Highgate Cemetery West

Swain's Lane, London N6

Proposed Mausoleum

Arboricultural Impact Assessment

July 2019

TWC1266-R-001

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1.0 Terms of Reference

1.1 We are instructed by Craig Hamilton Architects Ltd, on behalf of the Friends of Highgate Cemetery Trust, to undertake a tree survey of a parcel of land at Highgate Cemetery West in London. The survey and Arboricultural Impact Assessment have been carried out in accordance with B.S. 5837: 2012 'Trees in relation to design, demolition & construction - Recommendations'.

1.2 This report assesses the specific implications of a proposed Mausoleum on existing trees and provides detail on appropriate protection measures and mitigation recommendations.

1.3 All trees within the survey boundary have been inspected from ground level only. Should further, more detailed inspection be deemed appropriate, this will be covered under Recommendations (section 6.0). Trees are dynamic living organisms, whose health and condition can be subject to rapid change, depending on a number of external and internal factors. The conclusions and recommendations contained in this report relate to the trees at the time of inspection.

1.4 This survey and report has been completed by Richard O'Shea, who holds the formal qualification FdSc in Arboriculture and the LANTRA Certificate in Professional Tree Inspection. Richard is also a Professional member of the Arboricultural Association.

1.5 This report, its appendices and any subsequent revisions or additional information, may form part of any formal planning application in respect of the development of this site, and as such will be open to public scrutiny and comment.

2.0 Survey Methodology

2.1 The trees have been assessed using the current recommendations, as detailed in British Standard 5837:2012, in order to arrive at a Quality Category for each individual tree or group of trees. For full details of the assessment criteria see 'Table 1. Cascade chart for tree quality assessment' of BS5837:2012, shown in Appendix 2.

2.2 A Root Protection Area (RPA) has been assigned to each tree, calculated using the stem diameter at 1.5 metres above ground level. The RPA of all trees and groups have been plotted initially on a Tree Constraints Plan (TCP) along with stem locations, canopy spreads and quality categories which has been used as a design tool to identify constraints and inform the proposals. The TCP data and final proposals have been incorporated into a Tree Removal and Protection Plan (attached as Appendix 3).

2.3 All trees and groups surveyed have been given an identification reference T1-T6 and G1-G2. All collected survey data and work recommendations for individual trees and groups of trees are presented in the survey schedule which forms Appendix 1 to this report.

2.4 The scope of the survey was based on the extent of the Topographical Survey provided (Ref: On Centre Surveys Ltd No.22395A-2). The position of trees has been recorded using the Topographical survey, where trees were not shown their position was approximated using onsite observations. Groups have been defined by their similar characteristics such as species and age composition, condition and quality. Individual trees with a stem diameter below 75mm have not been recorded during the survey.

2.5 All trees and groups have been surveyed to record tree species, age class, diameter at breast height (dbh), height, crown spread, condition, estimated remaining contribution, recommendations, Quality Category and Root Protection Area (RPA).

3.0 Site Overview and Tree Population

3.1 Highgate Cemetery is located on both sides of Swain's Lane, Highgate in the London Borough of Camden. The cemetery is a Victorian burial ground that has many important monuments and tombs in both the East and West Cemeteries. It has been recognised for its importance and is listed as Grade I on Historic England's Register of Historic Parks and Gardens of Special Historic Interest.

3.2 The survey area is located within Highgate West Cemetery where the landscape is largely wooded. It comprises a mix of historic ornamental trees from the early twentieth century and mid nineteenth century, interspersed with naturally regenerating trees of mixed age; predominately Ash species, and an intermittent understorey comprised of overgrown shrubs (e.g. Laurel, Holly, Hawthorn). The trees grow amongst the burial stones and structures and there is a dense ground layer dominated by Ivy.

3.3 The survey area is a small parcel of ground on the north east flank of the 'Cuttings Road' path. The area includes a grassed verge and an embankment that rises north which is covered with a band of overgrown Laurel shrubs. There are no graves within the parcel of land although there are many graves on the top of the bank, and tree cover also continues to the north and east on the top of the bank.

Image 1: View from the north of the Cuttings Road path, showing the indicative location of the proposed Mausoleum (orange square) along with surrounding trees/vegetation.

4.0 Tree Categorisation and Guidance

4.1 A total of **6**no. Individual trees and **2**no. Groups of trees have been surveyed. The numbers of tree features in each quality category can be seen in the table below:

Quality Category	Individual Trees	Groups of Trees	Totals
A (trees of high quality with an estimated remaining life expectancy of at least 40 years)	T4, T6	-	**2**
B (trees of moderate quality with an estimated remaining life expectancy of at least 20 years)	-	-	**0**
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)	T1, T2, T3, T4	G1, G2	**6**
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)	-	-	**0**
Totals	**6**	**2**	**8**

4.2 Foremost consideration should be given to the retention of Category A and B trees (high and moderate quality) in relation to any new development. These trees are largely irreplaceable in the short to mid-term, and the requirement to remove them must be justified by sound design rationale.

4.3 Category A trees are of high value by virtue of their large size, mature age, good condition, ecological importance, landscape significance and/or potential long-term contribution. Trees are downgraded to B Category if they are in impaired condition, have a reduced life expectancy or lack the special quality necessary to merit Category A. These trees will still afford arboricultural, landscape or ecological importance.

4.4 Category C trees are of low value due to their young age, small size, impaired condition, limited life expectancy/landscape significance and/or conservation value. These tree features should not represent a significant constraint to a design brief; nevertheless, they should not be considered totally unsuitable for incorporation within proposals. In many cases, low quality trees can be suitably mitigated with replacement tree planting.

4.5 Category U trees are unsuitable for retention due to their poor health and reduced life expectancy and should be removed prior to development. U Category trees can sometimes be retained where they offer particular conservation value to the site.

5.0 Arboricultural Impact Assessment

5.1 The proposed development includes the construction of a new Mausoleum. The new above ground burial structure will be approximately 7.2m wide, 5.8m front to back and 7m high.

5.2 The Arboricultural Impact Assessment is based on the Proposed Site Plan produced by Craig Hamilton Architects Ltd (Ref:AD01RevA). For corresponding detail refer to Appendix 3 (Tree Removal and Protection Plan; drawing no 1266-D-001) and Appendix 1 (Tree Survey Schedule).

5.3 The proposals will require the removal of a section of a group of Portuguese Laurel (G1) for the construction of the Mausoleum. It will require the removal of a 7-8m section for the footprint of the structure and 3 metres either side of the structure to provide suitable stand-off for its construction and its architectural placement. The Laurels within the 3m buffer sections could be pruned to ground level, instead of completely removed, and be managed on a regular cycle as it regenerates.

5.4 It is recommended that the tree removal is marked up on site once the operational area is accurately marked out and prior to any tree work or commencement of development. The tree marking should be carried out by the project arboriculturalist and relevant project team members.

5.5 The Laurel group provides a degree of landscape amenity along the flanks of the embankment adjacent the 'Cuttings Road' path but it is considered that the proposed section for removal will not adversely affect the character of the immediate area or the wider landscape importance of the Cemetery. The overall impact is considered minor as the trees/shrubs are assessed as C Category (low value) and the majority of the Laurel group will be retained (approx. 40m) either side of the proposed Mausoleum.

5.6 All other surveyed trees can be retained as there is negligible impact proposed to their rooting areas. A small proportion of the RPA of T1 and T2 (Ash) located on top of the bank will incur minor impingement from proposed excavation of the embankment. The proposed foundation design and ground works detailed in drawing Ref: 11700SK1, mitigate for any significant impact to the trees as the construction of a retaining wall uses piling methods that minimise the level of excavation disturbance to the embankment and consequently this significantly reduces impacts to tree roots. There may be minor loss of Ash roots but it is likely to include small diameter roots and the health and stability of the trees will therefore not be compromised.

5.7 Although the Ash trees on top of the bank can be retained in relation to these proposals, it is recommended that trees T1, T2 and T3 are removed as part of ongoing arboricultural management due to their impaired condition and limited life expectancy. Trees T1, T2, and T3 are low quality specimens that have defects which include; weak stem unions, basal decay, drawn slender stems and crown dieback. The removal of these trees will open up a gap in the upper canopy in the immediate area in the short term but their removal shouldn't have a wider landscape impact. Their removal can potentially benefit better quality nearby trees, which include; a mature ornamental Horse Chestnut T4, and a good quality middle-mature Lime within G2.

5.8 In summary, it is proposed that a section of G1 (Laurel) is removed in direct relation to the proposals and trees T1, T2 and T3 (3x Ash) are removed in terms of their low value and impaired condition. It is considered that the removal of these trees will not adversely affect the character of the immediate area or the wider landscape importance of the Cemetery. There is an abundance of surrounding tree cover including mature historic trees, regenerating woodland and established understorey shrubs that will be unaffected by the proposals.

6.0 Tree Protection and Recommendations

6.1 Trees that have been selected for retention should receive remedial works as recommended in Appendix 1 and should be suitably protected with appropriate temporary tree protection fencing for the duration of the construction phase of the development.

6.2 The Root Protection Area (RPA) represents the minimum area around each tree that must be left undisturbed to ensure their survival. The RPA and/or crown spread of individual trees and groups will generally form a Construction Exclusion Zone (CEZ) which will be defined by tree protection fencing. Where construction is necessary within the CEZ of trees selected for retention, sensitive and controlled working procedures must be implemented.

Tree Protection

6.3 All trees that have been selected for retention should be suitably protected with appropriate temporary fencing for the duration of the construction phase of the development. The standard specification comprises of 2metre high Heras® type galvanized weldmesh panels, which is secured to the ground and appropriately braced to prevent lateral movement.

6.4 The standard Heras fencing specification is considered impractical and unnecessary due to the embankment topography and the limited potential impact to any surrounding trees. It is recommended that Netlon fencing, fixed with sturdy pins/pegs, is installed instead. This should be sufficient to demarcate the work area and provide a clearly visible barrier to restrict access/storage of materials into root zones of surrounding trees. Due to the sensitive nature of the surrounding graves, it is expected that there will be strict methods of operational conduct and procedure for construction in proximity to graves, and this in turn will ensure minimal impact to surrounding trees. The fencing type should be reviewed during construction to monitor its effectiveness.

6.5 The alignment of protective fencing is shown on the Tree Removal and Protection Plan (Appendix 3). The fencing should be installed after the completion of the tree works but prior to bringing any construction vehicles or material onto site and should not be removed until construction has been completed and all equipment and machinery has been removed from site.

Operations within Root Protection Area's (RPA's)

6.6 There will be minor impact to the rooting areas of surrounding trees as the proposed foundation design and ground works detailed in drawing Ref: 11700SK1, show piling methods that minimise the level of excavation disturbance to the embankment and consequently this reduces impacts upon tree roots.

6.7 The proposed excavation of the 1.5m wide trenches to allow pile rig access must be carried out in a controlled and sensitive manner to avoid impacts to surrounding root zones. Following the removal/cutting down of the Laurel stems within G1, there will potentially be some moderate sized stumps within the proposed excavation area. We recommend the larger stumps (i.e.15-30cm diameter) are not pulled out using a mechanical excavator which could have a tearing/ripping effect of the soil along the embankment. The stumps/root collar of the larger stems should be exposed using hand tools and the primary roots to be cut using hand saws so the stump can be extracted without causing disturbance to the soil profile, surrounding tree roots or graves. Due to the sensitive nature of the site, it is expected that there will be strict methods of operational conduct and procedure relating to excavation in proximity to graves, and this in turn will ensure minimal impact to surrounding trees.

6.8 Once the trench has been excavated, any roots exposed should be neatly pruned back to the trench face using a pruning saw.

6.9 Should any activities be required within the Construction Exclusion Zone (CEZ) identified on the Tree Removal and Protection Plan (Appendix 3), then the advice of the project arboriculturalist should be sought.

Tree Work

6.10 All tree work recommendations are specified in detail in the tree survey schedule (Appendix 1). Tree work must only be carried out by suitably qualified and experienced contractors, and should conform to guidelines set out in British Standard 3998: 2010 'Tree work – Recommendations'. Care must be taken to ensure during tree removal that damage to retained trees and disturbance to their RPA's is avoided.

6.11 It is recommended that the removal of trees in G1 is marked up on site once the operational area is accurately set-out and prior to any tree work or commencement of development. The tree marking should be carried out by the project arboriculturalist and relevant project team members.

Arboricultural Supervision

6.12 It is recommended that a meeting is arranged between the project arboriculturalist and project team members once the construction area has been set-out and prior to tree removal. The arboriculturalist will mark-up approved tree removal and discuss and confirm tree protection measures, operational planning and work methods to ensure retained trees are appropriately safeguarded. Further arboricultural input or supervision will be applied during the construction phase where it is deemed necessary.

7.0 Statutory Obligations and Guidance

7.1 Works to trees which are covered by Tree Preservation Orders [TPOs] or are within a Conservation Area [CA] require permission or consent from the Local Planning Authority [LPA]. The cemetery is within the Highgate Conservation Area and notification for any tree work should be approved by Camden Borough Council prior to commencement.

7.2 Full planning consent will however override the need for a separate CA notification or TPO application, providing that details of any tree works are included in the submission and subsequently approved by the local authority.

7.3 Highgate Cemetery has been recognised for its importance and is listed as Grade I on Historic England's Register of Historic Parks and Gardens of Special Historic Interest. The register does not itself bring additional controls over the park or garden, but local authorities have policies that must provide for the protection of the historic environment, and they must consult with English Heritage where applications affect a Grade I or II* registered site.

7.4 The National Planning Policy Framework 2012 (NPPF) states that heritage assets should be conserved in a manner appropriate to their significance, so they can be enjoyed for their contribution to the quality of life and this of future generations. The NPPF also assumes protection of all ancient woodland and veteran trees unless it can be clearly demonstrated that the need of, or benefits of, development outweigh the loss. In this survey area there are no ancient woodland or veteran trees.

7.5 The Forestry Commission should be informed if more than 5 cubic metres of timber in any one calendar quarter is being felled, however a felling licence is not required for felling to immediately facilitate a development authorised by full planning permission. Pre-emptive or enabling works undertaken prior to obtaining planning permission may require a felling licence.

7.6 Trees are a potential habitat for nesting birds and roosting bats and it is a criminal offence under normal circumstances to disturb or destroy - whether intentional or unintentional - the nesting or roost sites of bats. They are afforded protection under the 'Wildlife & Countryside Act 1981' and the 'Conservation of Species and Habitats Regulations 2010'. Therefore, avoid carrying out significant tree works during the bird nesting season [1st March to 31st July] and ensure that trees are professionally surveyed for signs of bat roosts and/or bat activity before starting any tree work.

APPENDICES

1. **Tree Survey Schedule**
2. **Survey Criteria and Categorisation**
3. **Tree Removal and Protection Plan (A3)**

Appendix 1
Tree Survey Schedule

No.	Species (common name)	Age class	Height	Crown spread :				Crown clearance	Stem dia. (mm)	Physiological condition	Structural condition	Estimated Remaining contribution	Comments	Recommendations	Ret. Cat. (sub cat.)	RPA (m)
				N	E	S	W									
INDIVIDUAL TREES																
T1	Ash	MM	18	1	3	3	4	10	450, 550	F/P	F/P	10-20	Basal twin stems with included union. Heavily ivy clad. Thinning crown, dieback and deadwood. Poor quality tree. Good quality Lime in G2 to the south.	Remove due to impaired condition.	C1	8.5
T2	Ash	MM	18	3	2	2	3	12	450	F/P	F	10-20	Growing within grave, damaging stonework. Heavily ivy clad, drawn and slender form, dieback and deadwood in upper crown. 1x spindly limb in northern upper crown.	Remove due to impaired condition.	C1	5.4
T3	Ash	MM	18	2	3	3	3	10	300	F/P	F	10-20	Drawn and slender form, forks at 8-10m. Cankered limbs in upper crown and dieback. Decay at base.	Remove due to impaired condition.	C1	3.6
T4	Horse Chestnut	M	18	8	6	7	7	4	1000	F	F	20-40	Edge of path pollard at 4 metres good regen . Tag 01703. Ribs of adaptive growth on bole to the East and West. Asymmetrical form bias West. Forks at 1.5 metres.	Retain	A1	12
T5	Lime	EM	8	2	2	2	2	4	300	F	F/P	10-20	Twin stem at 2.5m, tight included union. Twisted contorted stems and suppressed. Poor form. Laurel growing around its stem. Cherry nearby with basal decay - poor.	Retain	C1	3.6
T6	Yew	M	14	6	6	6	6	3	750 X1 300 X3	G/F	G/F	40+	On top of bank above Mausoleums. 1 main stem, 3 sub stems. Old branch failures and cavities. Good health.	Retain	A1	10.9

No.	Species (common name)	Age class	Height	Crown spread :				Crown clearance	Stem dia. (mm)	Physiological condition	Structural condition	Estimated Remaining contribution	Comments	Recommendations	Ret. Cat. (sub cat.)	RPA (m)
				N	E	S	W									
GROUPS OF TREES																
G1	Laurel	EM-MM	8					1	100-250	G	F	10-20	Growing along embankment, basal multistemmed and low spreading.	Remove stems within footprint of proposals and prune/remove to provide 3m clearance from structure. Reatin and protect Laurels outside construcion zone.	C2	1m beyond canopy spread
G2	Ash (2), Lime (3)	EM-MM	12-15					3	200-450	F	F	10-20	5 trees amongst graves. Lime to north is a good specimen (40cm dbh), balanced crown. 1x Ash (18cm) growing through Lime crown, drawn form, poor and decay at base. 1x Ash (28cm) drawn form, forks upper crown, east and west stems. 1x Ash, twin stem at base with included union, one stem leans south one central stem is drawn form, heavily ivy clad. 1x Lime to south has drawn form and suppressed by Ash.	Retain	C12	1m beyond canopy spread

Appendix 2

Survey Criteria and Categorisation

APPENDIX 2: SURVEY CRITERIA

Tree No.	Reference ID given to each tree or group of trees (unless tagged)
Species	Common name. Botanical name may be given if clarification is required
Age Class	Young, middle aged, mature or over-mature
Height	Estimated in metres
Crown Spread	Crown spread (North / East / South / West) measured from centre of trunk, in metres
Crown clearance	Approximate height between lowest part of canopy and ground level (metres)
Stem dia.	Trunk diameter/s (mm) measured at 1.5m above ground level, or other height as specified
Condition	Good, Fair, Poor or Dead based on the general physiological health and structural condition of the tree
Estimated Remaining Contribution	An estimation of the life expectancy in years, if the natural cycle of the tree is allowed to run its full course. (<10, 10-20, 20-40, 40+ years)
Comments	A brief description of the tree or group relating to its form, vitality and presence of any significant defects.
Recommendations	All tree work is based on current tree condition and the existing land use and will include work such as hazard abatement, encroachment pruning, thinning of groups/woods and good arboricultural practice.
Quality Category	Based on B.S.5837 Quality categories: **A** = Those of High Quality & Value **B** = Those of Moderate Quality & Value **C** = Those of Low Quality & Value **U** = Unsuitable for retention Subcategory values: 1) Arboricultural 2) Landscape 3) Cultural
RPA	Root Protection Area is based on stem diameter (mm) and is provided as the radius of circle measured in metres from centre of tree, or may be expressed as an area (m^2)

Tree Quality Categorisation

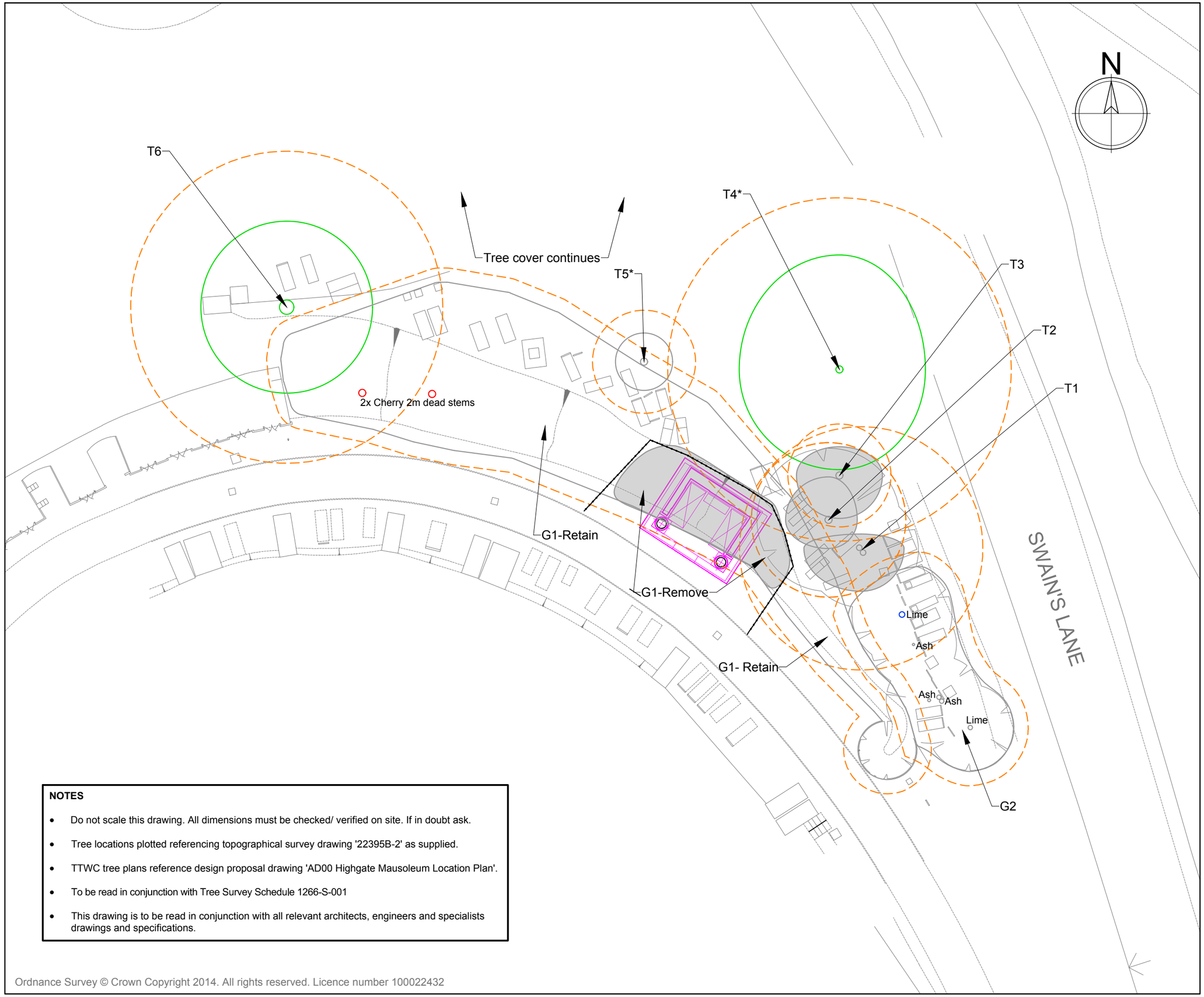
BS5837:2012 Trees in relation to design, demolition and construction – Recommendations. p.9

Table 1 **Cascade chart for tree quality assessment**

Category and definition	Criteria (including subcategories where appropriate)			Identification on plan
Trees unsuitable for retention (see Note)				
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; see 4.5.7.*			See Table 2
	1 Mainly arboricultural qualities	**2 Mainly landscape qualities**	**3 Mainly cultural values, including conservation**	
Trees to be considered for retention				
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)	See Table 2
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	See Table 2
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	See Table 2

Appendix 3

Tree Removal and Protection Plan (A3)



NOTES

- Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
- Tree locations plotted referencing topographical survey drawing '22395B-2' as supplied.
- TTWC tree plans reference design proposal drawing 'AD00 Highgate Mausoleum Location Plan'.
- To be read in conjunction with Tree Survey Schedule 1266-S-001
- This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.

KEY

Tree Categorisation:
(Tree quality assessment based on BS 5837:2012 Trees in relation to design, demolition and Construction - Recommendations)

Tree Retention

- **Crown spread of category A** Trees/groups of high quality and value
- **Crown spread of category B** Trees/groups of moderate quality and value
- **Crown spread of category C** Tree/groups of low quality and value
- **Crown spread of category U** Trees/groups unsuitable for retention

Tree Removal

- **Crown spread of category A** Trees/groups of high quality and value
- **Crown spread of category B** Trees/groups of moderate quality and value
- **Crown spread of category C** Tree/groups of low quality and value
- **Crown spread of category U** Trees/groups unsuitable for retention

Root Protection Area (RPA)
To be used to inform design proposals and assess potential tree impacts. It represents the minimum area around each tree that should be left undisturbed to ensure their survival.

* **Approximate position** (where not shown on the topographical survey)

Tree Protection Fencing
This outlines the Construction Exclusion Zone (CEZ) and is defined by the Root Protection Area.

PROJECT INFO

Project:	Highgate Mausoleum
Title:	Tree Removal and Protection Plan
Client:	Craig Hamilton Architects Ltd.
Project No:	1266
Drawing No:	1266-D-001
Rev:	
Scale:	1:250 @ A3
Date:	31.07.19
Drawn:	CA
Checked:	ROS
Figure No:	

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