ARBORICULTURAL CONSULTANTS

TREE PROTECTION &

CONSTRUCTION METHOD STATEMENT

FOR REDEVELOPMENT OF

GARAGES TO THE REAR OF

26 NEW END SQUARE

LONDON

NW3 1LS

By

ARBORICULTURAL SOLUTIONS LLP

ORIGINAL – SEPTEMBER 2019.

REVISION 1 – OCTOBER 2019.

REVISION 2 – FEBRUARY 2020.

SUMMARY

The purpose of this report is to provide a consideration of the arboricultural implications of the demolition of six existing garages and the erection of a three storey, two-bedroom single dwelling house including the excavation of a basement. Trees considered to be within the influencing distance of the development have been assessed in accordance with BS5837:2012 "Trees in relation to design, demolition and construction – Recommendations". I have inspected all the trees on and near the site that could potentially be affected by the development and list their details in Appendix A. As a result, 3 trees were inspected. The implications of the proposal are:

1. The development proposal requires excavation work within the circular representation of the RPAs of tree 1 (Common Oak) and tree 2 (Japanese Flowering Cherry) in the neighbouring gardens. Tree 2 is noted to be in poor condition. It is considered to be of short-term potential, and it is likely that the owners will need to remove it on safety grounds in the near future.

2. No tree removals are required to facilitate this development. All retained trees will be protected in accordance with BS 5837:2012 specifications throughout the development.

This report includes guidance on tree protection measures and providing these are adhered to there will be no adverse impact on the long-term potential on the retained trees.

1. Introduction

1.1. Instructions

1.1.1. We are instructed to inspect and report on trees in the vicinity of a proposed redevelopment of garages to the southwest of 26 New End Square, London NW3 1LS. Planning Permission reference 2016/0849/P has been granted subject to Planning Conditions two of which relate to the existing trees.

- Planning Condition 4 states that prior to the commencement of any works on site, tree protection measures shall be installed and working practices on site are to be in line with the arboricultural method statement submitted with the application by R. Skerratt dated 12.02.16 and shall follow guidelines and standards set out in BS5837:2012 "Trees in relation to design, demolition and construction". All trees on the site, or parts of trees growing from adjoining sites, unless shown on the permitted drawings as being removed, shall be retained and protected from damage in accordance with the approved protection details.

- Planning Condition 5 requires details of the design of building foundations and the layout, with dimensions and levels, of service trenches and other excavations on site in so far as these items may affect trees on or adjoining the site, shall be submitted to and approved by the Council as the local planning authority before any works on site are commenced. The relevant part of the works shall not be carried out otherwise than in accordance with the details thus approved.

1.2. Drawings and Documents

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

- Arboricultural Method Statement submitted with the planning application by R. Skerratt dated 12.02.16.
- Section C-C. Drawing number P3133 B/A11 Rev P1 at scale 1:50@A1 & 1:100@A3 dated 4/2/16.
- Section 2-2. Drawing number P3133 B/A10 Rev P2 at scale 1:50@A1 & 1:100@A3 dated 4/2/16.
- Lower ground floor plan showing structure over. Drawing number P3133 B/A03 Rev P2 at scale 1:50@A1 & 1:100@A3 dated 4/2/16.
- Lower ground floor plan. Drawing number P3133 B/A02 Rev P3 at scale 1:50@A1 & 1:100@A3 dated 27/4/16.
- Basement plan. Drawing number P3133 B/A01 Rev P2 at scale 1:50@A1 & 1:100@A3 dated 4/2/16.
- Outline sequence of works. Drawing number P3133 B/A20 Rev P1 at scale 1:50@A1 & 1:100@A3 dated June 2016.
- Outline sequence of works retaining wall. Drawing number P3133 B/A21 Rev P1 at scale 1:50@A1 & 1:100@A3 dated June 2016.

1.2.2. This tree protection and construction method statement is based on the approved Arboricultural Method Statement submitted with the planning application by R. Skerratt dated 12.02.16.

2. Report on site visit

2.1. General

2.1.1. The site was inspected on 12th 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 with light winds and good visibility.

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. The site plan provided was converted for use in Arbortrail tree data collection software. Crown measurements were taken using a laser rangefinder (Leica Disto D510). The trees surveyed were referenced with a number corresponding to the particular tree on the site plan. Where appropriate, close growing trees were entered as a group and given a generic entry within the tree schedule.

3.2.2. Each reference number 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 existing site plan was edited to show the above and below ground constraints relative to the existing site and potential conflicts with the proposed development (refer to drawing TPP_26NEWENDSQ_2 Rev A). The root protection areas (RPAs) have been calculated using Trees in Relation to Design, Demolition and Construction - recommendations BS 5837: 2012 (refer to Appendix A). The RPAs of trees implicated in the design proposal have not been adjusted in shape to take into account the existing or past site conditions such as the presence of roads, structures and underground services. The trees are growing within the neighbouring gardens close to boundary fencing and existing hard surfacing, so the prediction of their root spreads is problematic. Instead, the full RPA has been retained to show the areas where special precautions are required to prevent potential damage to the roots.

3.3.3. 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**

3.3.4. 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 occur, 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 site comprises six single storey garages and associated hard surfacing for vehicle access. The plot is an irregular shape bounded by a footpath to the west, by the gable end wall and rear garden boundary of an adjacent dwelling (7 Flask Cottages) to the south, and by the rear and side gardens of 26 New End Square, a 3 storey apartment block, to the north and east.

4.1.2. New close-boarded fencing runs along the full length of the eastern site boundary. A new timber frame and plywood panel hoarding runs along the northern and the greater part of the western boundary. The side and rear elevations of the garage block demarcate the southern and the rest of the western boundary.

4.1.3. The site slopes down quite steeply to the south and more gently from west to east. The maximum difference in levels, between the centre of the northern boundary and roughly the mid-point of the northern elevation of the garage block, is about 900mm.

4.2. Statutory Tree Protection

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 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 with regard to 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 Hampstead Conservation Area administered by London Borough of Camden. It has not been possible to confirm if any of the trees surveyed are the subject of a TPO.

4.3. Development Proposal

4.3.1 The development proposal is to demolish the six existing garages and construct a three storey, two-bedroom single dwelling house including the excavation of a basement. The development requires associated external works including the construction of a walled garden.

5. Tree Population

5.1. Tree schedule

5.1.1. Refer to appendix A for detailed records of individual trees and drawing Tree Protection Plan (drawing number TPP_26NEWENDSQ_2 Rev A).) for the locations of trees and groups. Trees that have been surveyed and included as groups have not been included in the following tree population analysis.

Species	Total Number	Age Class	BS Category
Common Oak	1	Early mature	B2
Japanese Flowering Cherry	1	Mature	C2
Sycamore	1	Early mature	B2

5.2.1. The trees surveyed are located within the communal gardens of the block of flats at 26 New End Square. Trees on land managed by London Borough of Camden are inspected every 3 years, between February and October they were last inspected by a Tree Officer 4/5/2018.

5.2.2. Tree 1 is an early mature Common Oak within the side garden of the flats at 26 New End Square. The tree has been categorised as B2 in accordance with BS 5837:2012 specifications as it is in good condition, of long-term potential and of considerable public amenity value (refer to photograph 1 below). The tree appears to be managed by cyclical crown reduction works. It has been cut back from the adjacent flats but otherwise has a generally well-balanced crown shape.

Photograph 1 showing tree 1 Common Oak.

5.2.3. Tree 2 is a Japanese Flowering Cherry within rear garden at of the flats at 26 New End Square. This tree appears to be declining in condition. The crown is becoming sparse and the foliage is chlorotic, pale yellow with green veins (see photograph 2 below). The tree is considered to be of short-term potential. The crown shape is unbalanced towards the southwest and the tree is of low amenity value.

Photograph 2 showing tree 2 Japanese Flowering Cherry.

5.2.4. Tree 3 is an early-mature Sycamore within rear garden at of the flats at 26 New End Square. The tree has been categorised as B2 in accordance with BS 5837:2012 specifications as it is in fair condition with a well-balanced crown shape and of medium-term potential. The tree appears to be managed by cyclical crown reduction works.

6. Arboricultural Impact Assessment

6.1. Impact on Trees

6.1.1. Existing trees are an important factor on construction sites, whether on or near the working areas. BS5837:2012 – "Trees in relation to design, demolition and construction – Recommendations" is intended to assist decision-making with regard to existing and proposed trees in the context of design, demolition and construction. Root systems, stems and canopies, with allowance for future movement and growth, need to be taken into account.

6.1.2. BS5837:2012 - Trees in relation to design, demolition and construction – recommendations have been used to calculate the RPAs. It should be noted that this method is primarily used to calculate the volume of soil required to maintain healthy growth based on the trunk diameter of the tree. In practice, roots may extend beyond this area, and

in some cases the spread may be less. 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 in excess of the tree's height.

6.1.3. Refer to Arboricultural Method Statement submitted with the planning application by R. Skerratt dated 12.02.16. for full analysis of the arboricultural implications of the proposed development.

6.1.4. Tree 2 (Japanese Flowering Cherry) is considered to be of short-term potential, and it is likely that the owners will need to remove it on safety grounds in the near future. On that basis, it would be appropriate to approach the owners of the tree to seek consent to remove tree 2 and provide replacement tree planting which would ensure continued canopy cover and provide some screening between the flats and the new development.

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 on site and entered into 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 in excess of 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 a number of 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 taken into account when considering the acceptability of further activity within the RPA.

8. Arboricultural Method Statement

8.1. Tree protection with barriers and ground protection.

8.1.1. The retained trees will be protected by barriers as shown on the tree protection plan TPP_26NEWENDSQ_2 REV A. This must be constructed as defined in Trees in relation to design, demolition and construction - recommendations BS 5837: 2012. In this case, as the trees are in the neighbouring gardens, the site hoarding will act as the protective fencing. The fencing will consist of a scaffold pole frame mounted with solid hoarding; the frame must be cross braced to prevent accidental movement.

8.1.2. Any root protection area within the development site will be subject to ground protection restrictions. The development site is currently under hard surfacing for vehicle access or forming the concrete floors of the existing garages. This should be retained to provide the ground protection.

8.1.3. All materials storage and mixing will be confined to areas outside the RPAs of all 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 RPAs. All contractors' facilities will be located on the west side of the development site outside the RPAs of the retained trees.

8.1.4. All tree protection measures **must** be in place before any works commence or materials or machinery is brought onto site. 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

8.1.5. Protective fencing must be clearly marked using a warning sign such as the example shown in Fig 3. If a protective fence requires temporary repositioning, ground protection must be used within the exposed RPAs unless there is existing hard surfacing. The use of a proprietary ground protection system such as Eve Trakway or Groundtrax would be suitable as temporary ground protection and provides flexibility in positioning panels.

8.2. Demolition of the Existing Garages

8.2.1. All tree protection must be in place before the existing garages are demolished. Plant operating on site must not enter the RPAs of retained trees unless on existing hard surfacing or areas where temporary ground protection is in place.

8.2.2. The garages will be demolished working from the north and west sides (New End Square) pulling inwards into the building footprint. The existing concrete floor will require removal, but where possible the existing hard surfaces should be retained as ground protection for the duration of the development. The hard surfacing can be broken up by use of a pneumatic hammer and the broken sections removed by hand. Whilst it is unlikely that

significant roots will be present beneath the hard surfacing, a mechanical digger should not be used as there is potential for roots to be ripped out of the ground in error.

8.3. Installation and/or upgrading of existing services

8.3.1. Where new services are installed, these will be positioned outside the RPAs of the retained trees. If services are to be located close to the RPAs, all excavations must be undertaken by hand or with the use of an Air Spade with the intention of retaining all roots over 25mm diameter intact and undamaged.

8.4. Basement Excavations in RPAs

8.4.1. Any work in RPAs **must** be carried out with care as set out in Appendix C section 1.6. On this site special precautions **must** be taken near retained trees, particularly tree 1 (refer to Appendix C section 1.12 and drawing TPP_26NEWENDSQ_1 REV A for locations of Special Precaution Areas).

8.4.2. Secant piling will be installed before the basement is excavated. Secant pile wall is an earth retention system formed by installing overlapping bored piles. The nature of the secant piled wall will be that any roots going into the excavated area will have been cut off by the installation of the piled wall. The piles will be installed from existing ground level with the piling rig restricted to the existing hard surfacing or temporary ground protection if required. Piles will be sleeved with an impermeable membrane to prevent leachates from poisoning roots and to design against heave and shrinkage.

8.4.3. Within the RPAs the outer face of all concrete foundations will be sheathed to protect the soil and adjacent roots from the potential toxic effects of concrete. Impermeable sheathing will be required to below the level of the rooting zone to approximately 1 metre depth.

8.4.4. 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.

8.5. Foundation Excavations in RPAs

8.5.1. The north section of the new building will be constructed on a contiguous pile foundation with the ground beam set above the rooting level. Contiguous pile walls are installed using rotary bored or CFA techniques. This type of retaining wall is constructed with close spaces between adjacent piles.

8.5.2. There are a number of speciality piling rigs that can operate in confined spaces, with restricted mast lengths to enable the rig to work in areas of limited headroom, light weight construction to reduce loading, and rubber tracks to minimise ground compaction and damage. For example, GP Services T15000 (specification below) rig which can drill 350mm diameter holes through most ground conditions up to 22m deep. The use of a speciality piling rig combined with appropriate ground protection will enable the necessary construction activities to be undertaken without damage being caused within the RPAs of the trees.

Neil Foundation Systems GP Services T15000 Technical Specifications	
Height when drilling	2400mm
Min. width	720mm
Max. width	1020mm
Length	1800mm
Weight	2500kgs
Mast length	2200mm
Max Torque	15000 Nm

8.5.3. Concrete/cement is toxic to tree roots. Piles will be sleeved with an impermeable membrane to prevent leachates from poisoning roots and to design against heave and shrinkage. The outer face of the concrete foundation pads and ground beams will be sheathed to protect the soil and adjacent roots from the potential toxic effects of concrete. Impermeable sheathing will be required to below the level of the rooting zone to approximately 1 metre depth.

There will be no excavations within the Root Protection Area without reference to the arboriculturalist.

8.5.4. Clumps of roots less than 25mm diameter (including fibrous roots) will be retained in situ without damage. 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. All exposed roots to be removed should be cut cleanly with a sharp saw or secateurs approximately 20cm back from the face of the final excavation.

8.5.5. 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.

8.6. Changes of Surface

8.6.1. Removal of existing surfacing (any hard surface used as a vehicular road, parking or pedestrian path including tarmac, solid stone, crushed stone, compacted aggregate, concrete and timber decking; this does not apply to compacted soil with no hard covering) is a high risk to any adjacent tree roots. In this case, where required, the existing concrete surface should be broken up by pneumatic hammer, it can be carefully lifted away working away from the tree 1 and using the hard surfacing as ground protection. If required, the sub-base should be removed by hand digging to ensure no tree roots are present beneath the hard surface.

8.7. Installation of new Surfaces

8.7.1. Changes of surfacing within RPAs is potentially very damaging as it usually involves changes in gradient/levels that may lead to root damage. As cement is toxic to roots, any excavations close to the RPAs must be lined with an impermeable membrane to prevent concrete leachates being exposed to roots. Whenever practicable, the old hard surface should be removed by working away from the tree so that any plant/equipment operates from the existing hard surface to prevent compaction damage.

8.7.2. Minor changes in surface levels may be required. In the area against the house the levels may require increasing by approximately 0-215mm to allow for access; and the upper zone (against the garden wall) will be increased by 0mm to 500mm (since it's a sloping site). This is within the area that is currently under hard surfacing and so is likely to be formed of compacted sub-base materials and made ground. The minor raising of levels within this area is not considered to be a significant issue.

8.8. Boundary Treatments

8.8.1. New timber fencing will be installed on the north and west boundaries of the site, this will include a pre-grown 'living screen' of Ivy to create a soft border on the northern boundary. The excavations for supporting posts/foundations should be excavated by hand to ensure no roots are present. If significant roots >than 25mm diameter are found it may be possible to cut them under advice from a suitably qualified arboricultural professional. If the roots have to remain, the fencing design should be suitably flexible to allow repositioning of the supporting posts. All excavations within the RPAs will be undertaken by hand digging only. Any design involving concrete must utilise an impermeable membrane in the excavation to prevent concrete leachates contacting roots.

8.8.2. In addition, a small section of brick wall will be installed on the northern boundary to create the garden gate entranceway to the property. This will be constructed on a screw piled foundation utilising two or three piles with small concrete pads to create the bearing surface for the brickwork. The excavation for the concrete pads will be a maximum of 300mm. The excavations will be undertaken by hand digging only and the concrete pads positioned around any roots over 25mm diameter. The excavations will be lined with an impermeable membrane in the excavation to prevent concrete leachates contacting roots. This works will be monitored by suitably qualified arboricultural professional.

8.9. Use of cranes

8.9.1. The use of cranes or other lifting equipment could damage a tree if the cranes jib or load encounters tree branches. Caution is needed during working operations to ensure the crane's jib or other plant and equipment does not damage any retained tree. The use of a Bank's Man with the ability to observe and communicate directly with the crane or plant operator may be a solution to avoid damage and may be considered in any Risk Assessment undertaken by the Crane Operator.

8.10. Landscaping

8.10.1. All retained 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. The use of mechanical cultivars within the RPAs is not allowed. All planting must be carried out using hand tools. No herbicides should be used to clear weeds as this will be taken up by the tree roots and likely lead to long-term damage.

8.10.2. Areas currently covered by hard surfacing may require decompaction by Terravent and resoiling with clean topsoil to improve the conditions for plant growth.

8.10.3. Consider tree planting within rear communal gardens of the flats at 26 New End Square as a long-term replacement for tree 2 (Japanese Flowering Cherry).

8.11. Other tree-related site works

8.11.1. **Pre-commencement site visit:** This is a small-scale development not requiring specialised construction methods or significant tree protection measures and therefore it is not considered necessary to arrange site meetings for this aspect. Any modifications to the proposed development may require that the tree report is updated.

8.11.2. **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. All personnel engaged in works near trees must have access to written copies of the method statement and understand the content before working near trees.

8.12. Sequence of events Table

Proposed Works
1. Undertake facilitation tree works- if required
2. Implementation of protective barriers and ground protection as per the TPP.
3. Pre-commencement site meeting including the contractor, LPA Landscape/Tree Officer and the supervising Arboriculturist or suitable delegate.
4. Construction operations, including further supervisory visits by the Arboriculturist or suitable delegate.
5. Removal of protective barriers.
6. Post-completion site meeting with all relevant stakeholders

9. General

9.1.1. 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.

9.1.3. 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.

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APPENDIX A TREE SCHEDULE LAND TO REAR OF 26 NEW END SQUARE, LONDON NW3 1LS.

Tree No.	Species	Height (m)	Stem No.	DBH (mm)	Crown radius (m)				Lower crown height (m)	Life stage	Condition Comments	Est. Rem'ing contrib'n	BS Cat	RPA (m^2)	RPA as circle of radius (x)m
					N	E	S	W							
1	Common Oak	18	1	620	6.3	3.5	5.8	7	3	EM	Good condition. Normal vigour. Roots lifting surfacing. Tree located within hard surface area. Epicormics on stem. Previously crown reduced. Light deadwood in crown. Unbalanced crown shape. Branches encroaching upon building. Screen value. Prominent tree. Contributes to general amenity of area.	40+	B2	173.9	7.44
2	Japanese flowering cherry	8	1	330	1	3	6	3	3.5	M	Declining condition. Low vitality. Bark wounds on surface roots. Exposed roots. Multiple stems above 1.5m. Included bark present in main fork. Rubbing branches causing damage. Light deadwood in crown. Crown becoming sparse. Dieback in crown. Foliage pale yellow with green veins. Upright /ascending branches. Unbalanced crown shape. Contributes to general amenity of area.	<10	C2	49.3	3.96

Tree No.	Species	Height (m)	Stem No.	DBH (mm)	Crown radius (m)				Lower crown height (m)	Life stage	Condition Comments	Est. Rem'ing contrib'n	BS Cat	RPA (m^2)	RPA as circle of radius (x)m
					N	E	S	W							
3	Sycamore	14	2	600	2.5	3	4	2.5	Not over site	EM	Average condition. Normal vigour. Occluded wounds on trunk. Cavity on stem. Epicormics on stem. Stem divides below 1.5m. Trunk forks at 0.5m. Decay pocket at fork where branch removed-good reaction wood development. Large dead stubs at topping points. Previously crown reduced. Screen value. Contributes to general amenity of area.	40+	B2	162.9	7.2

Appendix B 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 C 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. New Services

1.4.1. **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 in order 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.

1.5. Removing Surfacing in RPAs

1.5.1. 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:

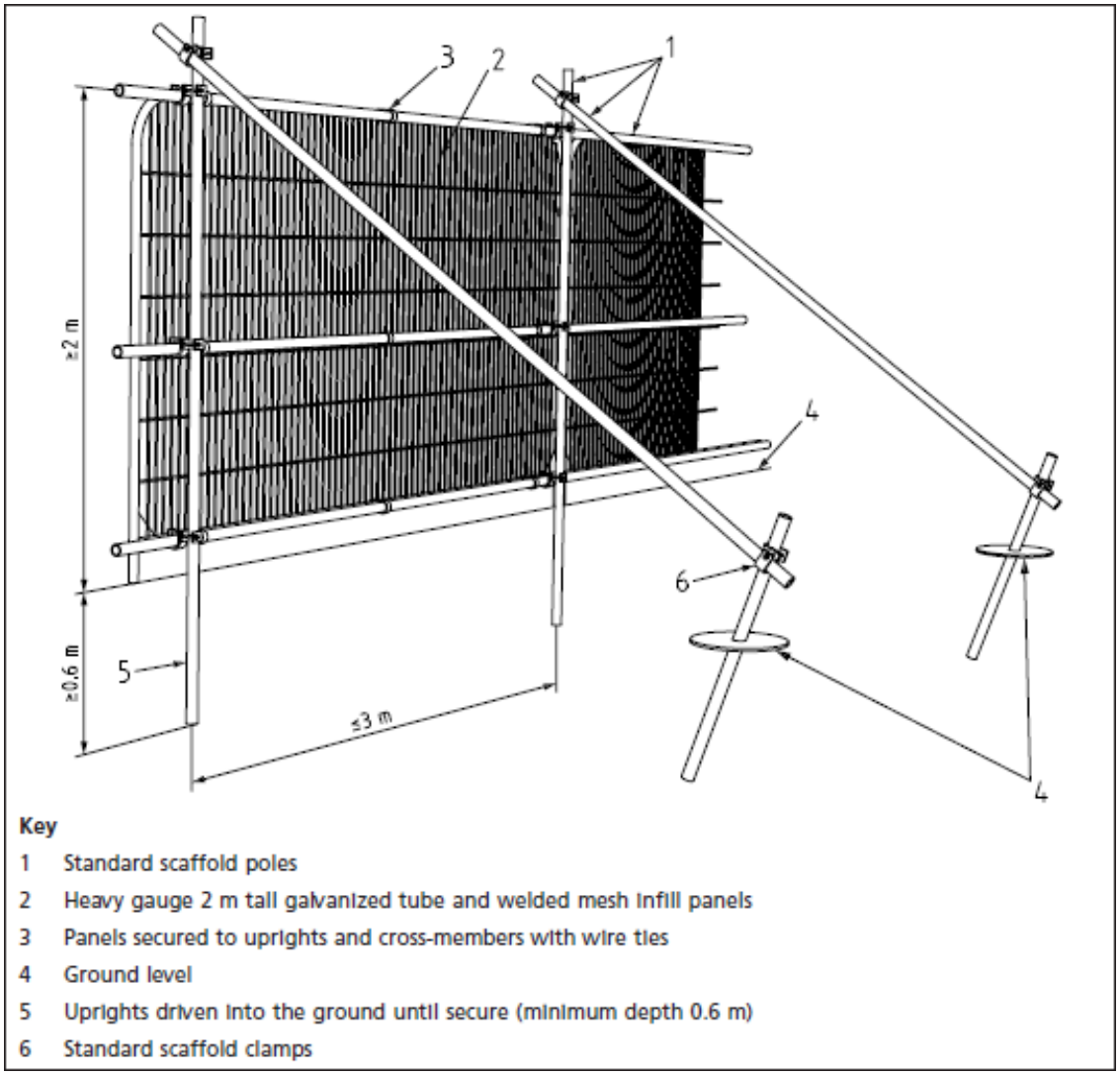
1. No vehicular activity or repeated pedestrian access into the RPAs unless on existing hard surfacing or custom designed ground protection, this must be designed for anticipated loads.
2. Regular vehicle and pedestrian access routes must be protected from compaction by temporary ground protection.
3. 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.

1.6. Soft Landscaping

1.6.1. 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 top soil 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)

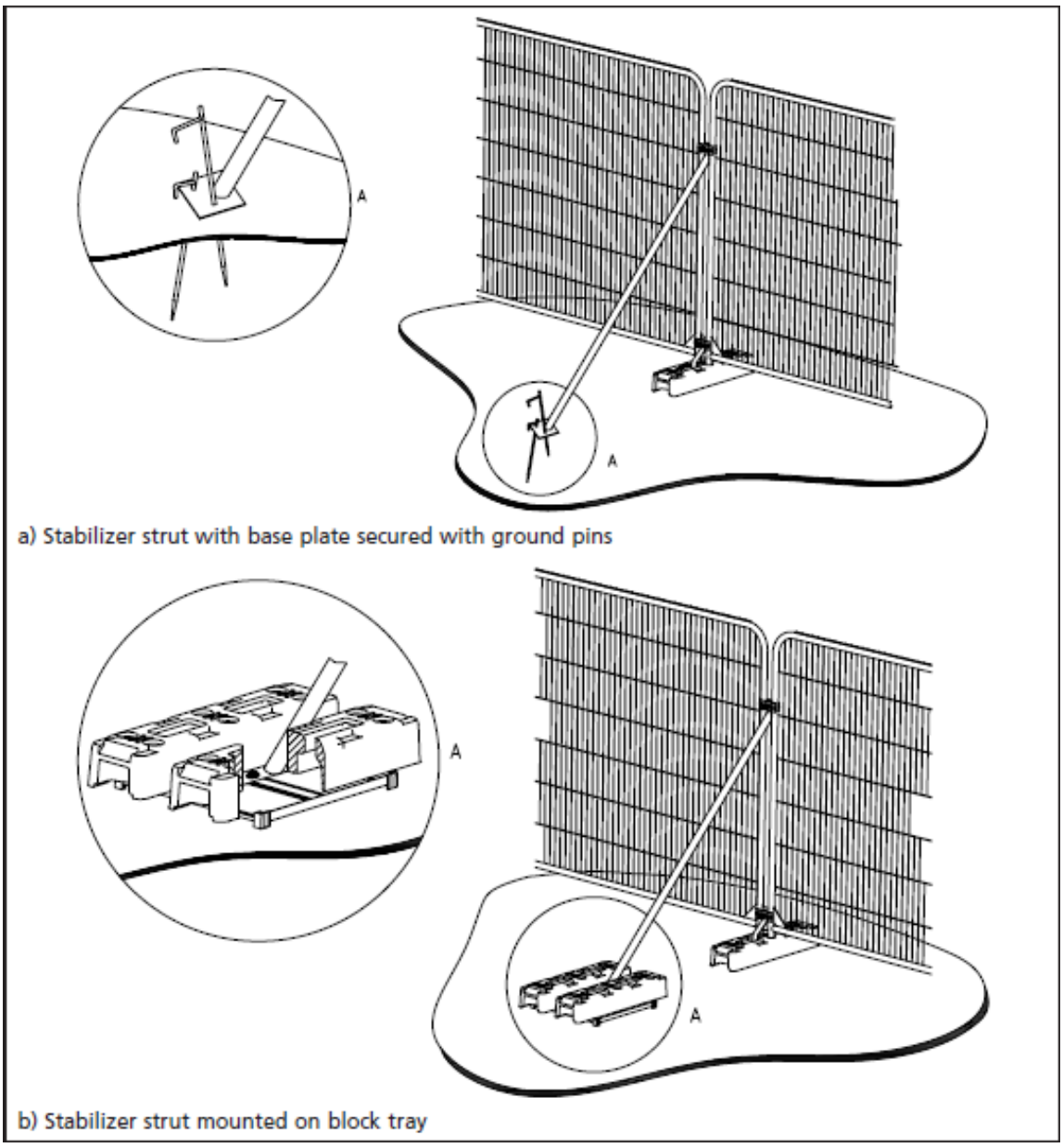


Figure 3: Example of warning notice