Site visits by the project arboriculturist may be required by the local planning authority, particularly if works are proposed within the RPAs of retained trees. Once the site is active, the project arboriculturist will ensure compliance with arboricultural conditions and advise on tree problems or any modifications that may arise. The developer must ensure that all conditions of the arboricultural method statement and any amendments are known and fully understood by all site personnel.

8.9. General

8.9.1. Limitations of report: This report is intended to highlight the potential for damage to the retained tree population from the proposed development and provide guidance on how to avoid or minimise that potential. The content may require amending as the scheme evolves or as additional information becomes available.

8.9.2. Arboricultural Standards: Any tree works should be done in accordance with the British Standard Recommendations for Tree work, BS 3998 as modified by later research. Works should be undertaken by properly qualified and experienced tree contracting company as recommended by a local authority or one approved by the Arboricultural Association. A Register of Contractors is available from:

The Arboricultural Association
The Malthouse
Stroud Green
Standish
Stonehouse
Gloucestershire GL10 3DL
UKTel +44 (0) 1242 522152
Fax +44 (0) 1242 577766
Email: admin@trees.org.uk.

8.9.3. Statutory wildlife implications: Wildlife in this country is afforded protection under the Wildlife and Countryside Act 1981 as amended by the Countryside and Rights of Way Act 2000. Statutory protection is given to birds, bats and other species that inhabit trees. Tree work is governed by these statutes and advice should be sought from an ecologist before undertaking any works that may constitute an offence.

Graham M Causey ***B.Sc. (Hons), F. Arbor. A, R.F.S Cert Arb. LANTRA Accredited Professional Tree Inspector***

APPENDIX A TREE SCHEDULE

Tree No.	Species	Height (m)	DBH (mm)	Crown radius (m)				FSB & direction	Lower crown height (m)	Life stage	General observations	Est. Rem'ing contrib'n	BS Cat	RPA-R (m)	RPA-A (m2)
				N	E	S	W								
T1	Silver Birch "Youngii"	3	110 (1)	0.5	2	2	1		2	M	Average condition Normal vigour Poor shape & form Suppressed growth Stem divides above 1.5m Unbalanced crown shape Crown distorted due to group pressure Branches encroaching upon building Bowed trunk No particular landscape value	10+	**C2**	1.32	5.5
T2	Damson	6	130 (1)	1.5	3	1.5	0.5		3.5	EM	Diameter estimated In neighbouring property Average condition Normal vigour Poor shape & form Suppressed growth Tall drawn form Root spread restricted Ivy on stem Stem divides above 1.5m Light deadwood in crown Mutually suppressed crown Unbalanced crown shape Crown distorted due to group pressure Contributes to low level screen Bowed & leaning trunk	10+	**C2**	1.56	7.6

Tree No.	Species	Height (m)	DBH (mm)	Crown radius (m)				FSB & direction	Lower crown height (m)	Life stage	General observations	Est. Rem'ing contrib'n	BS Cat	RPA-R (m)	RPA-A (m2)
				N	E	S	W								
T3	Damson	6.5	150 (2)	1.5	1.5	1	1		1.5	EM	Diameter estimated In neighbouring property Average condition Normal vigour Poor shape & form Suppressed growth Tall drawn form Root spread restricted Ivy on stem Stem divides at ground level Stem divides above 1.5m Light deadwood in crown Mutually suppressed crown Unbalanced crown shape Crown distorted due to group pressure Contributes to low level screen Bowed & leaning trunk Topped at 3m in past	10+	**C2**	2.54	20.3
T4	Sycamore	20	790 (1)	8.9	8.7	7.8	2		6	M	Average condition Normal vigour Basal decay present Occluded wounds on trunk Ivy on stem Cavity on stem Stem divides below 1.5m Stem divides above 1.5m Light deadwood in crown Mutually suppressed crown Unbalanced crown shape Contributes to general amenity of area Partially occluded wound ground level to 1.5m on northwest side	20+	**B2**	9.48	282.3

Tree No.	Species	Height (m)	DBH (mm)	Crown radius (m)				FSB & direction	Lower crown height (m)	Life stage	General observations	Est. Rem'ing contrib'n	BS Cat	RPA-R (m)	RPA-A (m2)
				N	E	S	W								
T5	Pyracantha	6	100 (5)	1	2	2	3		1.6	M	Diameter estimated In neighbouring property Average condition Normal vigour Tree in raised planter Root spread restricted Ivy on stem Multiple stems at ground level Previously crown reduced Rubbing branches causing damage Light deadwood in crown Unbalanced crown shape Crown distorted due to group pressure Contributes to low level screen	10+	**C2**	1.2	4.5
T6	Apple	6	230 (2)	0	3.5	3	2		2	M	Diameter estimated In neighbouring property Average condition Normal vigour Suppressed growth Leaning South Root spread restricted Stem divides below 1.5m Previously crown reduced Rubbing branches causing damage Light deadwood in crown Mutually suppressed crown Unbalanced crown shape Contributes to low level screen Appropriate to location	20+	**C2**	2.76	23.9
T7	Holly	6.5	180 (1)	3	3	3	3		0.5	EM	Good condition Normal vigour Rubbing branches causing damage Well balanced crown Branches encroaching upon building Contributes to low level screen	40+	**C2**	2.16	14.7

Tree No.	Species	Height (m)	DBH (mm)	Crown radius (m)				FSB & direction	Lower crown height (m)	Life stage	General observations	Est. Rem'ing contrib'n	BS Cat	RPA-R (m)	RPA-A (m2)
				N	E	S	W								
T8	Ash	25	610 (1)	8.4	4	8.2	10			M	Average condition Normal vigour Tall drawn form Exposed roots Unable to inspect stem due to Ivy Cavity on stem Stem divides above 1.5m Light deadwood in crown Unbalanced crown shape Crown distorted due to group pressure Tree subject to TPO Appropriate to location Contributes to general amenity of area Animal excavation beneath roots north east side Cavity at 0.5m where stem removed north side	20+	**B2**	7.32	168.3
T9	Aspen	5	80 (1)	1	1	0.2	0.4			Y	Self-set tree Average condition Normal vigour Suppressed growth Tall drawn form Leaning North-West Bark wounds on surface roots Bark wounding on trunk Unbalanced crown shape No particular landscape value	20+	**C2**	0.96	2.9
T10	Holm Oak	4	170 (2)	2	3	1	2		1.2	EM	Self-set tree Good condition Normal vigour Ivy on stem Stem divides below 1.5m Previously crown reduced Rubbing branches causing damage Light deadwood in crown Unbalanced crown shape Contributes to low level screen Dbh below fork at 1m Trunk bowed at base then straightens	40+	**C2**	2.04	13.1

Tree No.	Species	Height (m)	DBH (mm)	Crown radius (m)				FSB & direction	Lower crown height (m)	Life stage	General observations	Est. Rem'ing contrib'n	BS Cat	RPA-R (m)	RPA-A (m2)
				N	E	S	W								
T11	Ash	13	410 (1)	4	7	5	5		5	M	Declining condition Low vitality Exposed roots Basal decay present Ivy on stem Exudation on stem Crown becoming sparse Dieback in crown Major deadwood in crown Contributes to general amenity of area Bark loose around base to 0.5m height Possible scar from fungal bracket	<10	**U**	4.92	76
T12	Wild Cherry	5.5	340 (2)	5.5	4.6	4	4		1	M	Diameter estimated In neighbouring property Average condition Normal vigour Unable to inspect stem due to Ivy Stem divides below 1.5m Previously crown reduced Dieback in crown Major deadwood in crown Screen value Contributes to general amenity of area	20+	**C2**	4.08	52.3

KEY

Y = Young
SM = Semi-mature
EM = Early-mature
M = Mature
OM = Over-mature
V = Veteran

H = Hedge
G = Group
B = Shrubs
K = Small tree
W = Woodland
MS = Multi-stemmed
RPA-R(m) = radius of x metres
RPA-A = area of RPA

TREE QUALITY ASSESSMENT CASCADE CHART

Category and definition	Criteria (including subcategories where appropriate)		
Trees unsuitable for retention **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	• Trees that have a serious, irremediable, 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 *NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve*	
Trees to be considered for retention	**1 Mainly arboricultural qualities**	**2 Mainly landscape qualities**	**3 Mainly cultural values, including conservation**
Category A Trees of high quality with an estimated remaining life expectancy of at least 40 years	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)	Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture)
Category B Trees of moderate quality with an estimated remaining life expectancy of at least 20 years	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	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	Trees with material conservation or other cultural value
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	Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories	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	Trees with no material conservation or other cultural value

APPENDIX B TREE PROTECTION

1.1. Pre-commencement site meeting.

1.1.1. A pre-commencement site meeting is advised prior to any works commencing on site, to agree all the approved processes with the relevant concerned parties.

1.2. Protective fencing and ground protection.

1.2.1. All trees to be retained on site should be protected by barriers and ground protection where applicable. Barriers should be in place before any materials or machinery is brought onto site. Once in place, barriers and ground protection should be considered sacrosanct and should not be altered or removed without prior recommendation by an arboriculturist and approval of the local planning authority. Barriers should be fit for 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.

1.2.2. The protective fencing is to be erected prior to any site works or demolition works.

1.2.3. The barrier is to comprise of a vertical and horizontal framework (Figure 1 below), well braced to resist impacts, with vertical tubes spaced at a maximum interval of 3m. Weldmesh panels, such as Heras, should be securely fixed with wire or scaffold clamps to this framework. Weldmesh panels on rubber or concrete feet are not resistant to impact and should not be used. 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 freestanding scaffold support framework.

1.2.4. Where retained trees are near the existing buildings, a higher specification hoarding will be required to prevent damage from falling rubble. In place of the weldmesh, panels solid hoarding should be used, for example, scaffold boards.

1.2.5. 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 2 below). 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

1.2.6. It is advised that a plan be pinned up on site in highly visible areas such as in the site huts, so that all ground staff involved in the demolition and construction works have a point of reference for tree protection issues. All demolition and construction workers should be briefed on the importance of tree protection prior to works commencing. Special attention must be paid to ensure that protective fencing remains rigid and complete during all works.

1.2.7. Where it is agreed that vehicular or pedestrian access for construction purposes is necessary within the RPA, ground protection measure will be required to prevent damage to the soil structure within the RPA.

1.2.8. For pedestrian access within the RPA, the installation of ground protection in the form of a single thickness of scaffold boards over a compressible layer laid onto a geotextile, or supported by scaffold, is likely to be acceptable.

1.2.9. For wheeled or tracked vehicle, access within the RPA the ground protection should be designed by an engineer to accommodate the likely loading and may involve the use of proprietary systems or reinforced concrete slabs. The structure must use a no dig design (see methodology described in 1.7 below) to prevent root severance and must prevent localised soil compaction by distributing the load across the track width. Such a system may include the use of three-dimensional cellular confinement systems (CCS) as a component of the sub-base, to act as a load suspension layer.

1.2.10. New permanent hard surfacing should not cover more than 20% of the RPA or be wider than 3m within it; it should be constructed to be permeable to moisture and gas.

1.3. Construction exclusion zone

1.3.1. Once the construction exclusion zone (CEZ) has been protected by barriers and/or ground protection, demolition/construction can take place.

Inside the Construction Exclusion Zone (CEZ) of the protective fencing, the following prohibitions shall apply:

- No mechanical digging or scraping
- No hand digging
- No storage of plant, equipment or materials
- No vehicular or plant access
- No fire lighting
- No washing down of vehicles or machinery
- No handling, discharge or spillage of any chemical substance, including cement washings
- No action likely to cause localised waterlogging

- No change in ground levels
- No construction of a hard surface
- No earthworks

1.3.3. To inform site personnel of the purpose of the fencing, information notices shall be fixed to the fencing at 5m intervals. These notices shall be of all-weather construction and shall be in the form of the example provided at Figure 4 below and replaced as and when necessary.

1.3.4. In addition to the above, further precautions are necessary adjacent to trees outside the CEZ:

- Materials that will contaminate the soil, e.g. concrete mixing, diesel soil and vehicle washings, should not be discharged within 10 metres of the tree stem. This should take into consideration the topography of the site and slopes to avoid materials such as concrete washings running towards trees.

- Fires should not be lit in a position where their flames can extend to within 5m of foliage, branches or trunk. This will depend on the size of the fire and the wind direction.

- Notice boards, telephone cables or other services should not be attached to any part of the tree.

1.4. Avoiding damage to stems and branches

1.4.1. Site operations should be planned to ensure that wide or tall loads or plant with booms, jibs and counterweights, could operate without coming into contact with retained trees. Mechanical damage from large plant can be significant and make their safe retention impossible. Any transit or traverse of plant near trees should be conducted under the supervision of a banksman to ensure adequate clearance from trees is maintained at all times.

1.4.2. If the use of a tower crane is necessary, its location will be predetermined and agreed in writing by the Local Planning Authority, and its operation and movements supported by a detailed Method Statement.

1.5. Reporting damage to trees and protective fencing

1.5.1. In the event of any damage to trees scheduled for retention, the damage should be reported to the site agent immediately. The site agent shall report up the chain of responsibility to the project arboriculturist or in the absence of such an appointment to an appropriately qualified arboriculturist, to enable remedial measures to be carried out immediately and if possible.

1.5.2. Should protective fencing be damaged to impair its function, all work shall cease near the damage until the fence has been returned to standard.

1.6. Excavating in RPAs

1.6.1. All excavations must be carried out using hand tools (spades, forks and trowels) and taking care not to damage bark and wood of the roots. It is acceptable to use a pneumatic hammer carefully to break up any existing hard surface for removal. Specialist tools (air spade) may be suitable in certain situations to remove soil from around the roots. All soil removal must be undertaken with care to minimise the disturbance of roots beyond the immediate area of the excavation. Where a mass of flexible roots is encountered, it may be possible either to displace the roots to another location temporarily or permanently to avoid areas of excavation. Exposed roots to be removed should be cut cleanly with sharp saw or secateurs approximately 20cm back from the face of the final excavation. Roots that are exposed temporarily should be protected from drying out, direct sunlight and extremes of temperature by suitable covering. Roots greater than 2.5cm diameter should be retained where possible; roots up to 10cm diameter should only be cut in exceptional circumstances and roots greater than 10cm should only be cut after consultation with the appropriate supervising officer.

1.6.2. Working within RPAs requires a high level of care to ensure the long-term potential of the trees. Qualified supervision is vital to minimise the risk of misinterpretation. Site personnel must be properly briefed before work commences and ongoing work should be regularly inspected by an arboriculturist to confirm compliance by the contractor.

1.7. Removing Surfacing in RPAs

1.7.1. Roots are frequently found beneath or adjacent to existing surfacing or built structures and care is needed. Damage to the roots may be by direct physical damage or compaction of the soil from the weight of plant and machinery or repeated pedestrian movement. This is generally not a problem whilst surfacing is in place as the load is spread and additional protection is not required. However, once the existing surface is removed and the soil below exposed significant damage can occur to the soil structure and directly to the roots in a very short time. The following rules must be followed:

1. No vehicular activity or repeated pedestrian access into the RPAs unless on existing hard surfacing or custom designed ground protection, this must be designed for anticipated loads.
2. Regular vehicle and pedestrian access routes must be protected from compaction by temporary ground protection.
3. RPAs exposed by the works must be protected as set out in BS 5837:2012 until there is no risk of damage from construction activity

Appropriate tools for manually removing debris may include a pneumatic breaker/drill, crow bar, sledgehammer, pick, mattock, shovel, spade, trowel, fork and wheelbarrow. Secateurs and a bow saw must be available to deal with any exposed roots that have to be cut. Machines with a long reach may be used if they can work from outside RPAs or

from areas protected by ground protection designed for the loading within the RPA. Debris to be removed from RPAs manually must be moved across existing hard surfacing or temporary ground protection to prevent compaction damage. If possible, leaving below ground structures in place should be considered if their removal may cause excess root disturbance.

1.8. Installation of new Surfacing in RPAs

1.8.1. New surfacing is potentially damaging to trees as it may require changes to existing levels, result in localised soil structure damage and disrupt the exchange of water and gases in and out of the soil. Mature or older trees are more sensitive to this type of damage than younger trees. Potential adverse impacts on the trees can be minimised by limiting the extent of these changes. The most suitable surface will be porous to allow the relatively free movement of gas and water and load spreading to limit compaction damage. The actual specification is an engineering issue that must be considered in the context of the load-bearing capacity of the soil; this element requires specialised input from the appropriate professional.

1.8.2. The actual location and depth of roots is unpredictable and will only become clear once excavation starts and following the guidance in section 1.7 above. Ideally, all new surfacing in the RPAs will be no dig, but this is rarely possible on undulating surfaces. New surfacing generally requires an evenly graded sub-base which can be made up to any high points with granular, permeable fills such as crushed stone or sharp sand; this sub-base must not be compacted as in a normal installation. Some limited excavation is usually necessary to achieve this and need not be damaging to the tree if carried out with care and avoiding cutting large roots. Tree roots generally do not occupy the top 5cm of soil, so the removal of a turf layer need not cause root damage. It may be possible to dig to a greater depth with care and dependant on local conditions. On undulating surfaces, finished levels must be carefully planned and flexible enough to allow on-site adjustment if excavations reveal large roots. Roots of 2.5cm diameter and less can normally be cut without a significant impact on the tree and the minimal 5cm depth can be used. If roots larger than 2.5cm diameter are encountered and it is considered inappropriate to cut them by a suitably qualified professional, the surrounding levels must be adjusted to consider the high points by infilling with a suitable material.

1.8.3. Generally, the construction of hard surface access within the root protection area is to be that of a 'no-dig' design to avoid root loss due to excavation. In addition, the structure of the hard surface should be designed to avoid localised compaction, evenly distributing the carried weight over the track width and wheelbase of any vehicles that will use the access. The design will be based on a cellular confinement system as an integral component of the sub-base, to act as a load suspension layer.
1.8.4. The finished surface will be either a granular material, permeable and gas-porous finished surface (wearing course) to allow moisture infiltration and gaseous diffusion. It is essential to maintain adequate supplies of water and oxygen for trees through the soil.

Porosity is important particularly where the new hard surface covers an area of previously unmade ground, under which tree roots may have developed preferentially.

1.8.5. No-fines granular materials should be used wherever fill or a sub-base is required to help to ensure adequate gaseous diffusion. Excess water in the root protection area should be avoided, particularly on clay soils where water logging can occur. In these cases, the hard surface should slope away from the tree to avoid ponding. Provided surface water is not liable to be contaminated by salt or toxic run-off from oil or petrol, a permeable surface should be employed.

1.8.6. Washed gravel. Washed gravel retains its porosity unless excessively consolidated, and is particularly useful where changes of level occur, or an irregular shape is needed around the stem of a tree. Gravel is easily renewed or topped up. Although weeds may become established, they can be controlled by chemical or mechanical means. However, gravel is rarely suitable for use where there is vehicle or pedestrian traffic for example, in residential areas. Materials with high fines content, such as binding gravels or hogging, should not be used due to their almost impermeable texture when consolidated.

1.8.7. Paving slabs and block pavers. Paving slabs and block pavers are available with built in infiltration spaces between the slabs or blocks. These are ideal, though they should be laid dry-jointed on a sharp sand foundation to allow air and moisture to penetrate to the rooting area.

1.8.8. Graded Soil. Sufficient spoil shall be placed along the edge of the area to receive Geoweb, suitably graded away from the works in order that it may be pulled in later. This eliminates the need to transport soil over the finished surface. The spoil (E.g. Heicom sand) shall be graded into the finished structure at the end of the scheme.

1.8.9. Construction. Refer to Fig 4 for a general overview of a typical installation with porous tarmac (illustration courtesy of Geosynthetics Ltd). The depth of CellWeb will be dependent on the expected loads and should be based on the manufacturer's recommendation.

1.9. New Services

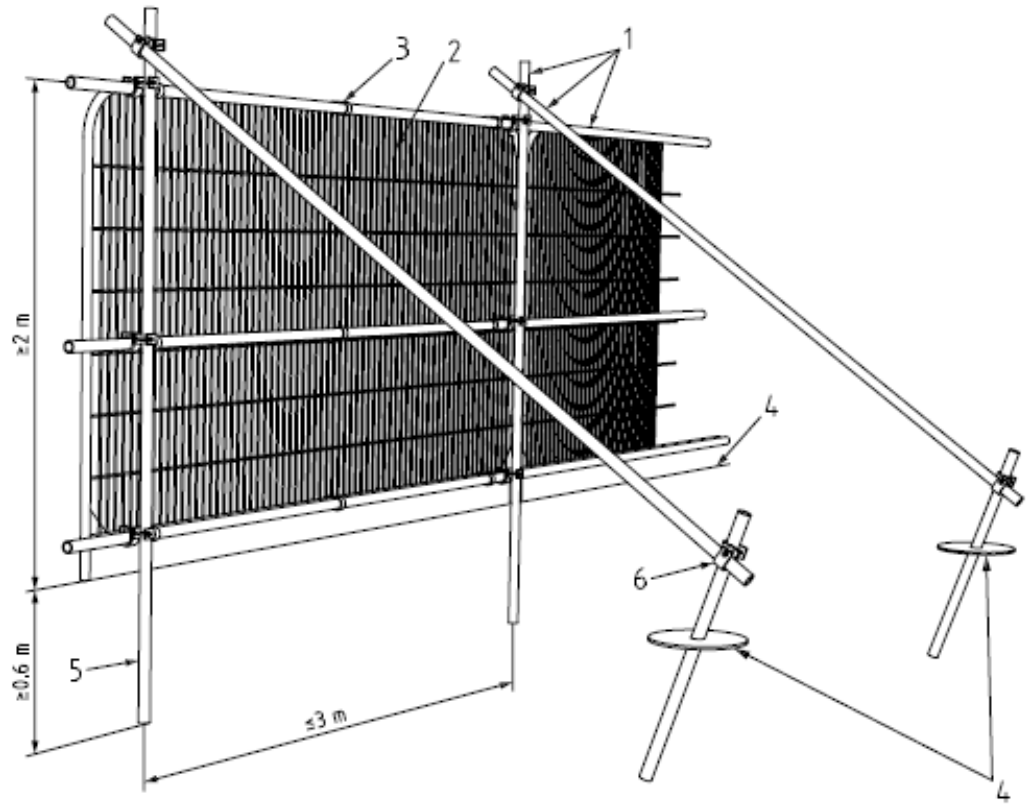
1.9.1. **Service connections:** The location of all new service routes should ideally be outside of the root protection zones of the trees to be retained to avoid damage to tree roots. All proposed service installations should be carried out in accordance with the guidelines set out in NJUG Publication No.10, and Section 11.3.5 and 11.7 of BS5837:2005. Great care should be taken to preserve and work around roots greater than 25mm in diameter, and clusters of smaller roots avoiding damage to bark. Where it is necessary to sever roots greater than 25mm in diameter, arboricultural advice must be sought. Where smaller roots must be severed, they should be cut back cleanly using secateurs or a sharp pruning saw. Where possible, services laid through protected areas need to be installed at a depth preferably not less than 750mm deep to preserve the maximum

number of roots and avoid conflicts between the tree roots and the utility service run. The trench should be kept as narrow as possible to reduce the potential amount of root severance. Backfilling of trenches should be carried out using the excavated soil, which should be worked in around roots and lightly "tamped" not compacted and preserving the original soil profile. The backfill should be left proud of surrounding levels to allow for settlement. Trenches must not be left open overnight, and arboricultural supervision should be provided during excavation of trenches through protected zones. If the trench is to remain open for any period during the day to prevent the roots from drying out, it is advised that moist Hessian sacking be wrapped around the exposed roots, and/or trench to prevent desiccation from occurring. All existing site services that are already within the root protection areas that are to be made redundant will still need to comply with the above to prevent any damage to roots within these areas.

1.10. Soft Landscaping

1.10.1. Soft landscaping includes the re-profiling of existing soil levels and covering the soil surface with new plants or an organic covering (mulch). It does not include the construction/installation of solid structures or compacted surfacing. No significant excavation or cultivation, especially by rotovators, should be carried out within the RPAs. Where new designs require levels to be increased to tie in with new structures or the removal of an existing structure has left a void below the surrounding ground level, good quality and relatively permeable topsoil should be used for the fill. It should be firmed into place but not over compacted in preparation for turfing or careful shrub planting.

Figure 1: Tree Protective fencing



Key

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

Figure 2: Tree Protective fencing (alternative)

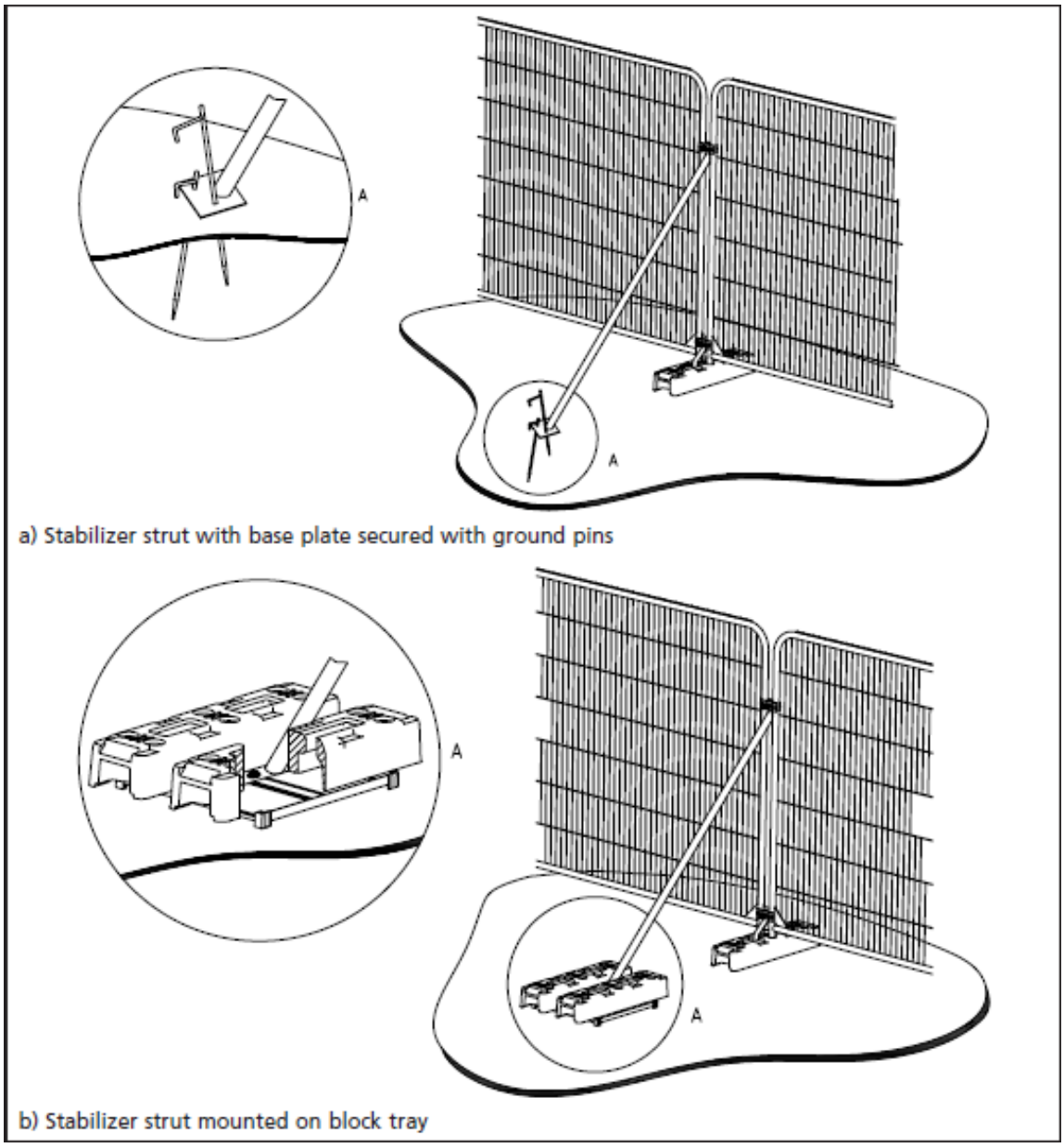


Figure 3: Example of warning notice

Figure 4: Cellular Confinement System