BS5837:2005 Tree Survey Report, incorporating Arboricultural Implications Assessment and Method Statement

In support of an application
for a docking station on the
carriageway and footway adjacent to:

Nos. 1-30 Gordon Mansions on Huntley Street
WC1

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SUMMARY AND OVERVIEW

Transport for London has been tasked with coordinating the implementation of a comprehensive Cycle Hire Scheme within London. The Cycle Hire Scheme requires the installation of a network of about 400 docking stations in nine central London boroughs. The Cycle Hire Scheme is planned to be operational by Summer 2010.

This Tree Survey Report relates to the installation of a docking station (made up of two sets of docking points and a terminal) on the carriageway and footway adjacent to nos. 1-30 Gordon Mansions on Huntley Street, WC1, and supports the application for full planning permission. It presents the results of an arboricultural survey conducted to BS5837:2005, along with an *Arboricultural Implications Assessment* and an *Arboricultural Method Statement*. The survey was undertaken by Cresswell Associates (a Hyder Consulting Group company) on behalf of Transport for London.

The proposed docking station (hereafter referred to as 'the Site') is located within the Root Protection Areas (RPA) of a single newly planted Field Maple (*Acer campestre*) tree (T1), located within the Site footprint. Full details of this tree are included in the Tree Data Schedule (Appendix 3).

The Tree Implications Table (Section 5.2) sets out the likely implications of excavation for the foundations of the docking points and the terminal on trees adjacent to the Site.

Given that T1 is located within the footprint of the proposed development, the docking station is to be constructed to allow the effective long-term retention of this tree. Since T1 is a recent planting, it is anticipated that the roots from this tree shall still be confined within the pit dug to facilitate planting, and it is highly unlikely that any roots will be encountered during excavation, and no risk to the tree from excavation within the Site is expected.

No remedial pruning works are necessary in order to facilitate the use of machinery during construction works. However, since a proportion of the branches of T1 are located above the Site at a height of 2 metres, the Clerk of Works shall ensure that all machinery operatives are made aware of the necessity to avoid contact with all branches and stems during construction

The stem of T1 shall require additional protection, as specified in Section 6, to prevent damage by construction machinery.

Assuming that the measures outlined in the Arboricultural Method Statement are adopted, it is considered that the proposed docking station would not detrimentally impact on trees within the vicinity of the development.

1 INTRODUCTION

1.1 Background and instructions

Hyder Consulting (UK) Limited have been instructed by Transport for London (TfL) to conduct an Arboricultural Survey at the site of a proposed Cycle Hire Scheme docking station on the carriageway and footway adjacent to Nos. 1-30 Gordon Mansions on Huntley Street, WC1. This report also includes an Arboricultural Implications Assessment (AIA) and an Arboricultural Method Statement (AMS).

Surveys have been undertaken with reference to a supplied plan, showing the location and extent of the proposed development (the 'General Arrangement', drawing number: TE00596/D127, Rev_A, provided by TfL). Tree positions in the vicinity of the Site have been plotted in accordance with this plan. Where the arboricultural survey has identified additional trees, the locations of these have been plotted on the Tree Constraints Plan (Appendix 4) using measurements taken on site

1.2 Scope and purpose of the report

This report is designed to accompany a planning application for the installation of a Cycle Hire Scheme docking station at the Site. Its purpose is to assist and inform the planning process according to guidelines laid out in BS5837:2005 'Trees in relation to construction – recommendations' (BSi, 2005).

Where applicable, trees located on or adjacent to the Site have been surveyed where either:

(i) the *Root Protection Area* (RPA) of the tree is located within or adjacent to the footprint of the development; or
(ii) young plantings occur immediately adjacent to the Site, which have the potential to affect the proposed docking station as they grow and their root systems develop.

All young plantings have been surveyed, including those with a stem diameter below 75mm.

The main sections of the report are set out as follows:

- Section 2: Tree Survey Methodology;
- Section 3: Site Overview, which should be read in conjunction with the Tree Constraints Plan (Appendix 4);
- Section 4: Results of the Tree Survey and Recommendations, which should be read in conjunction with the Tree Data Schedule (Appendix 3);
- Section 5: Arboricultural Implications Assessment; and
- Section 6: Arboricultural Method Statement.

2 TREE SURVEY METHODOLOGY

2.1 Date of survey

This report is based on a visual inspection carried out by Stuart Harris on 22 April 2010.

2.2 Survey methodology

The tree survey included all trees with the potential to be affected by the proposed development, as detailed in Section 1.2. Trees were visually surveyed from ground level using the *Visual Tree Assessment* (VTA) technique developed by Mattheck and Broeler (1994). No climbed inspections or specialist decay detection was undertaken.

In line with the approach recommended in BS5837:2005, the following data was gathered for each tree surveyed:

- Tree number
- Tree species (botanical names follow Stace (1997) for higher plants)
- Age (expressed as an age class category)
- Tree height (in metres)
- Crown height (height of crown clearance above ground in metres)
- Stem diameter (measured at 1.5 metres above ground level)
- Crown spread (measured in north, south, east and west directions)
- Observations on tree position, form, pruning history and any major defects observed
- Recommendations for arboricultural works, required in association with the docking station, along with a priority rating for completion of these works
- Tree physiological and structural condition
- Life expectancy (expressed as one of four categories)
- BS5837 retention category

In addition, a further two categories provide exclusion distances (measured from the centre of the tree stem, as a radius). These are:

- The NJUG Prohibited Zone (NJUG, 2007)
- The Hyder recommended 'no excavation zone'

The Hyder recommended 'no excavation zone' takes into account the size and condition of the tree, any major visible roots or ground-heave close to the stem, the size, shape and expected condition of the below-ground rooting area, and the nature of the proposed development, in order to set a recommended minimum distance (from the centre of the tree stem) to **any** ground excavation.

All trees surveyed have been plotted on the Tree Constraints Plan (Appendix 4) and their data recorded in detail within the Tree Data Schedule (Appendix 3). A single tree was surveyed in relation to the Site. An explanation of the categories and definitions used in producing the Tree Data Schedule is provided in Appendix 1.

No potentially affected trees were present on adjacent private land so no desk study was carried out to investigate the presence of any Tree Preservation Orders.

2.3 Limitations

This tree survey has been undertaken with specific reference to the planning submission requirements pertaining to the Cycle Hire Scheme. As such, this report makes no attempt to provide a full safety inspection of the trees surveyed. It should not be seen as a substitute for a Tree Safety Survey or Management Plan, which are specifically designed to minimise risk and liability associated with responsibility for trees. Potentially hazardous trees have been highlighted and appropriate recommendations made only where urgent action is required in the interests of public safety.

Where trees were located on third party land, detailed inspection using the VTA methodology outlined above was not possible. In these instances, measurements of stem diameter and crown spread have been estimated, and the RPA plotted accordingly.

Whilst every effort has been made to detect any major defects in inspected trees, no guarantee can be given as to the safety or otherwise of individual trees. Climatic conditions including storms, drought and temperature-related factors can, and do, cause damage and/or failure in apparently healthy trees.

3 SITE OVERVIEW

The Site is located on the carriageway and footway within Huntley Street, WC1. A single newly planted Field Maple (*Acer campestre*) tree (T1), is located within the Site footprint. This represents the only tree surveyed in connection with the proposed development. Any additional trees in the vicinity of the Site which shall not be affected by the proposals have not been surveyed.

4 RESULTS OF TREE SURVEY AND RECOMMENDATIONS

4.1 Tree Data Schedule

The Tree Data Schedule is included as Appendix 3 which displays the information gathered for this tree.

4.2 Tree protection status

It is understood that T1 is not likely to be the subject of a Tree Preservation Order since it is a Local Authority owned street tree.

4.3 Tree condition and recommendations

T1 was deemed to be in an acceptable condition and no arboricultural works have been recommended at this time.

5 ARBORICULTURAL IMPLICATIONS ASSESSMENT

5.1 Design proposals

The proposal for the Site is to construct a Cycle Hire Scheme docking station, incorporating a terminal and a number of docking points. The dimensions of the Site and the location of the terminal are shown on the Tree Constraints Plan (Appendix 4). Detailed foundation designs for both the docking points and terminal have been produced for the Site, and are included in the planning submission alongside this report. On all sites, the maximum excavations which may be required for docking points and terminal are as follows:

- **Excavation for docking points:**
- trench of 700mm width and 450mm depth;

- **Terminal excavation, either:**
- as a continuation of the docking point trench at 700mm x 450mm depth; or
- as an individual excavation of 700 x 700mm width x 450mm depth.

5.2 Appraisal of Tree Implications

The Tree Implications Table, below, shows the likely implications of excavation for docking point and terminal foundations on individual trees adjacent to the Site. This is based on the dimensions of the excavation(s) as detailed above, the likelihood of encountering tree roots, and the frequency and magnitude of any roots expected. In making these assessments, consideration has been given to the observed and likely rooting conditions surrounding the tree stem.

Docking Point Excavation	**T1**
Excavated trench of 700mm x 450mm depth	Minimal
Surface-only excavation or bolt-on design (no-dig).	None
Terminal Excavation	None

Major implications include: (i) impacts of a magnitude which may significantly affect the health and survival of the tree, either in the short- or long-term, or (ii) impacts which may result in significant structural damage to the tree, such that the tree may be rendered unsafe. Example: severance of a major root in close proximity to the stem.

Moderate implications are defined as impacts which may result in impaired vigour in the short-term, but which are unlikely to significantly affect the long-term health and survival

of the tree. Example: severance of secondary roots within a restricted area inside the RPA of the tree.

Minimal implications are defined as impacts from which the tree is likely to easily recover within a short space of time. Example: loss of minor roots at the edge of the RPA, on one side only.

5.3 Summary of Tree Implications

The Tree Constraints Plan (Appendix 4) shows the location of T1in relation to the proposed development. The plan indicates that the proposed docking station is located within the footprint of the Site. Since T1 is a recent planting it is anticipated that the roots from this tree shall still be confined within the pit dug to facilitate planting, and it is highly unlikely that any roots will be encountered during excavation, and no risk to the tree from excavation within the Site is expected.

Since T1 is located within the footprint of the Site, additional protection measures (in the form of a protective tree box) have been recommended in order to prevent accidental damage to the stem and branches by construction activity.

5.4 Implications of general construction activity

Tree protection measures are specified throughout Section 6 that will ensure that the impact of general construction activity shall be minimal. It is imperative that all site personnel, including temporary contractors, are made aware of this Arboricultural Method Statement, and the restrictions which apply.

5.5 Implications of tree pruning

No pruning works are required to facilitate the proposed development.

5.6 Implications of ground level changes and surfaces

The finished ground levels will be at the level of the existing footway, approximately 70mm above the existing carriageway. There shall be no impact on rooting conditions from the increase in ground level, since no roots from this tree are likely, at present, to be within areas of proposed ground level change.

5.7 Construction exclusion zones

Since T1 is located within the footprint of the Site, protective fencing has been specified around this tree in order to protect the stem and primary branches from damage during construction activity (see section 6.3).

Outside the Site, the existing hard surfacing shall be retained over the RPA, providing sufficient protection for tree roots.

5.8 Implications of retained trees on the proposals

T1 is a recent planting with significant growth potential. Given the position of this tree, consideration has been given to the design and location of docking point foundations within the Site. These are of a design able to withstand or accommodate future

movement caused by the growth of tree roots. The docking points shall be located to allow a minimum clearance of 1m from the tree stem (which is considered sufficient to enable future growth without impacting on the Site, given that Field Maple remains a relatively small tree in maturity), and shall be positioned to enable unhindered movement of bicycles using the facility. In addition, given the location of T1 within the Site, it is recommended that additional stem protection be provided by the installation of a permanent tree guard, offering protection from the traffic of cycles into and out of the docking points.

Occasional future crown lifting may be required as this tree matures, in order to maintain adequate vertical clearance distances.

6 ARBORICULTURAL METHOD STATEMENT

6.1 Overview

This section of the report details the tree protection measures to be adopted to protect the trees. The methodology should be discussed and agreed between the Local Authority Tree Officer, TfL, and the building contractor, once appointed. Any parts of the methodology which are deemed to be inaccurate or unworkable should be highlighted and addressed at an early stage, ideally before construction commences.

6.2 Pre-construction tree works

No pre-construction tree works have been recommended.

6.3 Tree fencing and protective measures

The stem and primary branches of T1 shall require protecting before commencement of any construction activity (including ground preparation) and throughout the development process. A fencing solution shall be required which prevents access to the stems by all construction machinery, materials and personnel. Weldmesh panels or 18mm shuttering ply to a height of 1.8m should be positioned around the tree stem at a distance of no less than 0.5m from the stem centre (a 1m x 1m box has been specified). This fencing shall need to be robust enough to withstand occasional knocks from construction machinery. The fencing should be secured to the ground using brackets or ground pins. Excavation to secure the fencing shall not be acceptable.

6.4 Site fencing and site preparation

It may be necessary to fence off the Site in order to make it secure and safe. No tree constraints exist in connection with the installation of site fencing, provided that either no-dig fencing is installed, or ground pins are used to secure site fencing to the ground where required.

6.5 Removal of surfaces

All surfaces within 1 m of T1 should be removed using hand tools, and only in a manner that does not damage the tree stem or roots.

6.6 Excavation

No significant arboricultural impact is expected and excavation within the Site can proceed without recourse to specific tree protection measures other than those specified in Section 6.8.

6.7 Installation and hazardous materials

Any mixing of cement-based materials is to take place outside the RPA of T1. Provision shall be made to ensure that any required mixing areas are contained so that no water runoff enters the RPAs of any trees. All mixers and barrows shall be cleaned within this dedicated mixing area.

All other chemicals hazardous to tree health, including petrol and diesel are to be stored in suitable containers as specified by COSHH Regulations 2002, and kept away from the RPA.

6.8 General construction activity

The stem of all trees shall be adequately protected from the impacts of general construction activity by temporary protective fencing. However, since the crown of T1 overhangs the Site at a height of 2m, the Clerk of Works shall ensure that all machinery operatives are made aware of the location of this tree and the necessity to avoid contact with all branches and the stem.

6.9 Removal of fencing

Fencing shall be removed after all construction activity is completed and without the need to excavate within the RPA of any tree.

6.10 Clerk of Works

A Clerk of Works will be appointed by TfL to oversee the installation of all Cycle Hire Scheme docking stations. Prior to the commencement of any on-site activities, the Clerk of Works will be fully briefed on all potential arboricultural issues by the consultant arboriculturalist. The Clerk of Works will ensure that the specified tree protection measures are implemented, and that all activities are conducted in accordance with the Arboricultural Impact Assessment and Arboricultural Method Statement.

7 REFERENCES

British Standards Institution (2005) *BS5837:2005 Trees in relation to construction – Recommendations.* BSi, London, UK.

Mattheck, C. and Broeler, H. (1994) *The Body Language of Trees: A Handbook for Failure Analysis*. Research for Amenity Trees No.4. DETR, London, UK.

NJUG (2007) *NJUG Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees*. Volume 4: Issue 2. The National Joint Utilities Group, London, UK.

Stace, C. (1997) *New Flora of the British Isles* (Second Edition). Cambridge University Press, Cambridge, UK.

8 APPENDICES

Appendix 1: Explanation of Terms

Appendix 2: Authors Qualifications and Experience

Appendix 3: Tree Data Schedule

Appendix 4: Tree Constraints Plan

APPENDIX 1: GLOSSARY OF TERMS IN THE TREE DATA SCHEDULE

1) Numbering
Each tree, group of trees or hedgerow is given an individual reference, made up of sequential numbers prefixed by a letter where:

T= Individual Tree, G = Group of trees, W = Woodland block, H = Hedge.

2) Age and Species

Age Class
Trees are assigned to one of five age classes as follows:

Young	Tree in establishment stage, normally up to 10 years old
Semi-mature	Establishing tree with potential for significant growth both in terms of tree height and crown spread.
Early-mature	Established tree, typically having attained at least 70% of likely mature height and crown spread
Mature	Approximate full height and crown spread attained
Over-mature	Extensive decline in physiological functions and/or structural integrity
Veteran	A tree that shows features of biological, cultural or aesthetic value that are characteristic of, but not exclusive to, individuals surviving beyond the typical age range for the species.

Species
Tree names and other plant names follow Stace (1997) and are provided as Common (English) species names.

3) Size and Spread

Crown Height
Height of crown clearance above adjacent ground level in metres. Where this varies around the canopy, the height closest to the Site is recorded.

Stem Diameter
Measured in centimetres at 1.5m above ground level (Diameter at Breast Height [DBH]). On multi-stemmed trees this measurement is taken immediately above the root flare of the tree.

Crown Spread
Radial crown spread measured in four compass directions (north, south east, and west) using magnetic north.

4) Notes
This section provides details, where relevant, pertaining to the tree's position, form, pruning history and an account of any significant defects observed. Any access restrictions are also noted here.

5) Recommendations
These are normally based upon remedial action to address any observed major defects. These may be recommended for tree safety reasons, or for reasons of good arboricultural practice and tree management.

Priority Scale
A priority is assigned to any works recommended in the preceding section as follows:

Urgent	Works should be carried out immediately, within 1 week maximum
Very High	To be carried out within 1 month
High	To be carried out within 3 months
Moderate	To be carried out within 1 year
Low	To be carried out within 4 years

Inspection Frequency
An interval of 6 months, 12 months, 18 months or 3 years has been allocated before the next inspection is due. Seasonal considerations should also be factored in to these guidelines for re-inspection. In summer, tree foliage colour and condition is readily observable. In winter, clear vision into the upper crown junctions may be obtained in those specimens where dense foliage obscures this view during the summer. An autumn inspection should be conducted in cases where fungal infection is suspected, when the fruiting bodies of many fungal species are more likely to be observed.

6) Condition and Value

Vigour:
An indication of growth rate and the tree's ability to cope with stresses:

High	Having above average vigour
Moderate	Having average vigour
Low	Having below average vigour
Very Low	Tree is struggling to survive and may be dying

Physiological Condition

Good	Healthy tree with no symptoms of significant disease
Fair	Tree with early signs of disease, small defects, decreased life expectancy, or evidence of less than average vigour for the species
Poor	Significant disease present, limited life expectancy, or with very low vigour for the species and evidence of physiological stress
Very Poor	Tree is in advanced stages of physiological failure and is dying

Structural Condition

Good	No significant structural defects observed
Fair	Some structural defects observed but these do not necessitate remedial action at present
Poor	Significant defects observed resulting in a tree which is likely to require either monitoring or remedial action
Very Poor	Major defects which compromise the safety of the tree. Remedial works or tree removal are likely to be required in the majority of target locations

Amenity Value

Very High	Exceptional specimen, observable by a large number of people.
High	Attractive specimen, observable by a significant number of people.
Moderate	One of the above factors is not applicable.
Low	Unattractive specimen or largely hidden from view.

Life Expectancy or Estimated Remaining Contribution (ERC)

The estimated number of years before the tree may require removal is expressed as one of the following categories: (i) <10 years; (ii) 10-20 years; (iii) 20-40 years; (iv) 40+ years.

7) BS5837 Retention Category

Each tree, group of trees or hedge is assigned to a retention category where:

A	Trees of high quality and value, retention is highly desirable
B	Trees of moderate quality and value where retention is desirable
C	Trees of low quality and value, or young trees with a stem diameter <150mm. Category C trees may be retained, replaced or relocated
R	Trees unsuitable for retention or trees which should be removed

Further clarity is supplied by the addition of plus (+) and minus (-) categories where appropriate.

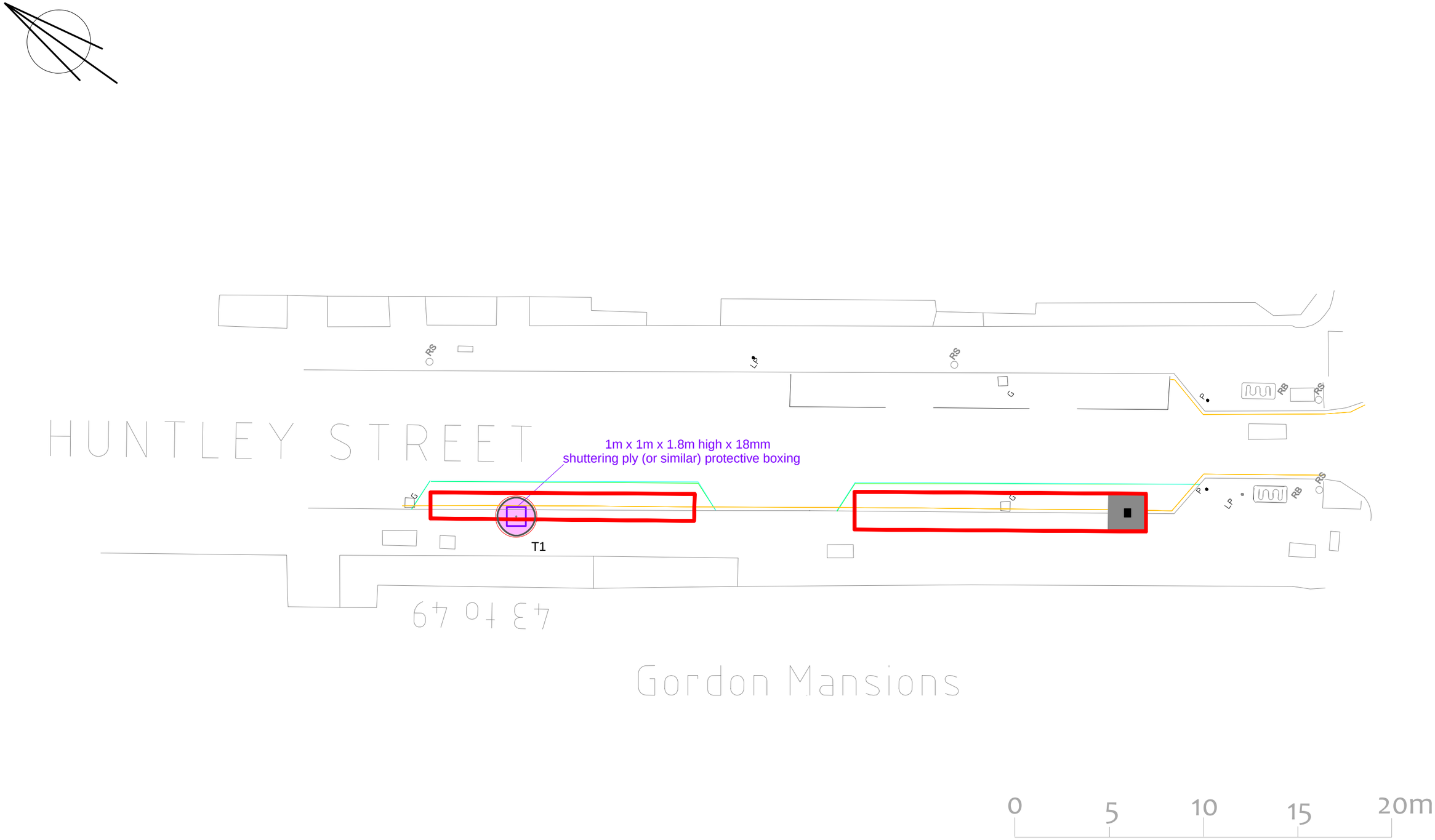
APPENDIX 2: AUTHOR'S QUALIFICATIONS AND EXPERIENCE

Stuart Harris N.D.Arb, N.C.H.Arb M.Arbor.A.

Stuart Harris is a professional arboriculturalist specialising in trees, woodlands and forestry. He holds a current Arboricultural Association/LANTRA Awards certificate in 'Professional Tree Inspection' and has conducted a wide range of tree safety assessments over a period of 10 years. He has over 25 years professional experience in relation to trees and woodlands encompassing technical, strategic and practical roles in tree and woodland maintenance and management, tree surgery, and tree safety assessment. His career experience spans the public and private sectors including roles within the Royal Botanic Gardens Kew, local authorities and private consultancies.

APPENDIX 3: TREE DATA SCHEDULE

APPENDIX 4: TREE CONSTRAINTS PLAN



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- PRELIMINARY -
NOT TO BE USED FOR CONSTRUCTION

Scale:	1/200	Client:	Transport for London
Paper Size:	A3	Project:	Cycle Hire Scheme
Author:	R MacDonald	TFL Ref:	02/610278/ALT
Checked by:	S Harris	Version/ Date:	Ver_A / 26.04.2010

Site

Huntley Street

Title

TREE CONSTRAINTS PLAN

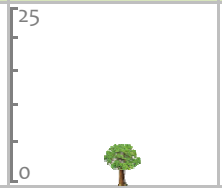
Key

- NJUG Prohibited Zone
- Hyder Recommended No Excavation Zone
  * Where not shown, the Hyder Recommended No Excavation Zone is the same as the NJUG Prohibited Zone
- T1 Stem of tree number 1

BS 5837 Retention Categories

- Stem of category A tree
- Stem of category B tree
- Stem of category C tree
- Stem of category R tree
- BS 5837 Root Protection Area
- Canopy extent of Category A tree
- Canopy extent of Category B tree
- Canopy extent of Category C tree
- Canopy extent of Category R tree

Tree Data Schedule: 02-610278

Reference (G = Group, H = Hedge)	Age & Species	Height (m)	Crown Ht (m)	Diameter (cm)	Crown Spread (m) N / W / E / S	Scaled Tree Diagram (m)	Notes	Recommendations: Priority	Recommendations: Inspect Freq (yrs)	Vigour: Physiological Condition / Structural Condition	Amenity Value: Life Expectancy (yrs) / Retention Category	NJUG Prohibited Radius (m)	Recommended 'No Excavation' Zone (m)
T1	Young **Field Maple** Acer campestre	4	2	8	N: 1 W: 1 E: 1 S: 1		Position: In paved footway. Form: Single stemmed and vertical with a balanced crown. History: No evidence of significant pruning. **Defects: No major visible defects.**	No action required. n/a	3	Moderate Good Good	Low 40+ C-	1.1	1.1