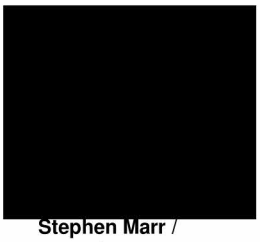
HOCHTIEF MURPHY Joint Venture

CLIENT	National Grid
SCHEME	London Power Tunnels 2
CONTRACT	Package 2 - Tunnels and Shafts

METHOD STATEMENT

ARBORICULTURAL METHOD STATEMENT ELTHAM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05th February 2021	05th February 2021	05th February 2021	05th February 2021
AUTHOR	REVIEWER	REVIEWER	APPROVER

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London Power Tunnels, Eltham/Arboricultural Method Statement/**Report for Hochtief-Murphy JV**

London Power Tunnels, Eltham, Eltham

Arboricultural Method Statement

Report for Hochtief-Murphy JV

Job Number	ART2272		
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Version	Checked by	Approved by	Date
V1.2	Fearghus Gage BSc (Hons) MArborA	Rosie McLaughlin BSc (Hons) MSc	28/01/21

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Executive Summary

Arbeco was commissioned by Temple on behalf of Hochtief-Murphy JV to produce an Arboricultural Method Statement to enable the protection of trees during future works associated with the development of land to the east of Eltham Substation, 737 Rochester Way, London, SE9 2RE. An initial Arboricultural Survey and Arboricultural Impact Assessment of the site was carried out in November 2018 (Arcadis, 2018). This Arboricultural Method Statement was produced using this data, it included British Standard BS 5837:2012 categorisations and dimensions of all trees on site and focused on arboricultural values (categories A1, B1, C1)[1] and landscape values (categories A2, B2, C3)[2].

The main findings of the survey are as follows:

There were 56 individual trees, five groups[3] of trees, and one hedgerow in and adjacent to the proposed development site each described in Appendix 1 (Arcadis, 2018) of this report.

Of the trees surveyed, two individuals were attributed Category A status, five individuals and one group were attributed Category B status and 49 trees, four groups and one hedge were attributed Category C status.

A tree constraints check was carried out with the London Borough of Greenwich and it was confirmed that no trees located adjacent to or in the proposed development site were subject to Tree Preservation Order or Conservation Area restrictions.

Development proposals will require the removal of a total of 48 individual trees and one group of trees. Of the trees to be removed 44 individuals and one group were attributed Category C status and four individuals were attributed Category B status.

Nine trees and one partial hedge were recommended for removal in the Tree Survey Report (Arcadis, 2018) and a further 39 trees and one group have been agreed for removal with the London Borough of Greenwich Tree Officer since the original survey took place.

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1 Categorisation grading in accordance with BS 5837 2012. Trees suitable for retention: - Category A. Trees of high quality with an estimated remaining life expectancy of at least 40 years.
Category B. Trees of moderate quality with an estimated life expectancy of at least 20 years.
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 150mm.
Category U. Trees of very low quality normally with a life expectancy of less than 10 years or requiring immediate removal due to health and safety concerns.

2 British Standard BS 5837 2012 recommends that these categories may be further broken down into sub categories A1 A2 A3 pertaining to Arboricultural, Landscape or Cultural values respectively.

3 The term “group” is intended to identify trees that form cohesive arboricultural features either aerodynamically (e.g. trees that provide companion shelter), visually (e.g. avenues or screens) or culturally, including for biodiversity (e.g. parkland or wood pasture).

Any work to trees should consider the potential presence of protected species, including breeding birds and roosting bats. The Ecology Scoping Report (The Ecology Consultancy, 2020) and any subsequent ecological reports should be consulted prior to the commencement of works.

1 Introduction

BACKGROUND

1.1 Arbeco was commissioned on 16 September 2020 by Temple on behalf of Hochtief Murphy JV to produce an updated Arboricultural Method Statement based on the initial Arboricultural Impact Assessment by Arcadis (2018) detailing site specific tree protection measures to be implemented during the course of development proposals at Land to the east of Eltham Substation (London Power Tunnels, Eltham) and provide sufficient information for the development of site layouts and construction exclusion zones to enable the protection of existing trees.

SCOPE OF REPORT

1.2 This report has been produced in accordance with British Standard BS 5837:2012 Trees in Relation to Design, Demolition and Construction – Recommendations (hereafter referred to as BS 5837:2012). It provides information on the current condition of trees at the site, their suitability for retention, and the above and below ground constraints to development.

1.3 This report has been prepared in order to discharge Condition 11. Condition 11 states;

All general mitigation recommendations set out within the Ecological Appraisal dated November 2018, shall be implemented in full. Full details demonstrating compliance with these works shall be submitted to and approved in writing by the Local Planning Authority prior to the operational use of the development hereby approved.

1.4 Any clear flaws or hazards have been identified in the Schedule of Trees provided in Appendix 1. Preliminary recommendations for the management of retained trees are provided, but a full hazard risk assessment comprising a more comprehensive analysis of tree condition and potential risk to target areas is beyond the scope of this report. Any recommendations relating to the management of potentially hazardous trees should be carried out as soon as possible[4].

[4] All tree works should be undertaken by a suitably qualified Arboricultural Contractor. No arboricultural works to trees subject to planning constraints shall be carried out without the written consent of the relevant Local Planning Authority (LPA). Any proposed tree works should be undertaken in accordance with British Standard BS 3998:2010 Treework - Recommendations. Works to trees that are the subject of a Tree Preservation Order or within a Conservation Area which are deemed to be dangerous under Regulation 14 of the Town and Country Planning (England) (Regulations) 2012 may under certain circumstances be undertaken without needing to seek the prior written consent of the LPA.

SITE CONTEXT AND STATUS

1.5 The site is situated in the London Borough of Greenwich, to the east of the National Grid Eltham substation, approximately 170m north-east of Falconwood Rail Station. The site comprises Welling and District Model Engineering Society miniature railway and measures approximately 0.84ha in extent. Its northern boundary is formed by Falconwood Field, an area of public open space, with residential properties on Montrose Avenue to the east, the mainline railway line to the south and Eltham Substation to the west. The Ordnance Survey National Grid reference for the centre of the site is TQ 44742 75501.

DESCRIPTION OF THE PROPOSALS

1.6 The works at the Eltham site will enable the following works:

Erection of a head house following the removal of the existing model railway; and

The formation of a temporary construction access from Welling Way.

2 Methodology

TREE SURVEY

2.1 An initial Arboricultural Survey and Impact Assessment for the site was undertaken by Arcadis in November 2018, the results of which can be found in document reference: *London Power Tunnels II Eltham Site: Tree Survey Report and Arboricultural Impact Assessment* (Arcadis, 2018). It included the condition and categories of the trees found on site in accordance with criteria outlined in BS 5837: 2012 and identified any above or below ground constraints on development.

SUPPORTING DOCUMENTS

2.2 Drawing Reference: The original Tree Constraints Plan produced by Arcadis (2018) was used for compiling this report. It included the layout of existing site features, including tree positions, canopy spreads and Root Protection Areas (RPA). For continuity tree numbering in this report corresponds with those found in the Arboricultural Impact Assessment (Arcadis, 2018).

PERSONNEL

2.3 This report was produced by Naomi Charman BSc (Hons), MRes, MArborA, an Arboricultural Consultant with over 14 years' experience within the environmental sector, working as both a contractor, LPA Tree Officer and private consultant.

LIMITATIONS

2.4 Preliminary recommendations for tree management are provided within the original Arboricultural Impact Assessment Report (Arcadis, 2018).

2.5 All information relating to tree size, condition, category and location provided in this Arboricultural Method Statement has been derived from the original Arboricultural Impact Assessment (Arcadis, 2018). No further data was gathered for the purposes of compiling this report.

2.6 All tree protection measures detailed in this Arboricultural Method Statement are based on impacts assessed as part of the Arboricultural Impact Assessment report (Arcadis, 2018).

3 Recommendations

TREE WORKS

3.1 The following tree works operations are recommended.

Trees T22, T23, T24, T25, T26, T27, T30, T55, T56 and part of H2 were recommended for removal in the original Tree Survey Report (Arcadis, 2018).

T5, T7 – T17, T19 – T21, T28, T29, T31 – T52 and G14 require removal in order to facilitate the development proposals and enable social distancing during construction and should be removed prior to the commencement of works.

3.2 Arisings from tree works (e.g. wood piles and standing dead trunks) can provide valuable habitats for wildlife. As such, consideration should be given to their retention on site in areas unlikely to cause issues to public health and safety.

3.3 All tree pruning should be carefully planned and undertaken in accordance with *BS 3998: 2010 Recommendation for Tree Works*.

3.4 Any recommendations highlighting the management of potentially hazardous trees should be reviewed as soon as is practically possible.

SITE SPECIFIC ISSUES

3.5 At the time of this report, finalised layouts for electricity, water and gas services had not been confirmed. It is recommended that the locations of the proposed services be carefully planned in consultation with the Arboricultural Consultant and wherever possible, existing service pipes and trenches are re-used to avoid the need for excavations inside the RPAs of trees to be retained.

4 Arboricultural Method Statement

4.1 This Arboricultural Method Statement details how existing trees to be retained should be protected during the demolition and construction phase of site development. The advice is specific to this site and should be read in conjunction with the Tree Protection Plan in Appendix 2.

SITE MONITORING AND SUPERVISION

4.2 An arboricultural consultant or competent person should be appointed to advise on tree protection for the site.

SUGGESTED SEQUENCING OF SITE MANAGEMENT

4.3 It is recommended that the following arboricultural input regarding on site management of retained trees is required, which should form the basis of the auditable schedule of inspection.

Table 1: Sequencing of site management and input.

Activity	Level of arboricultural input
Preliminary tree works.	Discuss and review works schedule with contractor.
Pre-commencement site meeting with site manager and the Local Planning Authority Tree Officer.	Initial site meeting. Review of tree protection measures. Agree frequency of site supervision and reporting. Agree any amendments to tree protection measures.
Erection of protective barriers and ground protection measures.	Preparation of amended plans and specifications for formal agreement with the Local Planning Authority Tree Officer. On-going discussion and advice during installation of tree protection fencing around the RPAs of T18, T58, T60, T61, H2, G13, G57, G59 and G62, and the temporary ground protection in the RPAs of T60 and G57.
Construction of shaft.	Pre-works on site briefing with contractor and direct on-site supervision by arboricultural consultant. Periodic site visits to ensure tree protection fencing and ground protection is in place.
Removal of protective fencing and ground protection measures after completion of construction works.	Pre-commencement on site briefing with contractor and ongoing site supervision at agreed intervals until completion.

GENERAL PRECAUTIONS TO BE TAKEN ON SITE

4.4 The following precautions should be maintained at all times:

All retained trees should be protected by the erection of protective barriers and or ground protection prior to the commencement of any works and should remain in place during the entire course of the development.

No fires should be lit within 10m of the canopies of trees to be retained.

Designated Construction Exclusion Zones (CEZ) should be suitably identified and maintaned to ensure that trees remain protected. Storage or stockpiling areas, temporary road access, accommodation and other facilities are to be located outside of RPAs, inside designated sites away from retained trees and all care must be taken to prevent the leakage or spilling of harmful materials into the soil.

No excavations or soil stripping or general disturbance and compaction of the existing soil strata should be carried out within the RPA of any tree to be retained.

All scheduled tree works should be carried out prior to the commencement of any site works and before the erection of tree protection measures.

A copy of the Method Statement and accompanying Tree Protection Plan should be made available and retained on site at all times and should be included in the site induction for all contractors and visiting personnel so that they are familiar with its content and requirements.

PRE- COMMENCEMENT SITE MEETING

4.5 A pre-commencement meeting on site between the Site Manager and Local Planning Authority Tree Officer was carried out on the 11 January 2021 in order to understand the scope of the tree removal and the requirements of tree pruning for access facilitation. and agree key stages for the implementation of tree protection measures and operations and to allow any aspect of the process to be discussed.

PRELIMINARY TREE WORKS

4.6 All tree works as described in Section 3 of this report should be carried out in accordance with BS 3998:2010 and should be undertaken prior to the commencement of any works. It should be the responsibility of the site owners and tree contractor to ensure that no tree works are carried out without the necessary prior written consents from the Local Planning Authority.

4.7 All trees to be removed should be clearly marked with an X on their main stem. Marking of trees should be supervised by the Local Planning Authority Tree Officer and the Arboricultural Consultant.

4.8 All tree pruning for access facilitation should be supervised by the Arboricultural Consultant, to ensure that specifications laid out in the Arboricultural Method Statement are followed and that trees are left in an acceptable state, with minimal loss in amenity value.

ERECTION OF PROTECTIVE BARRIERS AND GROUND PROTECTION MEASURES

4.9 The Tree Protection Plans show the approximate locations of tree protection fencing to be erected prior to the commencement of works to form Construction Exclusion Zones (CEZs). Protective barriers should remain in place through the entire course of the development and only moved with the prior written consent of the Local Planning Authority Tree Officer, in consultation with the appointed arboricultural consultant.

4.10 Protective barriers are to be erected around the RPAs of trees T18, T58, T60, T61, H2, G13, G57, G59 and G62. Tree protection fencing shall comprise a 2m high fence robust enough to withstand impact from plant machinery supported by a system of vertical and horizontal scaffold tubes and supporting back stays as specified in Figure 2 of BS 5837:2012.

4.11 Temporary ground protection is recommended for the area where the access road to the Welling Road is proposed within the RPAs of T60 and G57.

4.12 Weatherproof signage should be attached to the barrier in locations clearly seen by contractors and site operatives indicating that the CEZ area is protected and should not be accessed. Examples of warning notices are provided in Appendix 4.

4.13 Once the barriers have been placed into position, they are not to be removed or altered in any way until the conclusion of all site construction works.

4.14 In areas where CEZs will experience heavy traffic or activity, the protective fencing employed should be as specified in Figure 1 of Appendix 3. In areas experiencing light traffic with little or no works activity, it may be appropriate to employ fencing as specified in Figure 2 of Appendix 3.

COMMENCEMENT OF GROUND WORKS

4.15 Prior to the commencement of any ground works, an onsite briefing between the Site Manager, Arboricultural Consultant and Local Planning Authority Tree Officer should be carried out in order to understand appropriate methods of excavation within the vicinity of RPAs and to explain best practice procedures should any roots be disturbed by excavation activities. During the excavation process, all works likely to impact trees should be supervised by the consulting arboriculturalist.

4.16 Prior to the commencement of works, the locations of and excavation methods for the installation of any proposed services should be fully agreed upon by the site manager, and Arboricultural Consultant. Excavations for the installation of new services inside the RPAs of any trees to be retained should not be a requirement of finalised construction layouts.

4.17 Any trenching required for the installation of foundations or retaining walls inside or directly adjacent to the RPAs of trees to be retained should be carefully lined with a non-permeable membrane and supervised by an Arboricultural Consultant in order to prevent chemical leeching into adjacent soils.

4.18 The first 750mm of excavation within RPAs of retained trees should be carried out using hand tools or compressed air spades and is to be undertaken under the supervision of the consulting arboriculturalist.

4.19 Exposed roots (woody and fibrous) should be initially covered over using hessian sheeting pegged in and kept damp and prevented from drying out. A geotextile permeable terram may be used on the tree side of any trenching to protect soil/root environment from desiccation or contamination.

4.20 Any damaged roots of a diameter of 25mm or less should be cleanly severed using secateurs or hand saw. Cut ends should be treated as above.

4.21 Prior to back filling, retained roots should be surrounded with topsoil, uncompacted sharp sand or other loose, inert granular fill. Builders' sand should not be used due to its high salt content. The backfill material should be free from contaminants or foreign objects potentially damaging to the roots.

REMOVAL OF PROTECTIVE FENCING AND GROUND PROTECTION MEASURES AFTER COMPLETION OF CONSTRUCTION WORKS

4.22 Prior to the removal of any protective fencing or ground protection, an onsite briefing between the Site Manager, Arboricultural Consultant and Local Planning Authority Tree Officer should be carried out in order to understand appropriate methods of removal. During the removal process, the site should be subjected to ongoing visits at regular intervals by an Arboricultural Consultant until the conclusion of the works.

SITE SPECIFIC RECOMMENDATIONS

4.23 Prior to the commencement of demolition works, protective fencing in accordance with Figure 2 of BS 5837:2012 should be erected to form CEZs around all trees to be retained as displayed in the Tree Protection Plan (Appendix 2).

4.24 The removal of all existing hardstanding, artificial grass and other surfaces inside the RPAs of trees to be retained should be conducted using hand tools only. CEZs should only be accessed under full arboricultural supervision. Numbers of personnel accessing CEZs should be kept to a minimum and should be at the discretion of the Arboricultural Consultant.

4.25 Once all surfaces within the RPAs of trees to be retained have been removed. No further access into CEZs should be permitted until the completion of the demolition works unless confirmed in writing by the Local Planning Authority Tree Officer.

4.26 Prior to the commencement of construction works, the condition of retained trees and their protection measures should be reviewed by the Arboricultural Consultant and Local Planning Authority Tree Officer. Any remedial tree works or alterations to existing protection measures should be agreed on and carried out prior to the commencement of construction operations.

CONTACT DETAILS

4.27 This method statement is accompanied by a list of known contact details for all relevant parties and is included in Table 2.

Table 2. List of contact details for all relevant parties

Contact	Name	Company or Local Authority name	Contact Number	Report Issued Yes/No
Client	-	Hochtief-Murphy JV	[redacted]	Yes
LPA Tree Officer	Planning	London Borough of Greenwich	020 8854 8888	No
Arboricultural Consultant	Naomi Charman	Arbeco	[redacted]	Yes

References

Arcadis (2018). *London Power Tunnels II Eltham Site: Tree Survey Report and Arboricultural Impact Assessment.*

British Standard Institute (BSI) (2012). *BS 5837:2012 Trees in Relation to Design Demolition and Construction-Recommendations*. BSI, London.

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British Standard Institute (BSI) (2014). *BS 8545:2014 Trees: from nursery to independence in the landscape - Recommendations*. BSI, London.

Department for Communities and Local Government (2014). *Planning Practice Guidance on Tree Preservation Orders and trees in conservation areas.*

Lonsdale, D. (1999). *Research for Amenity Trees No.7: Principles of Tree Hazard Assessment and Management*. HMSO

Mattheck and Beloer (1994). HMSO London. Research for Amenity Trees No 4; *The Body Language of Trees.*

The Ecology Consultancy (2020) *9509.1_London Power Tunnels, Eltham_Ecology Scoping Report_V1.0*

Town and Country Planning Act 1990 (as amended).

Town and Country Planning (Tree Preservation) (England) Regulations 2012.

Appendix 1: Schedule of Trees

Client: **National Grid**
Survey date: **02/05/2018**

Project: **London Power Tunnels - Eltham**
Surveyor: **Martin Dilworth FdSc MArborA**

Tree reference number	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				Height of crown clearance (m)	Radius of nominal circle (m)	RPA (m^2)	Age class	Physiological condition	Structural condition	Comments	Estimated remaining contribution (years)	Category grading
				N	E	S	W									
T1	Ash (*Fraxinus excelsior*)	6	210, 210	3	3	3	34	2	3.6	39.9	Semi-Mature	Good	Good	Twin-stemmed	10+	C1
H2	Hawthorn (*Crataegus monogyna*)	2.5	75	1	1	1	1	0	0.9	2.5	Semi-Mature	Good	Good		10+	C2
T3	Pedunculate oak (*Quercus robur*)	4	315	4	4	4	4	1	3.78	44.9	Semi-Mature	Good	Fair	Previously crown reduced	10+	C1
T4	Rowan (*Sorbus aucuparia*)	3	260, 190	1	1	1	1	2	3.9	46.9	Early-Mature	Fair	Fair	Previously Pollarded	10+	C1
T5	Rowan (*Sorbus aucuparia*)	3	300	2	2	2	2	1	3.6	40.7	Early-Mature	Good	Fair	Previously crown reduced	10+	C1
#T6	Pedunculate oak (*Quercus robur*)	6	250	3	3	3	3	2	3.0	28.3	Young	Good	Good	Tree in hedgerow	10+	C1
T7	Ash (*Fraxinus excelsior*)	15	410	5	5	5	4	2	4.92	76.0	Early-Mature	Good	Fair	Major deadwood	20+	B1
T8	Ash (*Fraxinus excelsior*)	4	360	2	2	2	3	2	4.32	58.6	Semi-Mature	Good	Fair	Previously crown reduced	10+	C1
T9	Cherry plum (*Prunus cerasifera*)	4	310	2	2	3	2	2	3.72	43.5	Mature	Good	Good		10+	C1
T10	Cherry plum (*Prunus cerasifera*)	4	240	2	2	2	2	2	2.88	26.1	Mature	Good	Good		10+	C1
T11	Cherry plum (*Prunus cerasifera*)	4	160	2	2	2	2	2	1.92	11.6	Mature	Good	Good		10+	C1
T12	Silver birch (*Betula pendula*)	4	160	2	2	2	2	2	1.92	11.6	Semi-Mature	Good	Fair	Previously crown reduced	10+	C1
G13	Leyland cypress (*Cupressus × leylandii*) x 12	9	200	2	2	2	2	0	2.4	18.1	Semi-Mature	Good	Good		10+	C2
G14	Leyland cypress (*Cupressus × leylandii*) x 50	6	200	2	2	2	2	0	2.4	18.1	Semi-Mature	Good	Good		10+	C2
T15	Pedunculate oak (*Quercus robur*)	6	270	4	4	4	4	2	3.24	33.0	Semi-Mature	Good	Fair	Previously crown reduced	10+	C1

Tree reference number	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				Height of crown clearance (m)	Radius of nominal circle (m)	RPA (m^2)	Age class	Physiological condition	Structural condition	Comments	Estimated remaining contribution (years)	Category grading
				N	E	S	W									
T16	Pedunculate oak (*Quercus robur*)	4	480	2	2	2	2	2	5.76	104.2	Early-Mature	Fair	Fair	Previously pollarded	10+	C1
T17	Pedunculate oak (*Quercus robur*)	12	340	2	4	5	3	2	4.08	52.3	Early-Mature	Good	Fair	Leaning stem	10+	C1
#T18	Pedunculate oak (*Quercus robur*)	15	650, 400	8	7	8	9	2	9.2	191.1	Mature	Good	Fair	Private tree, unable to full inspect. Major deadwood in crown.	20+	B1
T19	Leyland cypress (*Cupressus × leylandii*)	6	150, 90, 90, 90	2	2	2	2	0	2.6	21.2	Early-Mature	Good	Good	Multi-stemmed	10+	C1
T20	Sycamore (*Acer pseudoplatanus*)	3	75	2	2	2	2	0	0.9	2.5	Young	Good	Good		10+	C1
T21	Elderberry (*Sambucus nigra*)	3	125, 75	2	2	2	2	0	1.7	9.6	Mature	Good	Good		10+	C1
T22	Goat willow (*Salix caprea*)	3	420	3	3	3	3	0	5.04	79.8	Mature	Good	Fair	Previously crown reduced	10+	C1
T23	Apple (*Malus domestica*)	2.5	150	1	1	1	1	0	1.8	10.2	Early-Mature	Good	Good		10+	C1
T24	Apple (*Malus domestica*)	2.5	130, 130	1	1	1	1	0	2.2	15.3	Early-Mature	Good	Good		10+	C1
T25	Apple (*Malus domestica*)	2.5	130, 130	1	1	1	1	0	2.2	15.3	Early-Mature	Good	Good		10+	C1
T26	Apple (*Malus domestica*)	2.5	75	1	1	1	1	0	0.9	2.5	Early-Mature	Good	Good	Leaning stem	10+	C1
T27	Apple (*Malus domestica*)	2.5	75	1	1	1	1	0	0.9	2.5	Early-Mature	Good	Good		10+	C1
T28	Norway spruce (*Picea abies*)	4	120	1	1	1	1	1	1.44	6.5	Young	Good	Good		10+	C1
T29	Silver birch (*Betula pendula*)	13	290	4	4	4	4	2	3.48	38.0	Early-Mature	Good	Good		20+	B1
T30	Wild cherry (*Prunus avium*)	6	280	5	5	4	2	2	3.36	35.5	Early-Mature	Good	Good		10+	C1
T31	Leyland cypress (*Cupressus × leylandii*)	5	210	1	1	1	1	0	2.52	20.0	Young	Good	Good		10+	C1
T32	Leyland cypress (*Cupressus × leylandii*)	6	190	1	1	1	1	0	2.28	16.3	Young	Good	Good		10+	C1
T33	Leyland cypress (*Cupressus × leylandii*)	6	190	1	1	1	1	0	2.28	16.3	Young	Good	Good		10+	C1

Tree reference number	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				Height of crown clearance (m)	Radius of nominal circle (m)	RPA (m^2)	Age class	Physiological condition	Structural condition	Comments	Estimated remaining contribution (years)	Category grading
				N	E	S	W									
T34	Sycamore (*Acer pseudoplatanus*)	13	290, 260, 260, 260	5	5	5	5	2	6.4	129.8	Mature	Good	Fair	Multi-stemmed	10+	C1
T35	Sycamore (*Acer pseudoplatanus*)	12	320	5	2	5	2	2	3.84	46.3	Early-Mature	Good	Fair	Crown supressed by adjacent trees.	10+	C1
T36	Sycamore (*Acer pseudoplatanus*)	10	210, 160	4	2	2	3	3	3.2	31.5	Semi-Mature	Good	Fair	Twin-stemmed. Crown suppressed by adjacent trees.	10+	C1
T37	Sycamore (*Acer pseudoplatanus*)	10	310	4	3	5	4	2	3.72	43.5	Early-Mature	Good	Fair	Crown supressed by adjacent trees.	10+	C1
T38	Hawthorn (*Crataegus monogyna*)	4	120, 120	3	1	2	2	2	2.0	13.0	Semi-Mature	Good	Fair	Twin-stemmed	10+	C1
T39	Silver birch (*Betula pendula*)	9	250	4	3	3	4	2	3.0	28.3	Semi-Mature	Good	Good		10+	C1
T40	Silver birch (*Betula pendula*)	13	370	5	4	4	4	2	4.44	61.9	Mature	Fair	Fair	Large pruning wounds with decay pockets.	10+	C1
T41	Ash (*Fraxinus excelsior*)	10	420	5	5	5	5	2	5.04	79.8	Mature	Good	Good		20+	B1
T42	Ash (*Fraxinus excelsior*)	12	360	5	5	5	5	2	4.32	58.6	Mature	Fair	Fair	Large pruning wounds with decay pockets.	10+	C1
T43	Wild cherry (Prunus avium)	12	430	6	5	4	5	3	5.16	83.6	Mature	Fair	Fair	Large pruning wounds with decay pockets.	10+	C1
T44	Rowan (*Sorbus aucuparia*)	4	110	2	2	1	2	2	1.32	5.5	Young	Good	Good		10+	C1
T45	Laburnum (*Laburnum anagyoides*)	3	100, 90	1	1	1	1	2	1.6	8.2	Young	Good	Good	Twin-stemmed	10+	C1
T46	Pedunculate oak (*Quercus robur*)	7	280, 220	3	4	5	5	2	4.3	57.4	Semi-Mature	Good	Good	Twin-stemmed	10+	C1
T47	Leyland cypress (*Cupressus × leylandii*)	18	740	4	4	4	4	2	8.88	247.7	Mature	Good	Good		20+	B1
T48	Leyland cypress (*Cupressus × leylandii*)	5	90, 90	1	1	1	1	0	1.5	7.3	Young	Good	Good	Multi-stemmed	10+	C1
T49	Wild cherry (Prunus avium)	6	440	4	4	4	4	2	5.28	87.6	Mature	Fair	Fair	Large pruning wounds with decay pockets.	10+	C1
T50	Rowan (*Sorbus aucuparia*)	5	310	3	3	3	3	2	3.72	43.5	Mature	Good	Fair	Small decay pocket at base	10+	C1
T51	Yew (*Taxus baccata*)	4	210	2	1	1	1	2	2.52	20.0	Young	Good	Good		10+	C1

Tree reference number	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				Height of crown clearance (m)	Radius of nominal circle (m)	RPA (m^2)	Age class	Physiological condition	Structural condition	Comments	Estimated remaining contribution (years)	Category grading
				N	E	S	W									
T52	Silver birch (*Betula pendula*)	4	310	3	2	2	2	2	3.72	43.5	Early-Mature	Good	Fair	Previously crown reduced.	10+	C1
T53	Wild Cherry (*Prunus avium*)	7	550	5	5	5	5	2	6.6	136.8	Mature	Good	Fair	Major deadwood in crown	10+	C1
T54	Wild Cherry (*Prunus avium*)	3	110	1	2	1	1	1	1.32	5.5	Young	Good	Good		10+	C1
T55	Wild Cherry (*Prunus avium*)	3	110, 120	2	2	2	2	1	2.0	12.0	Young	Good	Good		10+	C1
T56	Wild Cherry (*Prunus avium*)	3	120	1	2	2	2	1	1.44	6.5	Young	Good	Good		10+	C1
G57	Pedunculate oak (*Quercus robur*) x 2 Wild Cherry (*Prunus avium*) x 5 Hornbeam (*Carpinus betulus*) x 2	4	200	3	3	3	3	1	2.4	18.1	Young	Good	Good	Dense undergrowth preventing full visual inspection	10+	C2
T58	Silver birch (*Betula pendula*)	5	110	1	1	1	1	0	1.32	5.5	Young	Good	Good		10+	C1
G59	Pedunculate oak (*Quercus robur*) x 2	10	350	5	5	4	5	1	4.2	55.4	Early-Mature	Good	Fair	Mutual suppression	10+	C2
T60	Pedunculate oak (*Quercus robur*)	14	860	6	7	7	7	1	10.32	334.6	Mature	Good	Fair	Major deadwood in crown	40+	A1
T61	Pedunculate oak (*Quercus robur*)	14	#900	7	7	8	8	1	10.8	366.4	Mature	Good	Fair	Major deadwood in crown	40+	A1
G62	Ash (Fraxinus excelsior) x 2 Pedunculate oak (*Quercus robur*) x 1	14	#600	5	5	5	5	1	7.2	162.9	Mature	Good	Good	Dense undergrowth preventing full visual inspection	20+	B2

estimated trees

Table 2: BS: 5837 2012 Tree Quality Assessment Definitions

TREES FOR REMOVAL		
Category & Definition	Criteria	Identification on Plan
Category U Those in such a condition th they cannot realistically be retained as a living tree in t 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 du collapse, including those that will become unviable after removal of other U category trees (i.e. Where fo whatever reason the loss of companion shelter cannot be mitigated by pruning) Trees that are dead or are showing signs of significant immediate or irreversible overall decline. Trees infected with pathogens of significance to the health and or safety of other trees nearby by or ve low quality trees suppressing adjacent trees of better quality.	RED

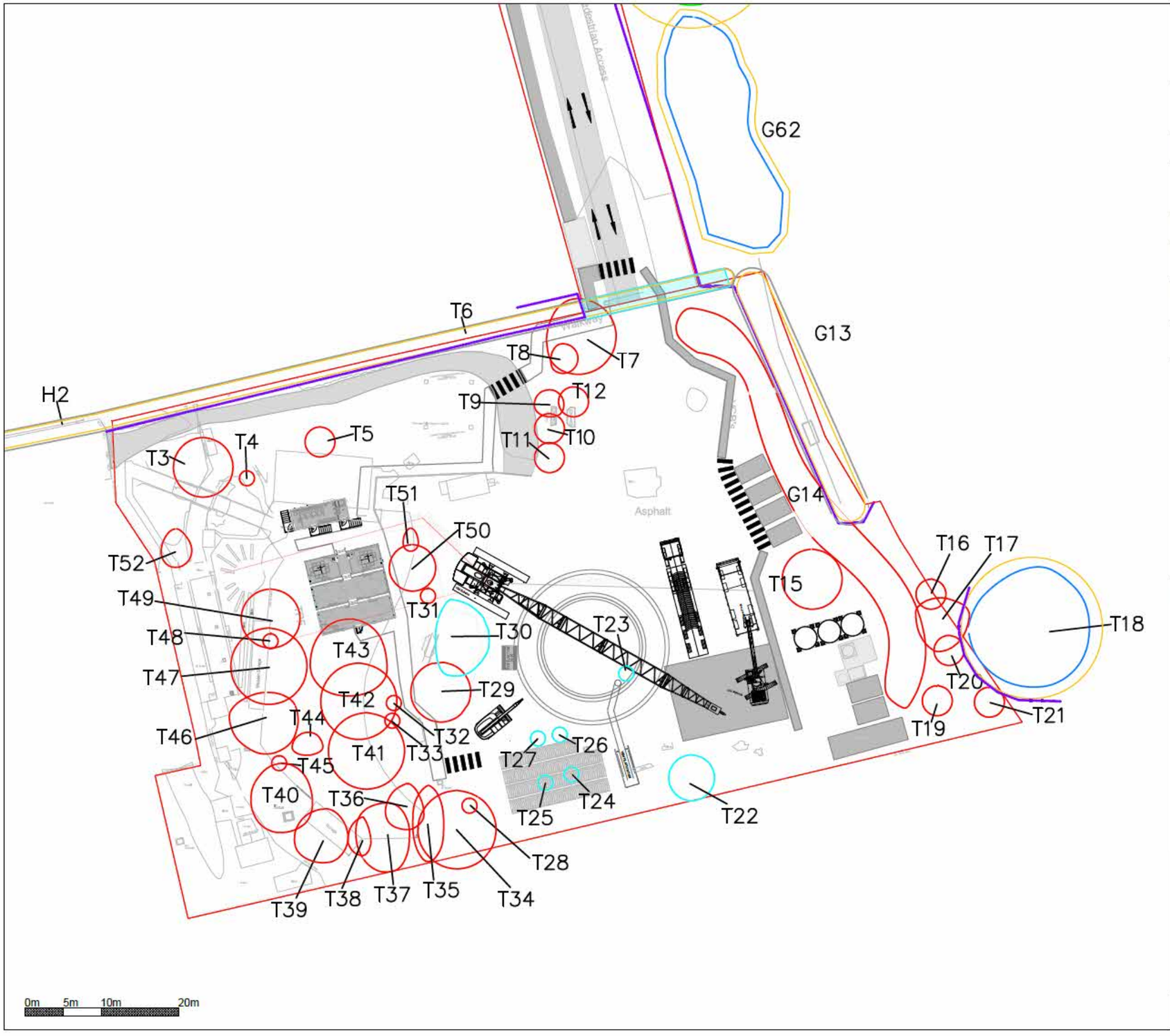
TREES TO BE CONSIDERED FOR RETENTION				
Category & Identification	1 Mainly arboricultural values	2 Mainly landscape values	3 Mainly cultural values including conservation	Identification on plan
Category A Trees of High Quality with a estimated remaining life expectancy of at least 40 years	Trees that are a particularly good example of their species, especially if rare or unusual, c essential components of groups or of formal or semi-formal arboricultural features e.g. th dominant and/or principal tree in an avenue)	Tree groups or woodlands of particular visual importance a arboricultural and/or landscap features.	Tree groups or woodlands significant conservation historical, commemorative c other value (e.g. veteran trees or wood pasture)	GREEN
Category B Trees of moderate quality with an estimated remaining life expectancy of at least 20 years.	Trees that might be included i the high category but are downgraded because of impaired condition (e.g. presence of remediable defects including unsympathetic past management and minor stor damage).	Trees present in numbers, usually as groups or woodlands such that they attract a high collective rating than they might as individuals: or trees occurring as collectives but situated so as to make little visual contributior to the wider locality.	Trees with material conservation or other cultura benefits.	BLUE

TREES TO BE CONSIDERED FOR RETENTION				
Category & Identification	1 Mainly arboricultural values	2 Mainly landscape values	3 Mainly cultural values including conservation	Identification on plan
Category C Trees of a low quality with a estimated remaining life expectancy of at least 10 years or young trees with a s diameter below 150mm	Unremarkable trees of very limited merit or such impair condition that they do not qualify in higher categories.	Trees present in groups or woodlands but without this conferring on them significantly greater landscape value and/o trees offering low or only temporary/transient landscape benefits.	Trees with no material conservation or other cultura benefits.	GREY

Table 3: Key Schedule of Trees

Column Heading	Explanation
Tree No	Sequential number corresponding to number on plan.
Species	English names.
Ht.	Height in metres.
S	Number of main stems.
St. 1.5 (Stem Diameter)	Stem diameter when measured in accordance with Annex C of BS 5837:2012.
NSEW	Crown radius in metres to cardinal points of the compass.
Cr. Cl. (Crown Clearance)	Height in metres between the ground and underside of canopy.
Ls.	Life stage definitions. Y= Young. SM = Semi-mature. EM = Early mature. M = Mature. OM = Over mature.
SC	Brief description of structural condition.
PC	Brief description of physiological condition.
Preliminary Advice	Preliminary tree works advice and recommendations.
LE	Estimated remaining useful life contribution in years. <10, 10+, 20+ and 40+ yr.
Cat. (Category)	Categorisation grading in accordance with BS 5837 2012. Trees suitable for retention: - Category A trees of high quality and amenity value. Category B trees of moderate quality and amenity value. Category C trees of low quality or amenity value. British Standards BS 5837:2012 recommends that these categories may be further broken down into sub-categories A1 A2 A3 pertaining to Arboricultural, Landscape or Cultural values respectively.
RPA m^2	Root Protection Area (RPA). Indicative area around a tree measured in m^2 and calculated in accordance with Annex C of BS 5837:2012 deemed to contain sufficient rooting volume to maintain the viability of a tree and where the protection of roots and soil structure is treated as a priority.
RPA *r*	Root Protection Area (RPA) radius calculation centred on the base c the tree and calculated in accordance with Annex C of BS 5837:2012
#	Estimated parameter, where access to the tree was not possibl obtain measurements.

Appendix 2: Tree Protection Plan



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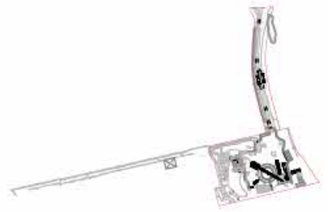
Job title	London Power Tunnels, Eltham Job no. ART2272
Client	Hochtief - Murphy JV
Map title	Tree Protection Plan
Section: 1/2	Scale (at A3) 1:500
Date of survey	N/A
Surveyor	N/A

Drawn	Approved	Date
NC	FG	17/11/2020



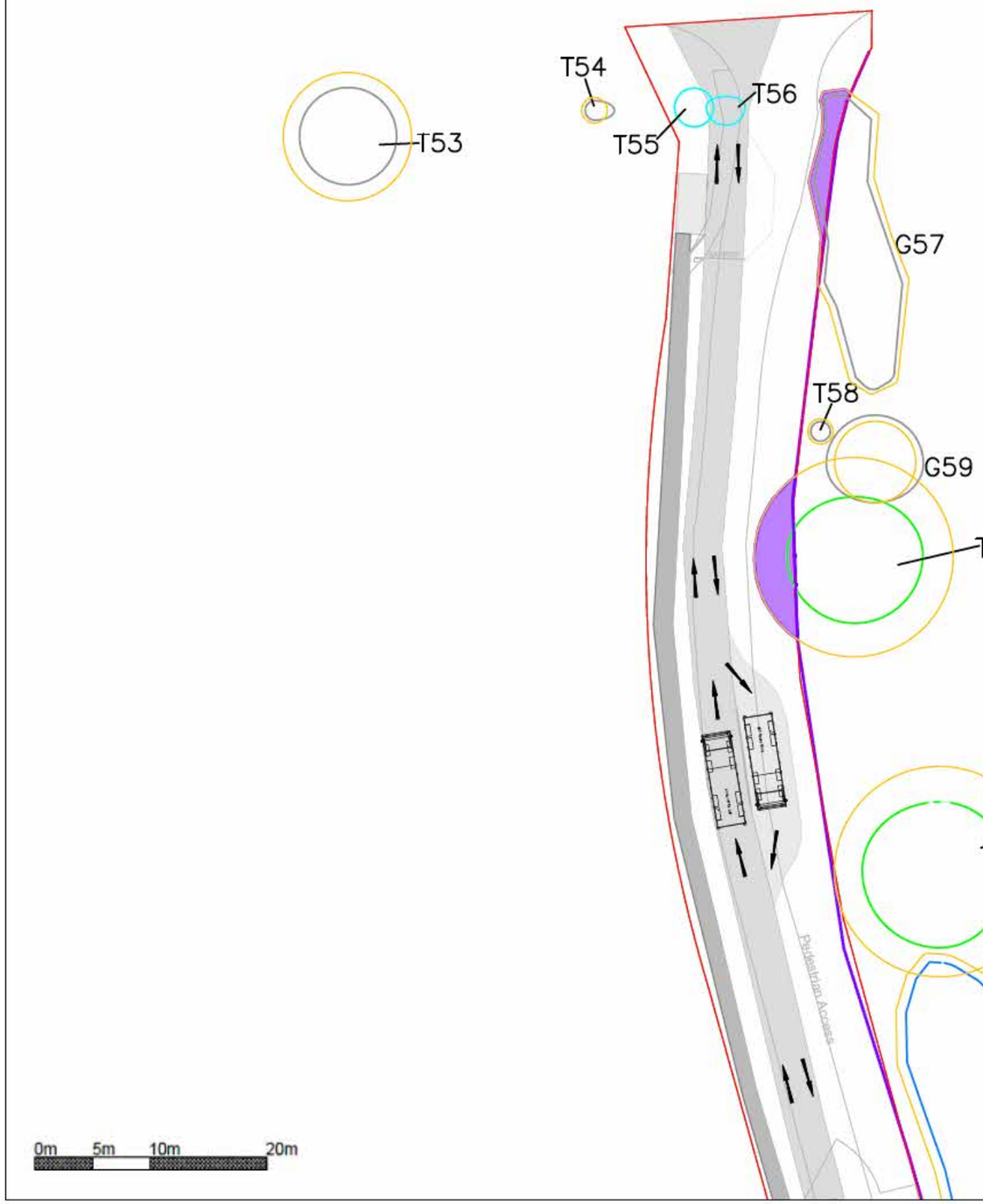
Legend

- Crown spread of category C - Trees with low quality and value
- Crown spread of category B - Trees with moderate quality and value
- Section of H2 for removal (Arcadis, 2018)
- Nine original trees recommended for removal (Arcadis, 2018)
- Additional trees recommended for removal
- Root Protection Area (RPA)
- Figure 2 BS 5837:2012 Fencing

N

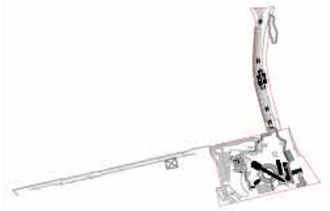
This plan is provided solely for the purpose of supporting the description of the arboricultural features of the site as contained in the accompanying report

a



arbeco
Ecology, Tree & Habitat Services

Job title	London Power Tunnels, Eltham
Job no.	ART2272
Client	Hochtief - Murphy JV
Map title	Tree Protection Plan
Section:	2/2
Scale (at A3)	1:500
Date of survey	N/A
Surveyor	N/A
Drawn	NC
Approved	FG
Date	17/11/2020



Legend

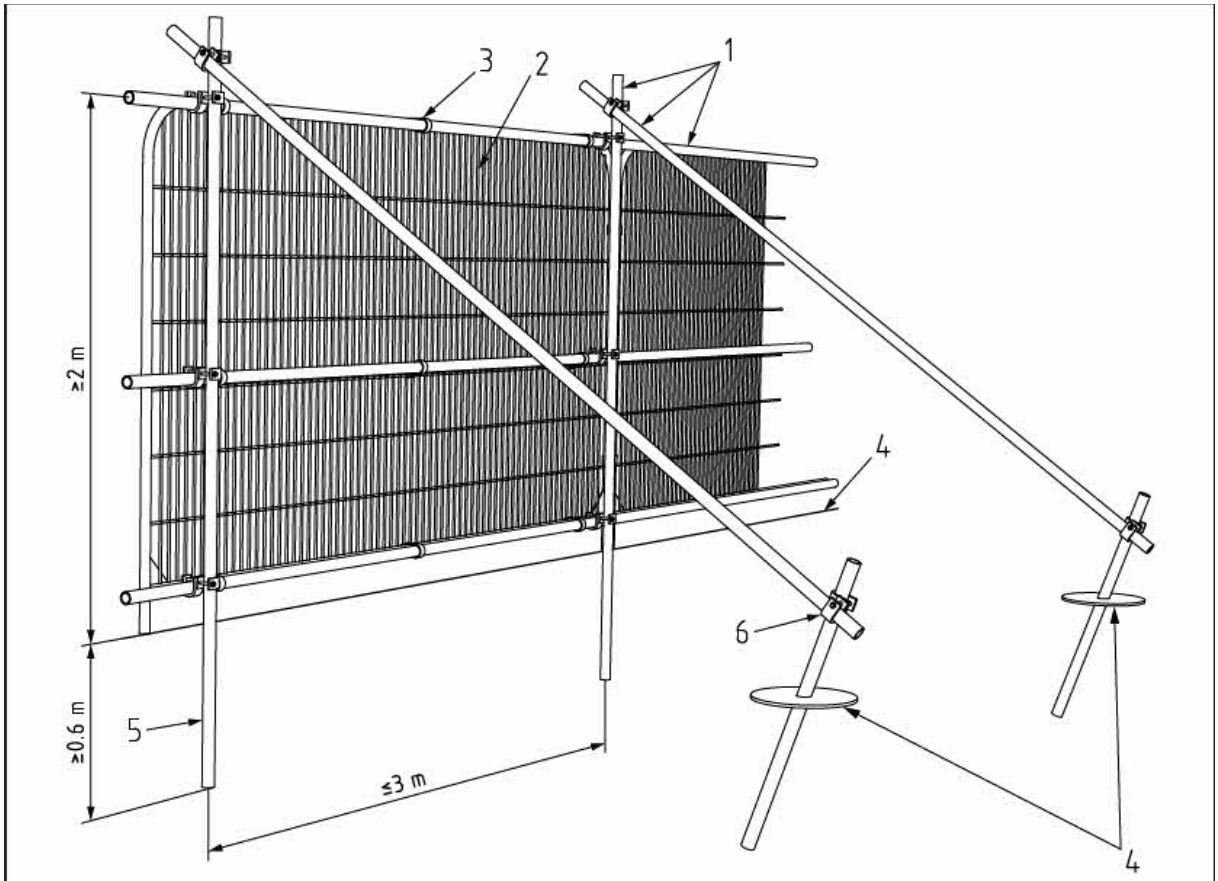
- Crown spread of category C - Trees with low quality and value
- Crown spread of category B - Trees with moderate quality and value
- Crown spread of category A - Trees with high quality and value
- Nine original trees recommended for removal (Arcadis, 2018)
- Additional trees recommended for removal
- Root Protection Area (RPA)
- Figure 2 BS 5837:2012 Fencing
- Precautionary Area/Temporary Ground Proteciton

N

This plan is provided solely for the purpose of supporting the description of the arboricultural features of the site as contained in the accompanying report

Appendix 3: Tree Protection Fencing and Ground Protection

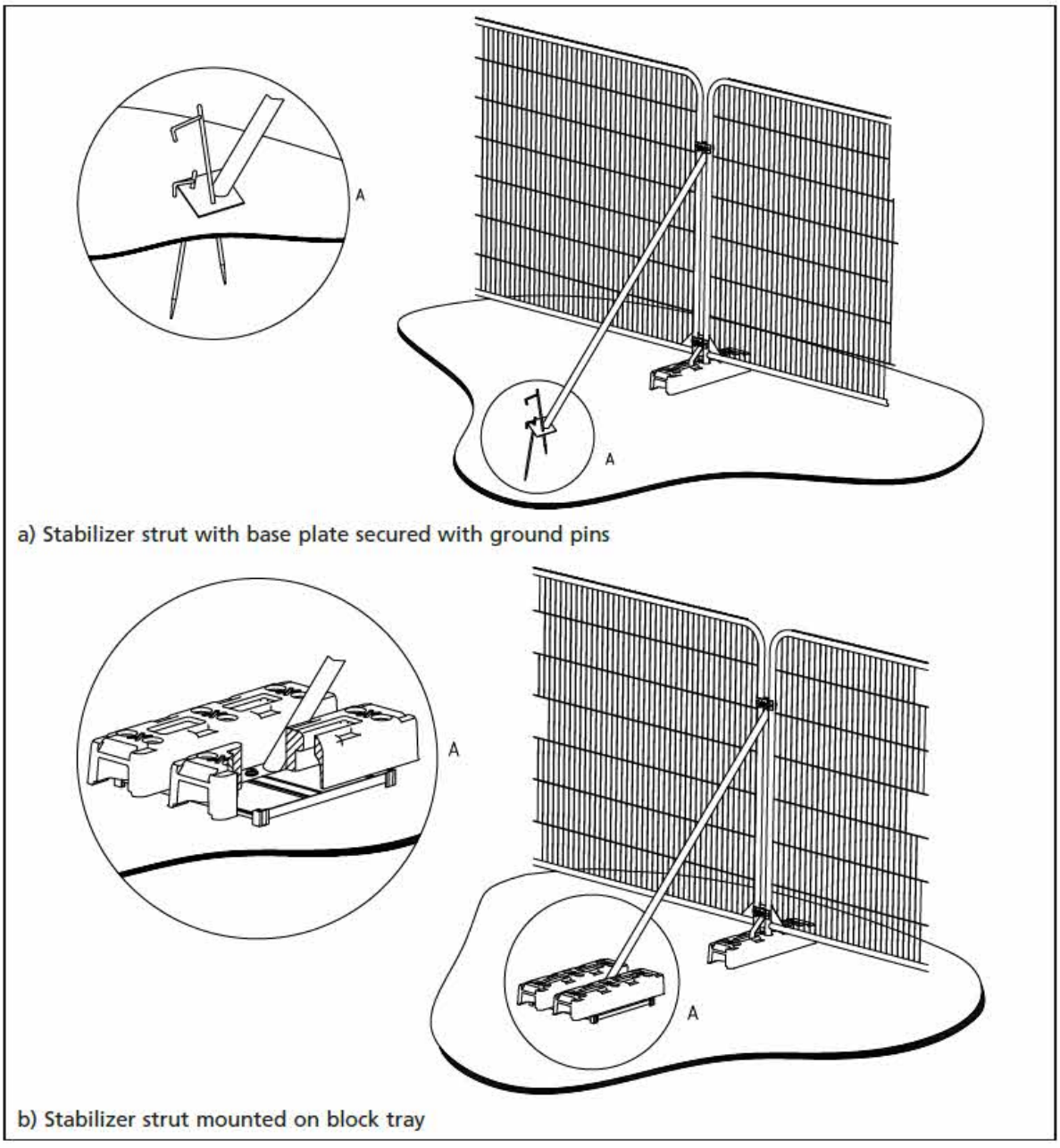
Figure 1: Default specification barrier (BS 5837:2012 figure 2)



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: Alternative ‘above-ground’ barrier system (BS 5837:2012 figure 3)



Appendix 4: Signage


PROTECTIVE FENCING. THIS
FENCING MUST BE
MAINTAINED IN ACCORDANCE
WITH THE APPROVED PLANS
AND DRAWINGS FOR THIS
DEVELOPMENT.


TREE PROTECTION AREA
KEEP OUT !
(TOWN & COUNTRY PLANNING ACT 1990)
TREES ENCLOSED BY THIS FENCE ARE PROTECTED BY
PLANNING CONDITIONS AND/OR ARE THE SUBJECTS OF A
TREE PRESERVATION ORDER.
CONTRAVENTION OF A TREE PRESERVATION ORDER MAY
LEAD TO CRIMINAL PROSECUTION
ANY INCURSION INTO THE PROTECTED AREA MUST BE
WITH THE WRITTEN PERMISSION OF THE LOCAL
PLANNING AUTHORITY

Appendix 5: Glossary of Terms

Glossary of Terms

Term	Explanation
Arboricultural Impact Assessment (AIA)	Evaluation of direct and indirect effects of a proposed design and construction.
Arboricultural Method Statement (AMS)	Methodology for the implementation of any aspect of development that is in the root protection area or has the potential to result in the loss o or damage to a tree to be retained.
Branch structure	Qualitative description of formation of main framework of limbs and branches.
Canopy face	Orientation of canopy relative to cardinal points of the compass
Canopy radius	A measurement taken from the centre of a tree to the furthest rac extension of tree canopy relative to the cardinal points of the compass.
Competent Person	Person who has training and experience relevant to the matter beir addressed and an understanding of the requirements of the particula task being approached.
Conservation Area	Local Planning Authority special designation generally prohibiting tree works without 6 weeks prior written notification.
Construction Exclusion Zone (CEZ)	Area based upon the calculated root protection area prohibiting access.
Cavity	Open and exposed aperture where wood tissue has internally degraded.
Constraints check	Formal search of local authority records to determine leg statutory constraints on tree works.
Crown lifting	Removal of lower branches to achieve a stated vertical clearance above ground level or other surface.
Crown reduction	Pruning of a trees canopy in both height and width.
Decay	Deterioration and breakdown of tree wood fibres resulting in structural and/or physiological dysfunction of a tree.
Dieback	Continual decline and death of wood tissue including twi branches.
Failure	Description of structural failure or wood fibres including fractu branches, limbs and main stems.
Fork	Area or point of union between one or more limbs or branches.
Hazard Risk Assessment	Qualitative and quantitative appraisal of the potential for tree failure and the possible risk of harm or damage to persons or property.
Local Planning Authority	Body responsible for the administration of Statutory duties relating Development Management.
Multi-stem	A single tree formed from 2 or more codominant main stems
Occlusion	Wood development enclosing an extant wound or pruning cut.
Pruning	The targeted removal of branches or limbs using saws or other tools.

Glossary of Terms

Term	Explanation
Physiological Condition	Observation relating to a trees physiology for example vigour, leaf area, growth rate, the presence of pests or disease.
Root Protection Area	Root Protection Area (RPA). Indicative area around a tree deemed t contain sufficient rooting volume to maintain the viability of a tree.
Shelter belt	A wind break normally made up of one or more trees planted in such a way to provide cover from the wind.
Structural Condition	Observation relating to a trees structural integrity and the presence of any physical defects.
Suppressed	Where a trees development has been influenced or effected by the presence of competing vegetation.
Tree Constraints Plan	A scaled plan indicating above and below ground constraints relating to the protection of trees
Tree Preservation Order	A legal order made by the local planning authority protecting specific trees in the interests of amenity.
Visual Tree Assessment (VTA)	A method of assessment based upon the research developed to recognise dynamic responses of a tree to its surroundings.
'V' Shaped Branch Union	The union point between two branches that have grown at a tight angle, forming the 'V' shape. This structure is inherently weaker than the 'U' shaped union.
'U' Shaped Branch Union	The union point between two branches that have grown at a wider angle, forming the 'U' shape. This structure is considered to be the strongest and most optimised shape that a union can form.

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