ARBORICULTURAL CONSULTANTS

TREE PROTECTION &

CONSTRUCTION METHOD STATEMENT

FOR REDEVELOPMENT OF

KINGS CROSS COMMUNITY HUB

51 ARGYLE ST,

LONDON

WC1H 8EF

By

ARBORICULTURAL SOLUTIONS LLP

ORIGINAL – DECEMBER 2020.

SUMMARY

The purpose of this report is to provide a consideration of the arboricultural implications created by the proposed development. In accordance with the specifications and recommendations of BS5837:2012 "Trees in Relation to Design, Demolition, and construction – recommendations", I have inspected all the trees on and near the site that could be affected by the development and list their details in Appendix A.

The application is for the redevelopment of the existing Kings Cross Brunswick Neighbourhood Association building including front and rear extensions and lower ground level development. As a result, ten trees were inspected. The implications of the proposal are:

- Trees 1 (Cherry Plum), 5 and 6 (Purple-leaf Plum) and tree 9 (Downy Birch) will require removal to facilitate the redevelopment.

- Trees 3 (Downy Birch), 4 (Italian Alder), 7 and 8 (Fastigiate Hornbeam) are outside the proposed construction area. These trees will be protected and retained.

- Trees 2 (Purple-leaf Plum) and 10 (Downy Birch) are within the construction area. These trees will be retained and will require special precautions (refer to 8.1 Tree Protection Method Statement) to minimise the risk of damage to the roots.

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 re-development of the existing Kings Cross Brunswick Neighbourhood Association building. We are to report on the current condition of the trees, their amenity value and suitability for retention and also provide comments on any potential impacts on the trees from proposed development and guidance on any necessary tree protection.

1.2. Drawings and Documents

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

- Lower ground floor as proposed. Drawing number 16L12A01 Rev B at scale 1:100@A2.
- Roof floor as proposed. Drawing number 16L12A02 Rev B at scale 1:100@A2.
- Front elevation as proposed. Drawing number 16L12A03 Rev A at scale 1:100 & 50@A2.
- Rear elevation as proposed. Drawing number 16L12A04 Rev A at scale 1:100 & 50@A2.
- Section BB as proposed. Drawing number 16L12A05 Rev B at scale 1:100 & 50@A2.
- Section CC as proposed. Drawing number 16L12A06 Rev A at scale 1:100 & 50@A2.
- Section DD as proposed. Drawing number 16L12A07 Rev A at scale 1:100 & 50@A2.
- Section EE as proposed. Drawing number 16L12A08 Rev B at scale 1:50@A2.
- Section FF & GG as proposed. Drawing number 16L12A09 Rev A at scale 1:50@A2.
- Existing ground level plan. Drawing number 16L12SK.

2. Report on site visit

2.1. General

2.1.1. The site was inspected on 20th October 2020 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.

2.1.2. The relevant data was recorded to assess the condition of the trees, their potential constraints on the proposed development and the protection and construction measures required to ensure their long-term retention.

2.1.3. Information is given on condition, size and indicative positions in accordance with British Standard 5837:2012 *Trees in relation to design, demolition and construction – Recommendations.*

3. Tree inspection and methodology

3.1. Inspection

3.1.1. Trees likely to be affected by the development were identified and inspected from ground level only. The trees were inspected based on the Visual Tree Assessment (VTA) method as proposed by Mattheck and Breloer (1994) 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 existing site plan provided in CAD format 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 produce a Tree Constraints Plan (TCP) showing the constraints on the existing site layout (refer to drawing TCP_KINGSXHUB_1 Rev A). This information is then overlaid on the proposed layout and a tree protection plan produced (refer to TPP_KINGSXHUB_2 REV A).

3.3.3. 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 Community Centre grounds close to buildings 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.

3.3.4. 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**

3.3.5. 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 is on the north side of Argyle Street, and currently consists of a community centre located entirely at lower ground floor level. The front part of the centre is below a three-storey residential block (49 Argyle Street), while the rear part is below a six-storey block of flats (Fleetfield), both of which form part of the Birkenhead Street Estate. The existing entrance to the community centre is below street level and is accessed via a ramp and steps from Argyle Street.

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 falls within the Kings Cross St Pancras Conservation Area. The boundary with the Bloomsbury Conservation Area runs down the middle of Argyle Street to the south and along the western boundary of the site where 19 Grade II listed houses on Argyle Square back on to the site. It is unlikely that the trees surveyed are subject of TPO as they are on land owned and maintained by London Borough of Camden Housing Services.

4.3. Development Proposal

4.3.1 The development proposal is to redevelop the existing Kings Cross Brunswick Neighbourhood Association building including internal alteration and refurbishment of the existing community centre and new front and rear extension to create the new King Cross Community Hub. The works include new landscaping at front and rear.

5. Tree Population

5.1. Tree schedule

5.1.1. As noted in sections 2.1.3. and 3.2, inspection of the trees followed a defined protocol as per BS 5837:2012 to ensure a systematic and consistent approach and assessment of the condition and value of the trees.

5.1.2. Refer to appendix A for detailed records of individual trees and drawing Tree Protection Plan (TCP_KINGSXHUB_1 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.

5.2. Species diversity

Species	Number
Cherry Plum	1
Purple-leaved Plum	3
Downy Birch	3
Italian Alder	1
Fastigate Hornbeam	2
Total:	**10**

5.2.1. The tree population comprises four different genera. It is typical of Local Authority amenity planting and there are no rare or unusual species present.

5.3. Age distribution

Age class	Number
Semi-mature	2
Early mature	2
Mature	6
Young	0
Dead	0
Total:	**10**

5.3.1. The age of the trees is skewed towards trees with a life expectancy of 20 to 40 which are likely to provide medium-term continuity of canopy cover in the area.

5.4. Grade classification

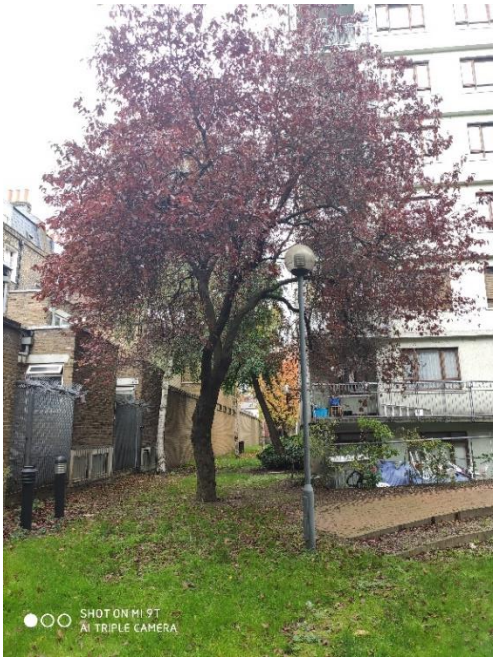
Tree grade	BS5837:2012 Definition	Number
A	High	0
B	Moderate	3
C	Low	6
U	Remove	1
Total:		6

5.4.1. Tree 1 has been categorised as U (Trees unsuitable for retention) as it has a fungal bracket of *Ganoderma* on the trunk and is in such a condition that it cannot realistically be retained in the context of the current land use for longer than 10 years.

Photographs 1 and 2 showing tree 1 (Cherry Plum) and fungal bracket on trunk.

5.4.2. Trees 2 to 6 are considered to be of low category reflecting their small size and restricted amenity value. These trees are growing at the rear of the existing Community Centre building and so are of restricted public amenity value (refer to photographs 3 to 6 below).

5.4.3. Trees 7, 8 and 10 have been categorised as B2. Trees 7 and 8 are in good condition and of long-term potential and tree 10 is a prominent tree at the front of the buildings (refer to photographs 6 and 7 below).



Photograph 3 showing tree 2.

Photograph 4 showing trees 3 and 4.

Photograph 5 showing trees 5 and 6.

Photograph 6 showing tree 5 to right of tree 7 at centre.

Photograph 7 showing trees 9 and 10 at the front of the building.

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. The proposed development will have no impact on the root protection areas of trees 3, (Downy Birch), 4 (Italian Alder), 7 and 8 (Fastigate Hornbeam). These trees will be retained, and protective fencing installed to prevent construction access to these trees.

6.1.4. Trees 1 (Cherry Plum), 5 and 6 (Purple-leaf Plum) and tree 9 (Downy Birch) will require removal to facilitate the redevelopment. Trees 1, 6 and 9 are within the footprint of the proposed building and so cannot be retained.

6.1.5. The basement excavation extends into the west side of the RPA of tree 5 and in addition, the tree is located within the proposed garden area. Plum trees are recognised by a number of authorities as being shallow to moderately deep rooted on clay soils. Excavations within the RPA may lead to significant root damage or loss and result in a decline in the health of the tree concerned. Plum trees (*Prunus* species) are vulnerable to infection by *Ganoderma* as the infection is considered to be associated with root damage and severance. As with any fungal species that causes root and butt rot in living trees, decay by *Ganoderma* can cause mechanical failure of the stem base or root plate.

6.1.6. Trees 2 & 10 will be protected and retained. The circular representation of the root protection areas extends into the proposed construction areas. the basement excavations encroach slightly into the RPA of Tree 2 (Purple-leaf Plum). This is a very minor incursion and is unlikely to have a significant impact on the stability or health of the tree. In addition, new paving is proposed over approximately 25% of the area of the RPA. This will need to be of porous permeable design laid on a 'minimal dig' base to prevent damage to the rooting zone.

6.1.7. Tree 10 (Downy Birch) is located at the front of the property within the existing stepped and ramped access to the building and the. There are several elements of hard landscaping and hard surfacing making the prediction of the root locations difficult. The existing ground level slopes downward towards the existing building and the encroachment within the RPA to create the lower ground level patio area is less than 15% of the RPA. Birch trees tend to be shallow rooted and intolerant of root damage so any works within the RPA will require careful

monitoring. Refer to Section 8 Arboricultural Method Statement below for details of tree protection.

6.1.8. The outside area around the rear extension has been re-designed to provide new garden/planting areas around the existing ramp and the new building. In the context of the loss of trees, a comprehensive new landscaping scheme to include new tree planting will be submitted including a selection of species chosen enhance the amenity of the development. The final species selection can be made after consultation with the relevant interested parties.

6.2. Tree Protection Plan (TPP)

6.2.1. The TPP illustrates the location of the protective barriers and must be displayed on site in a highly visible area so that all staff involved in the works have a point of reference for tree protection issues.

6.3. Construction Exclusion Zone (CEZ)

6.3.1. For the purpose of this report the CEZ can be defined as all the area within the RPAs of retained trees outside the work areas and the areas behind the tree protection fencing.

6.3.2. Site operations are not permitted in the CEZs without reference to the Arboricultural Method Statement in this report (refer to section 8 of this report).

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 (m²) 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 2 and 10 may require crown pruning works to enable construction access to the development.

8.1.2. With reference to TPP_KINGSXHUB_2 REV A the retained trees 3, 4, 7 and 8 are at the rear of the development area and so are not accessible to construction traffic. It is likely that site security hoardings will be installed on the site boundary and these will act as the tree protection fencing. The areas currently under hard surfacing adjacent to trees 7 an 8 will be retained and so can act as ground protection for construction access if required. If machinery access is required to the rear of the development within the RPAs of trees 7 and 8, a proprietary ground protection system such as Groundtrax would be suitable as temporary ground protection and provides flexibility in positioning panels. If any protective fencing requires temporary repositioning, ground protection must be used within the exposed RPA unless there is existing hard surfacing.

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 Works.

8.2.1. All tree protection must be in place before any demolition work is undertaken. 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. Any demolition will be undertaken from within the existing building pulling inwards onto the existing hard surfacing. 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 trees 2 and 10 (refer to Appendix C section 1.12 and drawing TPP_KINGSXHUB_2 REV A for locations of Special Precaution Areas).

8.4.2. Before any basement or foundation excavation works commence the outline of the basement within the RPA of tree 2 will be carefully excavated by hand and any roots crossing into the footprint of the basement cleanly cut before the excavation works commence.

8.4.3. Excavations will be undertaken from within the existing building footprint working north and west towards tree 2 and to the southeast towards tree 10. Excavations within the RPAs will be undertaken by hand to below the depth of visible roots or until it can be demonstrated that there are no roots within the proposed excavation area to prevent roots being ripped out of the ground in error.

8.4.4. 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.

8.4.5. 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.

8.5. Foundation Excavations in RPAs

8.5.1. The new building will be constructed on a mini piled foundation.

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. Whilst the volume of roots within the RPA may vary, particularly where there are topographic or built features that may restrict root spread, 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. In this case, where required, the existing hard landscaping and concrete ramp surfaces within the RPA of tree 10 should be broken up by pneumatic hammer, it can be carefully lifted away working away from the tree 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. Cellular confinement systems can be used in areas where tree root damage would be caused by digging into the ground to lay a conventional sub-base for new hard surfacing and where the long-term viability of trees could be harmed if soil that they may depend upon is at risk of becoming compacted. Compaction can occur for many reasons but vehicles passing over unreinforced ground are particularly damaging, although repeated foot traffic can also be detrimental to soil structure.

8.7.3. A cellular confinement system is a series of geocells arranged in a honeycomb-like formation that is combined with an underlying geotextile and angular stone to spread loads in such a way as to minimise compaction of underlying soil. Due to its 3-dimensional structure, a geocell mat offers all-round confinement to the encapsulated material, which provides a long-term improvement in the performance of the sub-base. When a surface is reinforced in this way the load is distributed over a larger area of the subgrade-base interface, leading to lower vertical stress and reduced deformation of the subgrade. (Refer to Appendix B Fig 4. for an example of this phase of construction).

8.7.4. The finished surface can be either a granular material or permeable and gas-porous wearing surface (porous paving/tarmac or resin bound gravel) 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.

8.7.5. 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.

8.7.6. 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.

8.8. Lightly founded structures

8.8.1. Where the refuse and recycling stores, new fencing, gates or boundary walls are planned within the RPAs of retained trees, 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 design should be suitably flexible to

allow repositioning of any foundation structure. Any design involving concrete must utilise an impermeable membrane in the excavation to prevent concrete leachates contacting roots.

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. Other tree-related site works

8.10.1. **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.

8.10.2. **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.

8.11. Sequence of events Table

Proposed Works
1. Undertake facilitation tree works- if required
2. Implementation of site security hoarding
3. Construction operations, including further supervisory visits by the Arboriculturist or suitable delegate.
4. Removal of protective barriers.

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.

Report by: ***Fiona Critchley B. Sc. (Sp. Hons), Ad Dip. F. Arbor. A, Tech Cert. (AA), R.F.S Cert Arb LANTRA accredited Professional Tree Inspector.***

Checked by: Graham Causey ***B. Sc (Hons), F. Arbor.A. R.F.S Cert Arb. LANTRA accredited professional tree Inspector.***

APPENDIX A TREE SCHEDULE: KINGS CROSS COMMUNITY HUB

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	Cherry Plum	9	1	490	3.5	4	2.5	2.5	3	M	Declining condition. Normal vigour. Leaning east. Root spread restricted. Basal growth. *Ganoderma* at 1m east side. Stem divides above 1.5m. Previously crown reduced. Rubbing branches causing damage. Crown distorted due to group pressure. Branches encroaching upon building.	<10	U	108.6	5.88
2	Purple-leaf plum	8	1	410	4.5	4	4.5	4.5	1.5	M	Average condition. Normal vigour. Root spread restricted. Basal growth. Basal decay present. Occluded wounds on trunk. Decay present on stem. Stem divides above 1.5m. Included bark present in main fork. Previously crown reduced. Rubbing branches causing damage. Branches restricting highway light.	<10	C2	76	4.92

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	Downy Birch	12	1	260	1	1.5	3.5	2	2	M	Average condition. Normal vigour. Tall drawn form. Root spread restricted by adjacent building. Exposed roots. Crown distorted due to group pressure. Branches encroaching upon building. Inappropriate location within 1m of building.	20+	C2	30.6	3.12
4	Italian Alder	11	1	360	3	1.5	3.5	6	3	EM	Average condition. Normal vigour. Leaning south-west. Root spread restricted. Light deadwood in crown. Unbalanced crown shape. Lateral spread reduction in past. Branches encroaching upon building. Inappropriate location within 1m of building bowed trunk	20+	C2	58.6	4.32
5	Purple-leaf plum	7	3	200	3	1	2.5	3	1.5	M	Average condition. Normal vigour. Exposed roots. Multiple stems below 1.5m. Occluded wounds on trunk. Rubbing branches causing damage. Crown distorted due to group pressure. Low branches over road/footpath.	20+	C2	18.1	2.4

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							
6	Purple-leaf plum	5	1	210	1	1	1.5	2.5	1.5	EM	Average condition. Normal vigour. Stem divides below 1.5m. Occluded wounds on trunk. Rubbing branches causing damage. Crown distorted due to group pressure. Low branches over road/footpath.	20+	C2	20	2.52
7	Fastigate Hornbeam	8	1	210	1.5	1.5	1.5	2	2	SM	Good condition. Normal vigour. Roots lifting surfacing. Tree located within hard surface area. Included bark present in main fork. Branches restricting highway light.		B2	20	2.52
8	Fastigate Hornbeam	8	1	240	2.5	2.5	2.5	2.5	2	SM	Average condition. Normal vigour. Roots lifting surfacing. Tree located within hard surface area. Major bark wounding on stem. Included bark present in main fork.		B2	26.1	2.88

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							
9	Downy Birch	13	3	210	3	3	3.5	3.5	2	M	Average condition. Normal vigour. Poor shape & form. Exposed roots. Multiple stems at ground level. Included bark present in main fork. Possibly topped at 7m in past stems rubbing & crossing at 1m. Rubbing branches causing damage. Light deadwood in crown. Low branches over road/footpath. Branches restricting highway light. Screen value. Appropriate to location. Contributes to general amenity of area.	10+	C2	20	2.52
10	Downy Birch	16	3	410	5	6	3	5	2	M	Good condition. Normal vigour. Root spread restricted. Rubbing branches causing damage. Light deadwood in crown. Crown distorted due to group pressure. Low branches over road/footpath. Screen value. Tree prominent in locality. Appropriate to location. Contributes to general amenity of area.	20+	B2	76	4.92

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. 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

1.4.2. 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 in order to prevent any damage to roots within these areas.

1.5. Excavating in RPAs

1.5.1. 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 some 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.

1.5.2. 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.

1.6. Removing Surfacing in RPAs

1.6.1. 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

1.6.2. 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.

1.7. Installation of new Surfacing in RPAs

1.7.1. 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.

1.7.2. 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 take into account the high points by infilling with a suitable material.

1.7.3. 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.

1.7.4. 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.

1.7.5. 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.

1.7.6. **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

1.7.7. **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.

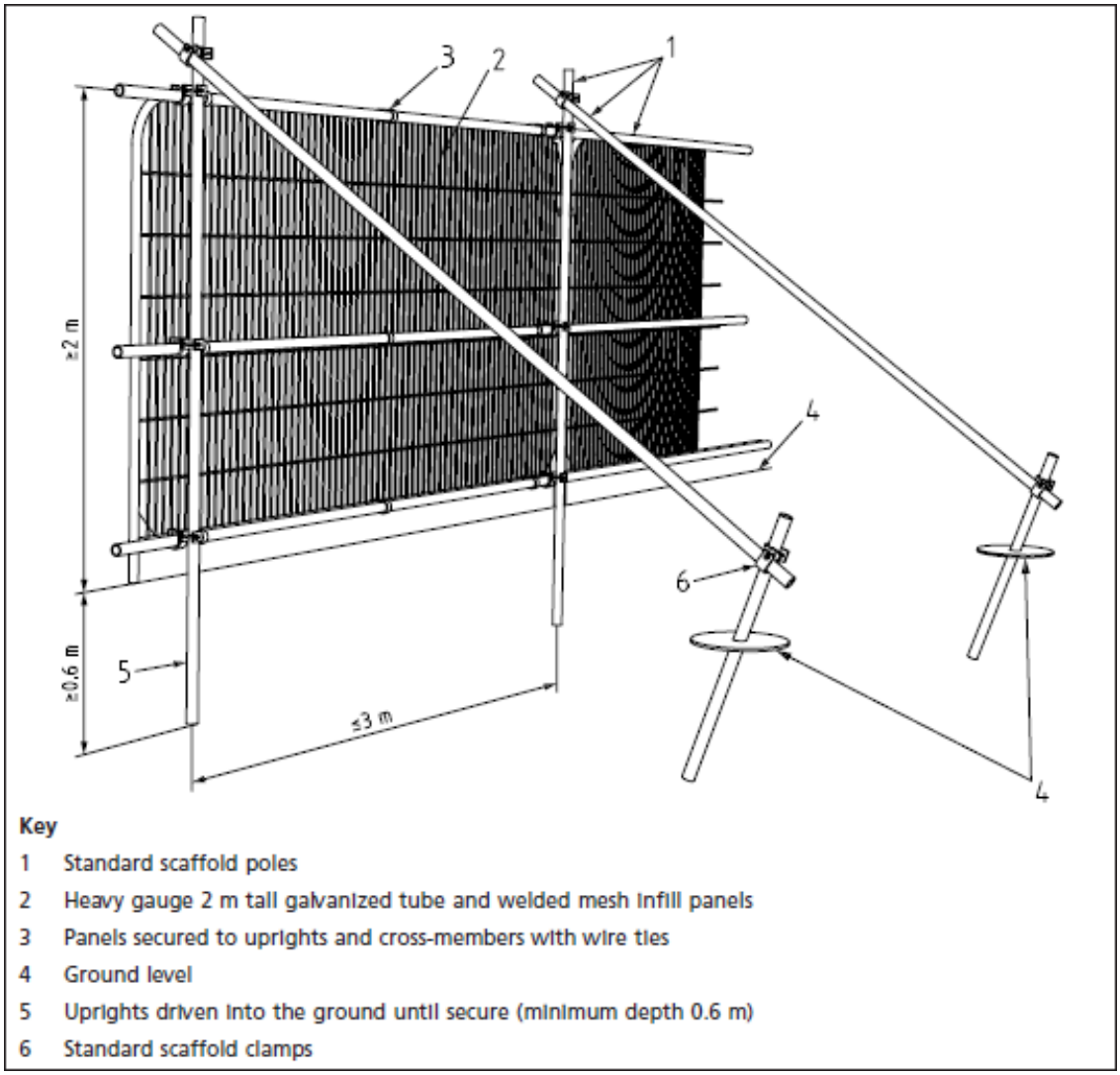
1.7.8. **Graded Soil**

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.

1.7.9. **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.

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)

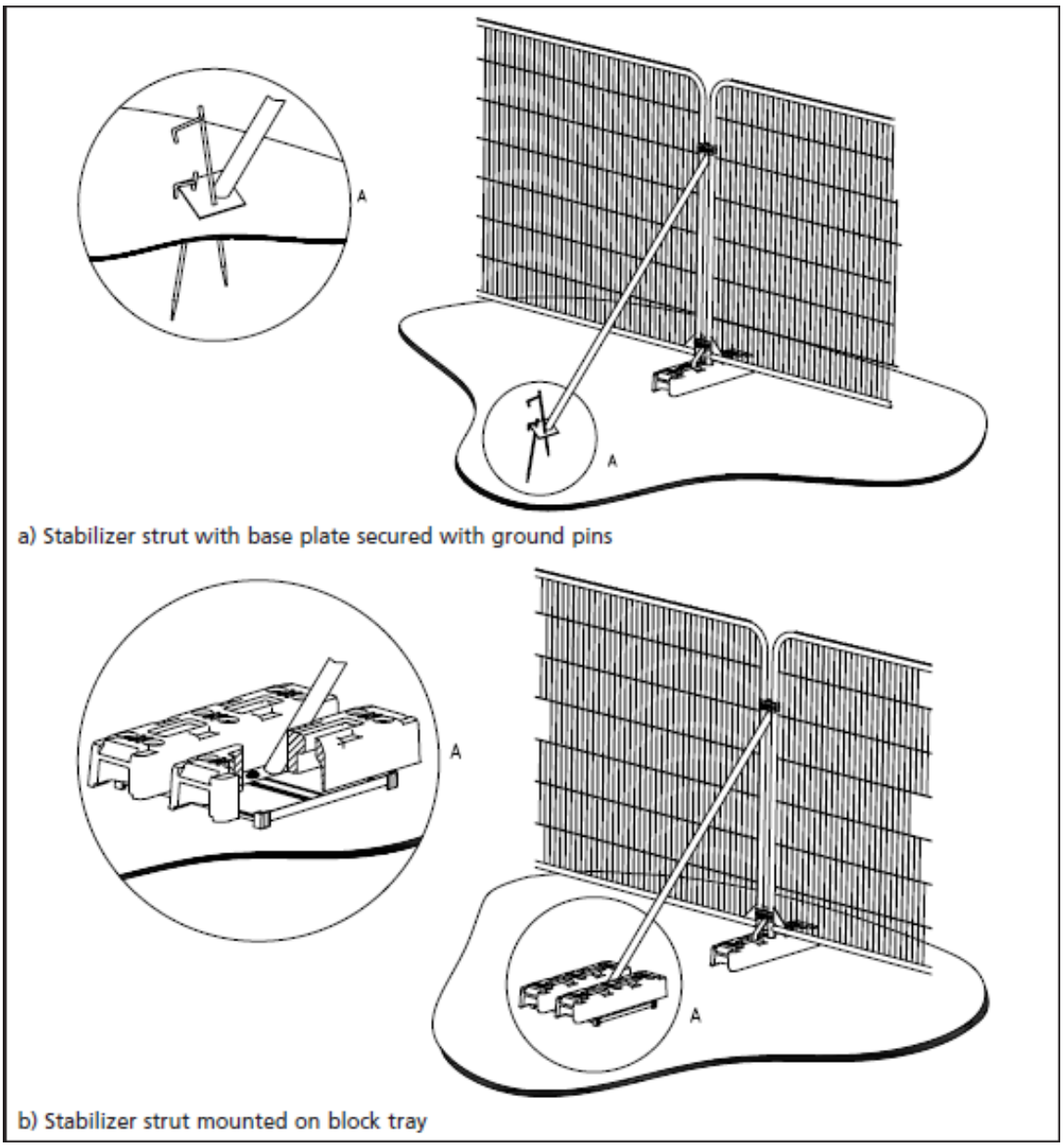


Figure 3: Example of warning notice

FIGURE 4: CELLULAR CONFINEMENT SYSTEM

Fig 1: EXAMPLE OF INSTALLATION OF CELLULAR CONFINEMENT SYSTEM

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3 WALNUT CLOSE
PETERBOROUGH, PE7 1LL

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EMAIL: grahamcausey@gmail.com
fionacritchley2016@gmail.com

KEY

BS CAT B

BS CAT C

BS CAT U

ROOT PROTECTION AREA

SHADE SEGMENT

Fleetway

Fleetfield

ARGYLE STREET

SQUARE

T1 T2 T3 T4 T5 T6 T7 T8 T9 T10

accessible toilet
kitchen
office
wc
games room
office
store
store
games room
store
RAMP
RAMP
RAMP

0m 1m 2m 3m 4m 5m

DRAWING TITLE

TREE CONSTRAINTS PLAN

EXISTING SITE

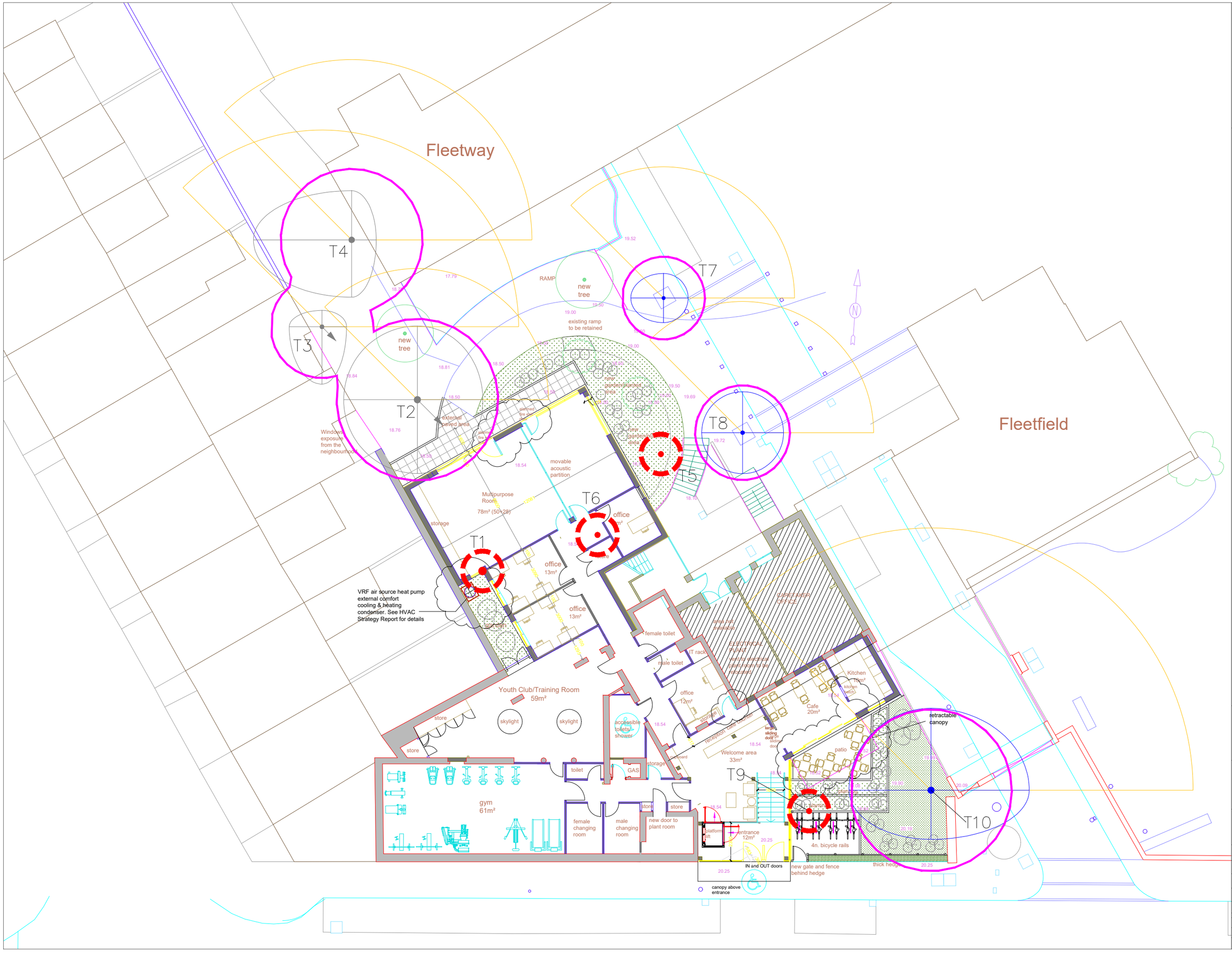
PROJECT

KINGS CROSS COMMUNITY HUB

CLIENT

SCALE	1:200@A3
DATE OF ISSUE	OCT 2020
SURVEYOR	FC DATE 19/10/20
DRAWN BY	GMC
DRAWING No.	TCP_KINGSXHUB_1 REV A

No.	DATE	REVISION



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KEY

- BS CAT B
- BS CAT C
- BS CAT U
- ROOT PROTECTION AREA
- SHADE SEGMENT

DRAWING TITLE

TREE CONSTRAINTS PLAN
PROPOSED SITE

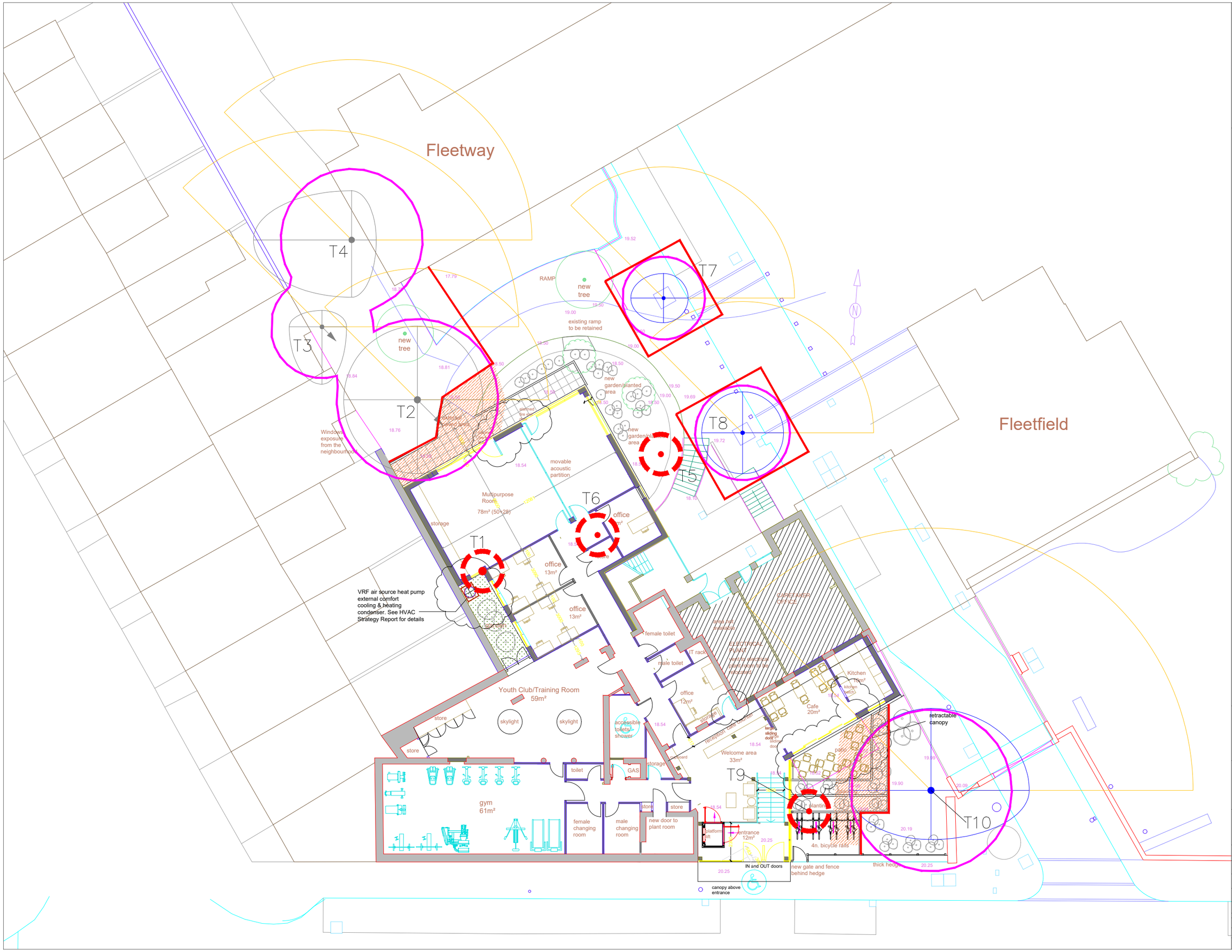
PROJECT

KINGS CROSS COMMUNITY HUB

CLIENT

SCALE	1:200@A3		
DATE OF ISSUE	OCT 2020		
SURVEYOR	FC	DATE	19/10/20
DRAWN BY	GMC		
DRAWING No.	TCP_KINGSXHUB_2	REV	A

No.	DATE	REVISION



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KEY

BS CAT B

BS CAT C

ROOT PROTECTION AREA

SHADE SEGMENT

TREE REMOVED

GROUND PROTECTION & SPECIAL PRECAUTIONS

PROTECTIVE FENCE

DRAWING TITLE

TREE CONSTRAINTS PLAN

PROPOSED SITE

PROJECT

KINGS CROSS COMMUNITY HUB

CLIENT

SCALE	1:200@A3		
DATE OF ISSUE	DEC 2020		
SURVEYOR	FC	DATE	19/10/20
DRAWN BY	GMC		
DRAWING No.	TPP_KINGSXHUB_2		A

No.	DATE	REVISION