



Arboricultural Survey BS5837: 2012

Stage 1: Feasibility of Development

Survey for trees at the site:	10 Thurnscoe Hall Mews, High Street, Thurnscoe, S63 0AF
Prepared for:	Ashley Newton- Atom Architectural
Reference:	Tree Survey 0376
Date:	13 th June 2023
Surveyor (s)	Miss R D Selwyn BSc (Hons) Arboriculture and Urban Forestry, MArborA Mr S Selwyn Dip Arb L4 (ABC)

Selwyn Trees
30 Tickhill Road
Doncaster
South Yorkshire
DN4 8QE
01302 816850
Email: info@selwyntrees.co.uk



§ Selwyn UI-1272A



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1.0 INTRODUCTION

- 1.1 Ashley Newton of Atom Architectural engaged Selwyn Trees to carry out and produce a BS5837:2012 Arboricultural Survey and Tree Constraints Plan for a site at the property 10 Thurnscoe Mews, High Street, Thurnscoe, S63 0AF
- 1.2 An Arboricultural site visit was carried out on the 12th of June 2023 to carry out the survey, which included assessing the condition of any trees and collecting tree data to compile this report.
- 1.3 The weather on the day of the site visit was dry and sunny.
- 1.4 We were provided with the following documents:
- 01- Proposed Floor Plan Rev-
 - 02- Proposed Elevations Rev-
 - 03- Existing Floor Plan Rev-
 - 04- Existing Elevations Rev-
 - 05- Existing Site Plan Rev-
 - 06- Proposed Site Plan Rev-
 - 07- Location Plan Rev-
 - Promap-2209347-2315560-720-0
- 1.5 This report was compiled by Rachel Selwyn, BSc (Hons) in Arboriculture and Urban Forestry, who has 7 years of experience working for Selwyn Trees and is a professional member of the Arboricultural Association.

2.0 SCOPE OF THE REPORT

- 2.1 The purpose of the survey and report is to identify the quality of woody vegetation over 75mm diameter on site to determine retention potential. Also, the survey will show the extent of canopy spreads, and Root Protect Area calculations, based on the BS5837:2012 standard to determine the development potential of the site. It aims to give a balanced judgment of the condition of any trees, hedges, and groups, which may be affected by a planning proposal, and where necessary, any future management. General information and guidance on the impacts of any proposed development may be given. The information provided in this report has been compiled in accordance with the relevant British Standard- BS5837:2012-‘Trees in relation to design demolition and construction recommendations.
- 2.2 The Tree Constraints Plan (TCP) is a map drawing that identifies trees, hedges, and group locations, their crown spreads, and the extent of their Root Protection Areas (RPA). The information is used by architects to design any development on-site around tree constraints. Once plans are discussed, detailed information on the impacts of a specific proposal can be compiled in a supportive Arboricultural Impact Assessment to validate a planning application.

3.0 CAVEATS AND LIMITATIONS

- 3.1 This survey has been undertaken in compliance with BS5837:2012; it is not intended to be a tree safety survey. Tree inspection was carried out from ground level using the Visual Tree Assessment methodology. The survey did not include any climbing or investigation beyond what was visible from access points. Digital Scanning Software and other decay detection methods were not available to detect internal decay. No soil samples were taken. Any structural defects present may not be visible, for example being masked by vegetation, whether the tree’s foliage, plants growing around the base of the tree, or climbing plants growing on the stem and into the crown.
- 3.2 This report includes an evaluation of the tree(s) on the day the site visits were made. Where access was limited, measurements were estimated. This report takes into account findings from these visits. Where similar trees are growing in large groups, their height and diameter may be estimated. Trees were surveyed if they affected the site and if their diameters at 1.5m exceeded 150mm in a woodland setting (75mm for individual trees).
- 3.3 This Arboricultural survey is valid only for typical weather conditions. Healthy trees, or parts of healthy trees, may fail at any time. Structural failures occur when the stresses due to the forces acting on a tree exceed the strength of the tree structure or the tree–soil connection supporting the tree. Even a structurally strong tree, free of defects, will fail when a load is applied that exceeds the load-

carrying capacity of one or more of its parts. Most tree structural failures involve a combination of structural defects or conditions, such as the presence of decay or poor structure and an unusual or extreme loading event, such as strong wind. Every effort has been made to identify defects or hazards but no guarantee can be given for their safety. Healthy trees may fail in unusually high or unpredictable winds or violent storms and as the consequences of such weather phenomena are unforeseeable, Selwyn Trees cannot be held liable for any such failures.

- 3.4 Unless otherwise stated, the survey data should be considered time-limited for planning purposes to a maximum of 1 year.
- 3.5 Any legal descriptions stated or given by the consultant are understood to be accurate. Selwyn Trees will not assume responsibility for legal matters that arise from this survey, and will not be required to act as a legal witness to give testimony or attend court unless agreed arrangements are subsequently made.
- 3.6 Land managers are responsible for any work on surveyed trees or for carrying out any recommendations.

4.0 SITE DESCRIPTION

4.1 The site surveyed is at the residential property 10 Thurnscoe Hall Mews, High Street, Thurnscoe.



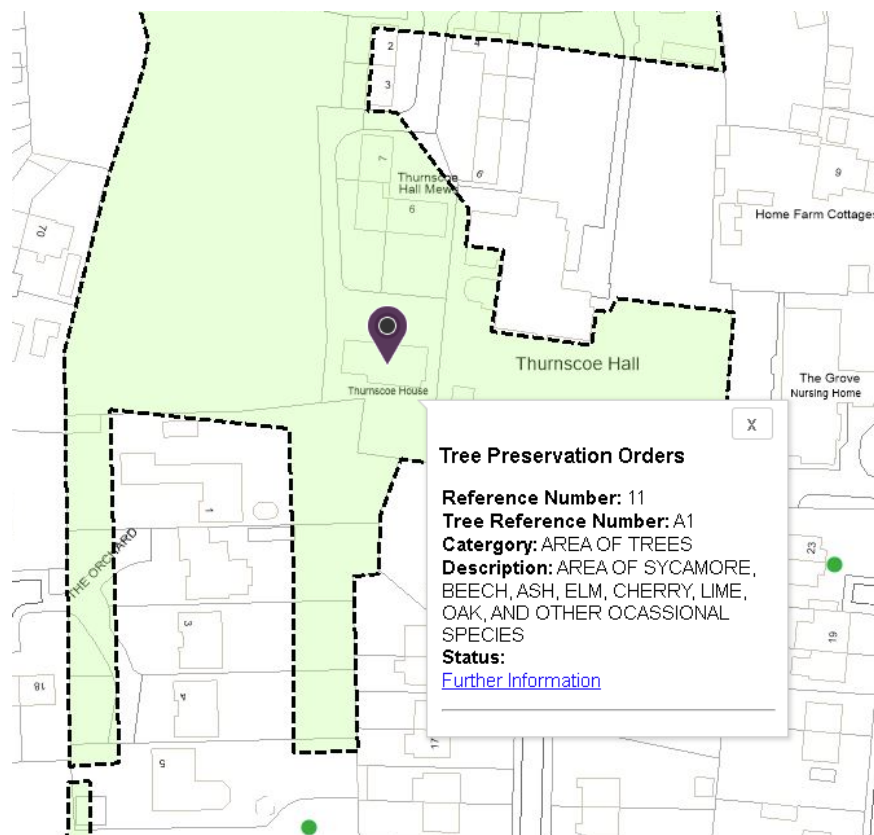
Figure 1: the aerial view of the site area from Google Maps ©. The site surveyed is approximately outlined in red.

- 4.2 The site is a residential property consisting of a long tarmac/ asphalt access driveway from the north of Thurnscoe Hall Mews. A detached residential dwelling is present on the site with a tarmac driveway present to the north and an amenity garden to the rear (south of the dwelling).
- 4.3 The site is bordered by neighbouring residential properties on the north, east and south sides. The main accessway into the site is via the existing driveway from the north, from Thurnscoe Hall Mews. The neighbouring property to the east is Thurnscoe Hall. The site is bordered to the west by a small woodland-type area. There are level changes present on the site and the ground level slopes slightly downwards, from south to north.

- 4.4 According to the Cranfield Soil and Agrifood Institute (2023) the soil type in the area of the site is “Slowly permeable seasonally wet acid loamy and clayey soils”.

TPO (Tree Preservation Order) and Conservation Area Status

- 4.5 According to the interactive map on the Barnsley Metropolitan Borough Council website, a group Tree Preservation Order (TPO) covers the site, as shown below:



<https://www.barnsley.gov.uk/barnsley-maps/tree-preservation-orders/>

5.0 ARBORICULTURAL SURVEY INFORMATION & KEY

- 5.1 This report takes into account findings from this visit. Quantitative data is provided on tree species, height, diameter, age class, crown spread, British Standard category, crown clearance, and a brief assessment of tree condition and future potential. Trees found to be structurally dangerous or in poor condition are identified.
- 5.2 The location of the trees with their calculated Root Protection Area (RPA) is shown in the tree constraints plan in the next chapter.
- 5.3 All data for each tree is presented in table format. The survey includes the information below:

Tree Survey Table Key:

Survey Reference number- Trees were tagged.

Species- Species identification is based on visual observation with the common English name given first and the botanical name given in italics. If the species was not identified it is marked as Unidentified.

Tree Heights - These were measured in meters using laser technology. Where access was limited or there was little visibility due to overcrowding, heights were estimated.

Stem no. – Number of stems

Ø (mm)= Stem diameter measured at 1.5m above ground level - Measured using diameter tape in mm at 1.5m above ground level. In the case of grouped trees, the largest diameter was recorded.

Stem Diameters -

Crown Spread - The crown spread was measured in meters in the North, South, East, and West directions. Where access was limited crown spread was estimated.

Crown Clearance - the height of the first significant branch was measured. Where access or visibility is limited, this was estimated.

Age class - trees were recorded as young, semi-mature, early mature, mature, and over-mature as prescribed in BS 5837:2012.

RP - Root Protection

- **A (m²)= Area**
- **R (m)= radius**

Condition – tree condition was recorded particularly concerning structural and/or physiological conditions (eg. The presence of decay, physical defects, and/or preliminary management recommendations)

Where trees are grouped or in the case of woodlands, the condition stated will be typical of the feature. Groups of trees and woodlands are represented and the RPA will be included in the total area shown. The RPA will be calculated by taking an average measurement of stem diameter.

Deadwood -

Minor deadwood- less than 25mm in diameter

Moderate deadwood- 25-50mm in diameter

Major deadwood – Greater than 50mm in diameter

P = Physiological condition**S = Structural Condition**

Those trees marked 'Good' can generally be classed as having good overall structural and physiological condition. They usually contribute significantly to the local or site amenity.

Those trees marked 'Fair' can generally be classed as having reasonable structural and physiological condition. They may contain smaller areas of included bark within either major or minor fork junctions. They may be subject to single or multiple fungal invasions, bacteria or viruses. They may be subject to minor crown dieback, unusually pale or smaller foliage or have been subjected to outside influences such as restriction of rooting spread, vandalism or mechanical damage, but should be viewed as in generally good overall condition.

Those trees marked 'Poor' can generally be classed as having poor overall structural or physiological condition. They may contain large areas of included bark either within major fork junctions. They may be subject to single or multiple fungal invasions, bacteria or viruses. They may contain splits or cracks throughout the branching structure. They may be subject to significant crown dieback or exhibit unusually pale or small foliage. They may be subject to outside influences such as restriction of rooting spread, vandalism or mechanical damage and are costly to retain.

Estimated Remaining Contribution/ Life Expectancy – estimated (eg. Less than 10 years, 10-20 years, 20 – 40 years, 40+ years)

BS5837:2012 Tree Survey

Selwyn Trees

Client: Ashley Newton - Atom Architectural
 Project: 10 Thurnscoe Hall Mews, Thurnscoe, S63 0AF
 Survey Date: 12/06/2023
 Surveyor: Rachel Selwyn

30 Tickhill Road
 Doncaster
 South Yorkshire
 DN4 8QE
 Phone: 01302 816850
 Mobile: N/A

Tree and Tag No Species	Hght (m)	Stems		Crown		Age	RP A (m²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations		Cat ERC
		No	Ø (mm)	Spread (m)	Clear (m)					Survey Comment		
G1											Estimated Measurements	
A Group	25	1	500	N	3	M	A: 113.1	Good	C: Good	A group of offsite trees, adjacent to the site’s driveway. The group consists predominantly of sycamore (Acer pseudoplatanus) and Leylandii. Trees within the group are mature and large. Pruning has been carried out for clearance over the driveway of the site, and clearance is above 4m. The driveway is a tarmac/ asphalt surface. Inspection limited due to limited access Next inspection due: 24 months	B.2	
- -				E	5.5		R: 6		S: Good		20 to 40 yrs	
				S	3				B: Good			
				W	3							
T1											Estimated Measurements	
Sycamore	21	1	720	N	9	4	M	A: 234.5	Good	C: Good	B.2	
Acer pseudoplatanus				E	7	3.5		R: 8.63		S: Good		20 to 40 yrs
				S	6	3.5				B: Fair		
				W	3	7						
Age Classifications: N Newly planted EM Early Mature Condition: C Crown Stems: Ø Diameter Y Young M Mature S Stem (Eq) Equivalent stem diameter using BS5837:2012 definition SM Semi-mature OM Over Mature B Basal area ERC: Estimated Remaining Contributio												

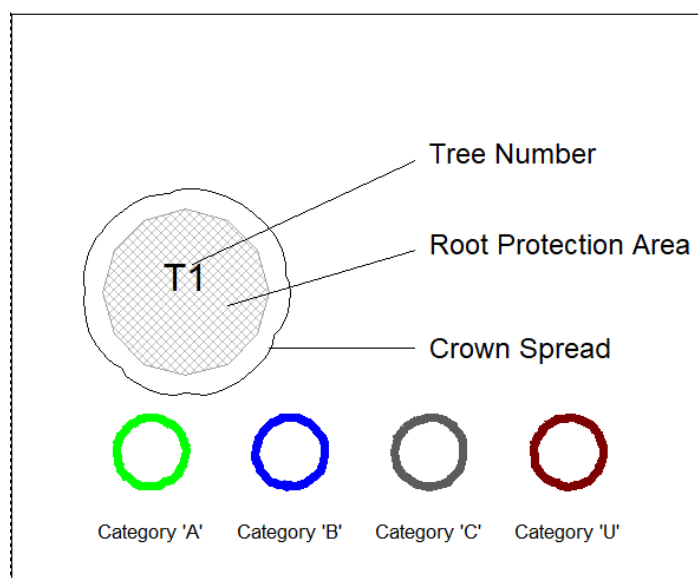
Tree and Tag No Species		Hght (m)	Stems		Crown		Age	RP A (m ²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations		Cat ERC	
			No	Ø (mm)	Spread (m)	Clear (m)					Survey Comment			
T2												Estimated Measurements		
Sycamore <i>Acer pseudoplatanus</i>		20	1	420	N	5	5.5	M	A: 79.8 R: 5.03	Good	C: Fair S: Good B: Fair	Raised soil present at the base on the south-west side. Tree has a typical upright, woodland - type structure as it is growing within a line of trees and affected by group pressure; most of the growth extends north and south. Multiple pruning wounds present throughout and most are occluding well. Minor epicormics's are present within the crown. Next inspection due: 24 months	B.2 20 to 40 yrs	
T3												Estimated Measurements		
Sycamore <i>Acer pseudoplatanus</i>		17	1	230	N	3	5.5	SM	A: 23.9 R: 2.75	Good	C: Fair S: Good B: Fair	Plenty of future growth can be expected. Typical woodland-type structure and very confined on all sides, affected by group pressure . Physiological condition is good. Some historical ivy was present on the main stem in the past. Next inspection due: 24 months	B.2 20 to 40 yrs	
T4												Estimated Measurements		
Sycamore <i>Acer pseudoplatanus</i>		21	1	645	N	9	7	M	A: 188.2 R: 7.73	Good	C: Good S: Good B: Good	Minor helical twisting present in the main stem. The tree has an edge structure but is quite spreading. Several pruning wounds are present, on the main stem, especially on the north-west side; at least 7 wounds present. Most pruning wounds are occluding well, but some small cavities may be forming. The tree has a high crown as a result of this crown lift pruning previously carried out. The ground level does slope slightly downwards from south to north. Physiological condition is good. The structural condition is good. Next inspection due: 24 months	B.2 20 to 40 yrs	
T5												Estimated Measurements		
Wild Cherry <i>Prunus avium</i>		12	1	200	N	3	3.5	SM	A: 18.1 R: 2.4	Good	C: Fair S: Fair B: Fair	Offsite tree. Branches of the tree do extend over the boundary and reach the dwelling on the site. Clearance over the accessway is currently sufficient. Physiological condition is good. Plenty of future growth can be expected. Next inspection due: 24 months	B.2 10 to 20 yrs	
Age Classifications:		N	Newly planted	EM	Early Mature		Condition:		C	Crown	Stems:		Ø	Diameter
		Y	Young	M	Mature				S	Stem			(Eq)	Equivalent stem diameter using BS5837:2012 definition
		SM	Semi-mature	OM	Over Mature				B	Basal area	ERC:		Estimated Remaining Contributio	

Tree and Tag No Species	Hght (m)	Stems		Crown		Age	RP A (m²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations	Cat ERC
		No	Ø (mm)	Spread (m)	Clear (m)					Survey Comment	
T6										Estimated Measurements	
Sycamore <i>Acer pseudoplatanus</i>	18	3	492 (Eq)	N E S W	6 6 5 3.5	5 2.5 3 3.5	M A: 109.7 R: 5.9	Fair	C: Fair S: Fair B: Fair	Offsite tree. Tree has 3 stems, co-joined below 1.5m. Access was limited to be able to inspect closer. There is evidence of some pruning on the south side. The tree canopy appears slightly thin and sparse on the north east side. Some lower epicormics's present, but not significant. The branches extend over the boundary but doesn't reach the house. Clearance is good. The tree appears to have reduced vitality. Some cracking is present in the tarmac of site's driveway the within 4m of the tree. Inspection was limited due to lack of access Next inspection due: 24 months	B.2 20 to 40 yrs
Age Classifications: N Newly planted Y Young SM Semi-mature EM Early Mature M Mature OM Over Mature Condition: C Crown S Stem B Basal area Stems: Ø Diameter (Eq) Equivalent stem diameter using BS5837:2012 definition ERC: Estimated Remaining Contributio											

Tree Constraints Plan (TCP) Map key

RPA (Root Protection Area) - The Root Protection Area for a tree is the minimum area required to meet the everyday needs of a normal healthy tree. The standard root protection area of a tree is described as a circle (with the tree at the centre) with a radius of 12 times the stem diameter, measured at 1.50m above ground level. The maximum radius for a root protection area (excluding ancient and veteran trees) is capped at 15.0m. BS:5837 recommends that there should be no excavation, no changes in soil level (either increases or decreases), and no compaction within the root protection area. The radius of the root protection area for ancient and veteran trees, based on the current Standing Advice, is 15 x stem diameter (measured at 1.50m above ground level) or 5.0m beyond the edge of the canopy, whichever is greater. The RPA illustrated polygon is a design tool used to calculate the minimum area of soil a tree needs at its current size to survive. However, the true root spread may be different from the polygon design tool illustrated, depending on the site conditions and site features. Therefore, these are taken into account when assessing root spread and the impacts of any development on roots.

The RPA Polygons and crowns spreads of the trees surveyed are illustrated on the map plans by the following key:



Retention Category- Corresponds with BS 5837:2012

A - Trees of high quality and value, including visual amenity (sub-categories 1, 2, 3). It is usual for such trees to be retained unless the planning merits of a particular scheme or layout override. Category A trees are those of high quality and value, and of a condition whereby they could make a substantial contribution to the site. Such trees should be retained where possible and considered during the design phase and physical protection during the construction phase in accordance with BS 5837.

B – Trees of moderate quality and value, including visual amenity value (sub-categories 1, 2, 3). Such trees should be considered for retention. Category B trees are those of moderate quality and condition and that could make a significant feature within the site. Category B trees should be retained if possible and offered

adequate consideration during the design phase and protection during the construction phase in accordance with BS 5837:2012.

C – Trees of low quality and value including visual amenity (sub-categories, 1, 2, 3). Category C trees are considered to be of low quality and value or lacking stature, but of adequate condition to remain. These trees could be retained where possible but where they form a significant constraint to development their removal should be considered. Where they are retained they will require consideration during the design phase and physical protection during the construction phase in accordance with BS 5837:2012.

U – Trees in such a condition that they cannot be realistically retained as living trees in the context of the current land use for longer than 10 years. Category U trees are of such a condition that any existing value would be lost within 10 years. As a result, it is recommended that Category U trees are not considered a constraint for development and are removed before construction commences.

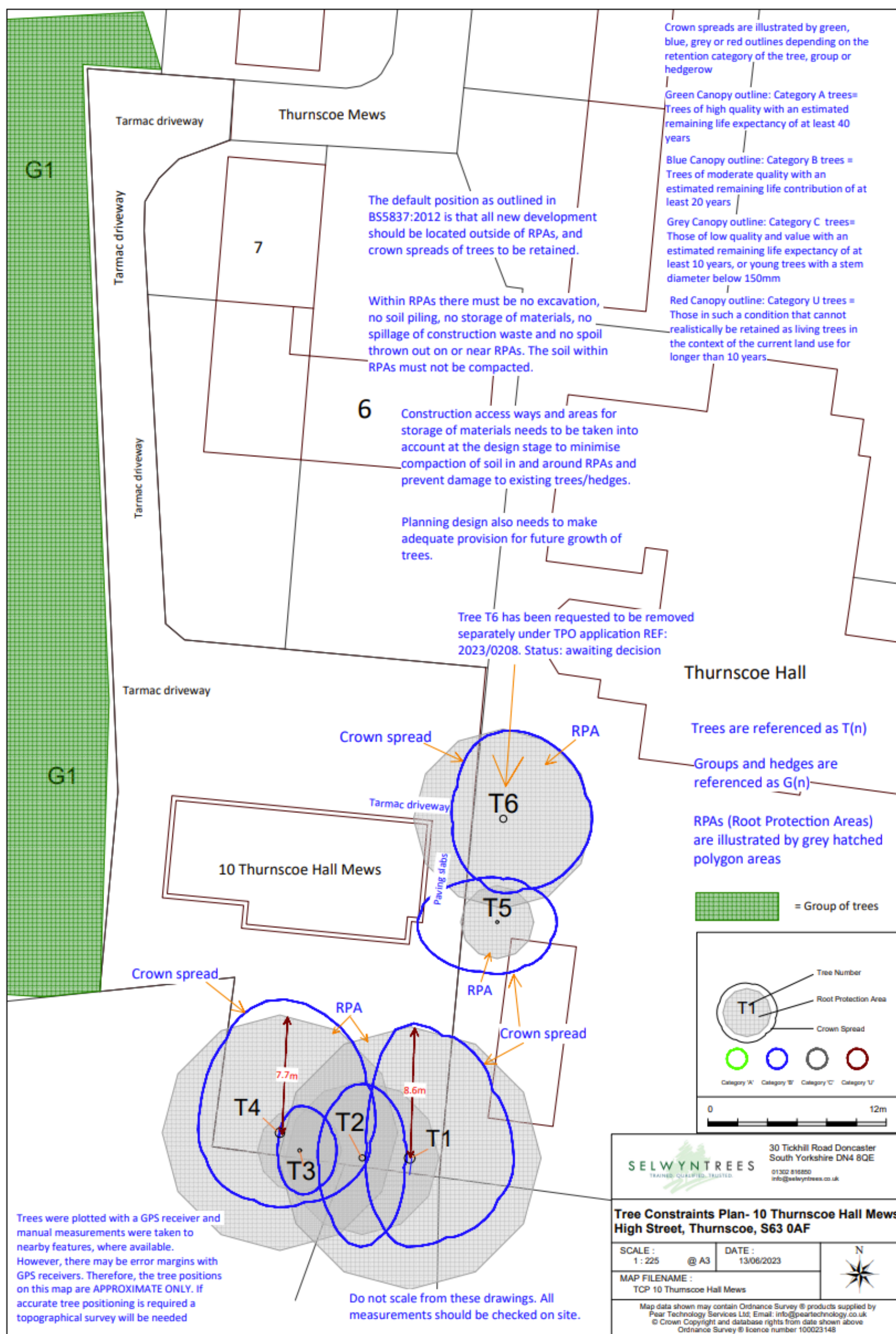
Subcategories – trees in categories A to C will qualify under one or more of three sub-categories (1, 2, 3). Sub-categories 1, 2 and 3 are intended to reflect Arboricultural and landscape qualities, and cultural values, respectively. This is set out in Appendix 2.

The tree survey lists which sub-category applies. Each sub-category is intended to have equal weight such that, for example, an A1 tree has the same retention priority as an A2 tree. Some trees could qualify under more than 1 criterion.

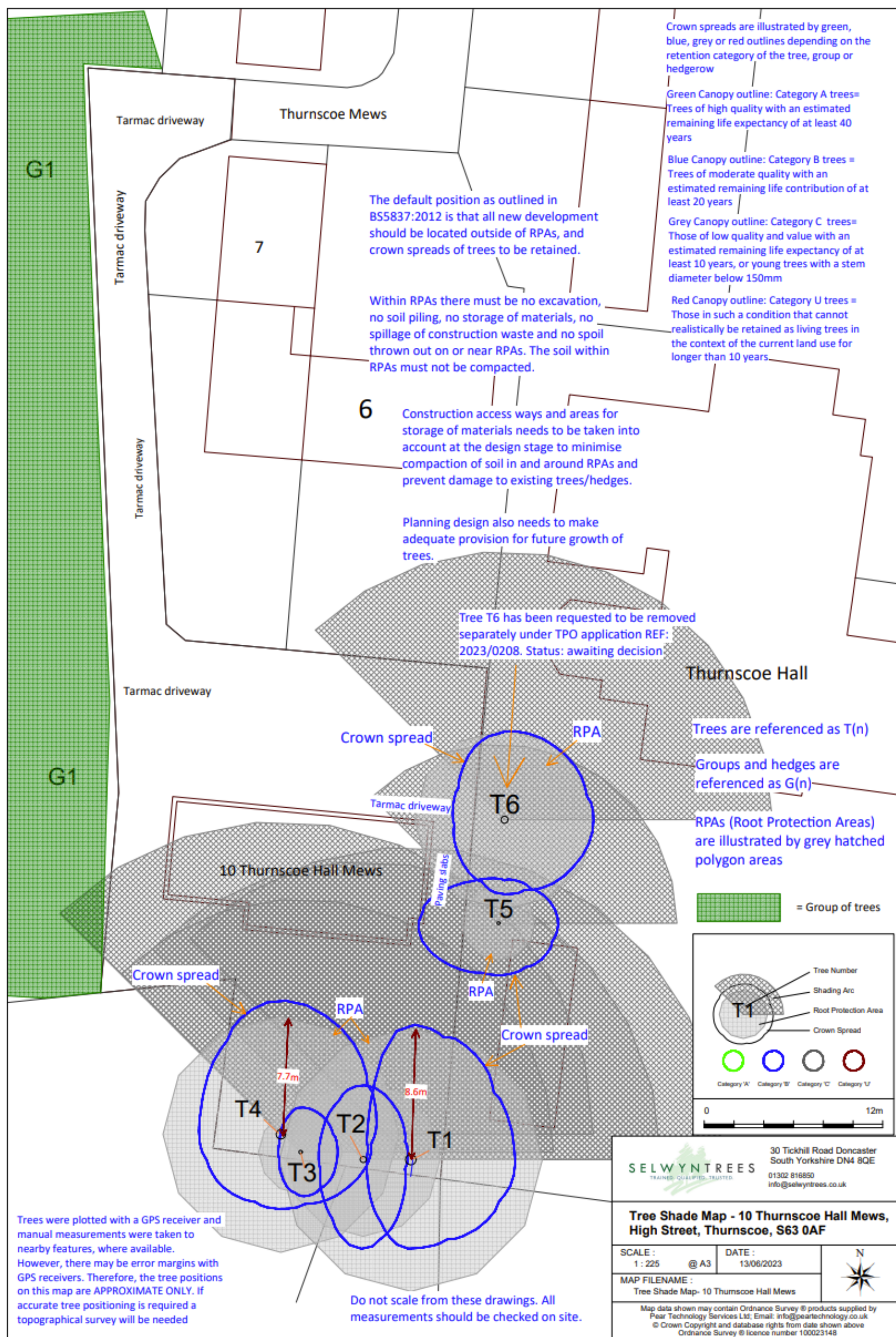
Trees were surveyed if they had a stem diameter above 75mm as per the BS 5837: 2012 guidelines (150mm for woodland trees). Trees with stem diameters less than this are classed as too young to be significant.

For more information on tree categorisation, please see **Appendix 1 British Standard BS5837:2012**

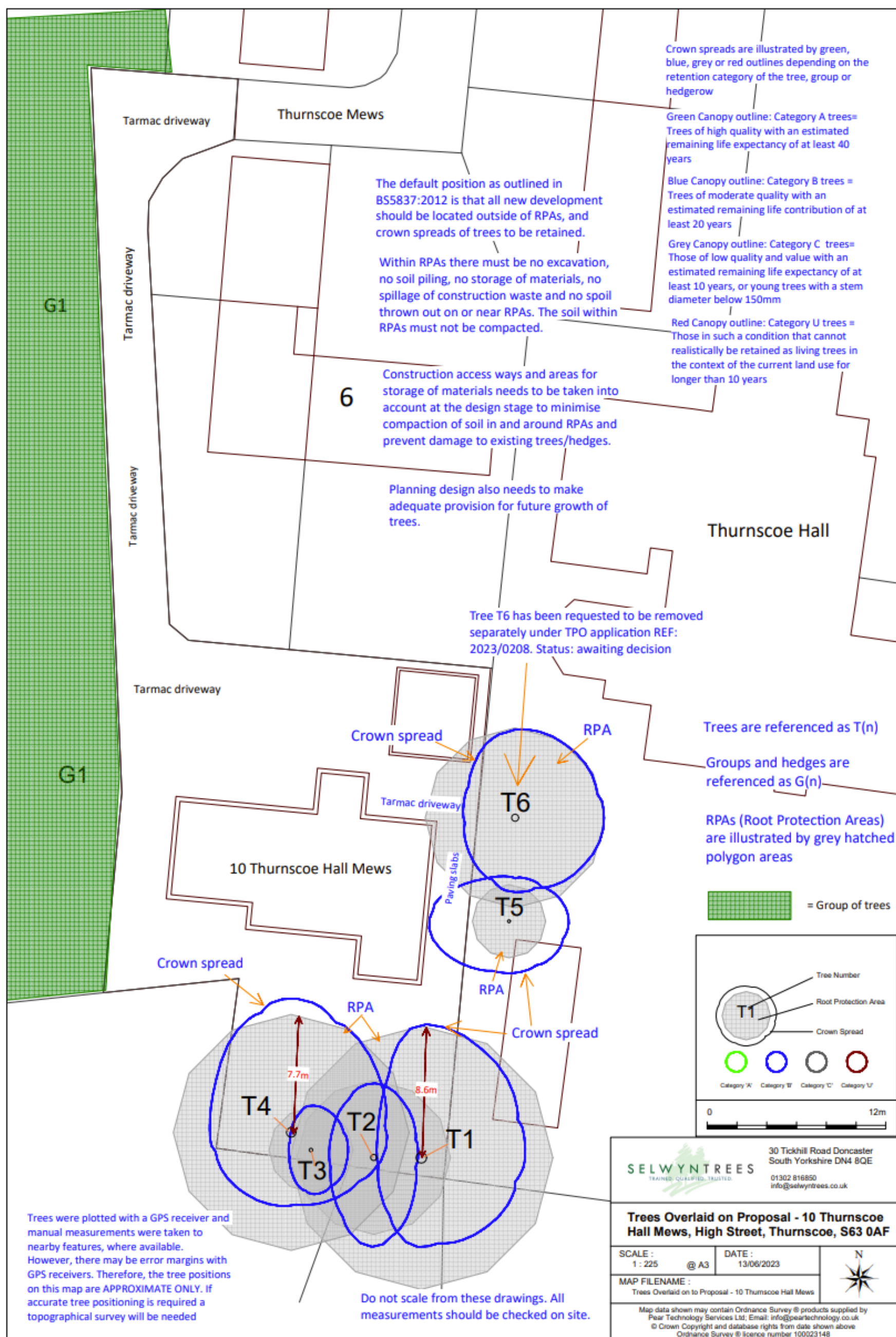
TREE CONSTRAINTS PLAN MAP:



TREE SHADE MAP:



TREES OVERLAID ONTO THE PROPOSAL:



8.0 TREE CONSTRAINTS INFORMATION AND GUIDANCE

- 8.1 Please see the BS5837 Survey table above which provides details, measurements and comments regarding the trees surveyed. Please also see the TCP (Tree Constraints Plan) above for illustrations of tree crown spreads, and Root Protection Area (RPA) calculations. Some trees have work recommended, regardless of development. Some preliminary comments on the tree constraints of the site and guidance on the most successful objectives for development from a tree's perspective are given below.

General construction site hazards:

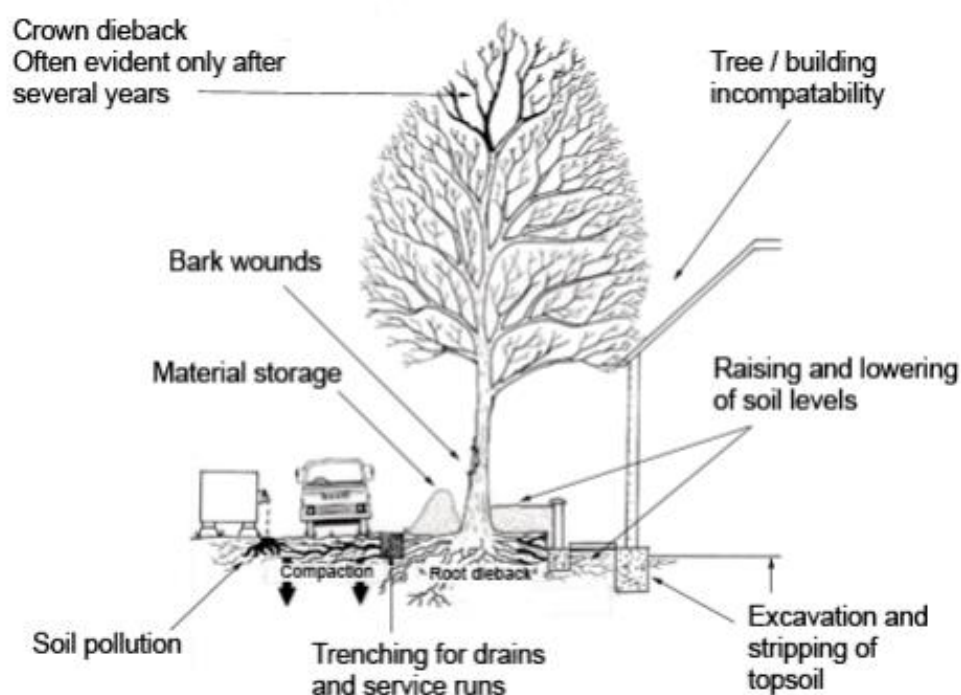


Image 1: Credit to District Department of Transportation Urban Forestry Administration
https://ddot.dc.gov/sites/default/files/dc/sites/ddot/publication/attachments/guidelines_tree_protection_during_construction.pdf

- 8.2 The default position as outlined in BS5837:2012 'Trees in relation to Design, Demolition and Construction- recommendations' is that all new development should be located **outside of RPAs, and crown spreads** of trees to be retained. RPAs are illustrated by the grey-hatched polygon areas on the Tree Constraints Plan map.

UNDERSTANDING ...



How a Tree Grows

No



Yes



Image 2: Root severing leading to root plate failure. Image credit to District Department of Transportation Urban Forestry Administration:

https://ddot.dc.gov/sites/default/files/dc/sites/ddot/publication/attachments/guidelines_tree_protection_during_construction.pdf

8.3 Often, trees and especially large trees, are not compatible close to dwellings. The reasons for this include:

- The shade the trees cast onto properties and windows reduces light
- Tree debris such as leaves, twigs, seeds, saps and small branches can drop onto roofs, guttering, cars, driveways paths, and gardens. These can cause anxiety and nuisance for occupiers as tree debris can be an annoyance and result in occupiers wanting to significantly prune or remove the trees. Pruning is a form of damage to a tree which can destroy its amenity value and cause health and structural issues for the tree. Therefore, reducing the need to prune trees in future, is a central component of good planning design with trees.
- Anxiety regarding a tree's potential to fall on houses and gardens: - This is a very common concern homeowners tend to have and can result in many wanting to remove trees and not replant them due to their anxiety regarding them.
- Trees can cast shade over gardens, which can make growing lawns and plants difficult. New gardens require sufficient light to be functional as gardens. Some council guidelines state that new amenity gardens should receive at least 50% of unobstructed sunlight in summer.

- 8.4 The extent of the canopy spreads of the trees, will need to be taken into account in planning designs, to also ensure they do not dominate new amenity gardens. The RPAs (Root Protection Areas) also need to be taken into account to ensure root severing and damage do not occur. Root damage may lead to a decline in tree health, instability and even tree death. Therefore, this must be avoided.

New hard surfacing within RPAs (Root Protection Areas) of trees

- 8.5 New roads and driveways need to be located outside RPAs (Root Protection Areas) of trees. These are indicated on the attached Tree Constraint plan by the grey-hatched polygon areas.
- 8.6 Construction access ways and areas for storage of materials need to be taken into account at the design stage to minimise compaction of soil in and around RPAs and prevent damage to existing trees/hedges.
- 8.7 Compaction reduces pore spaces in soil, reducing water and oxygen availability. This limits root growth and can suffocate roots leading to the decline and even death of trees.

Compaction of soil in the critical root zone is the leading cause of tree death on construction sites

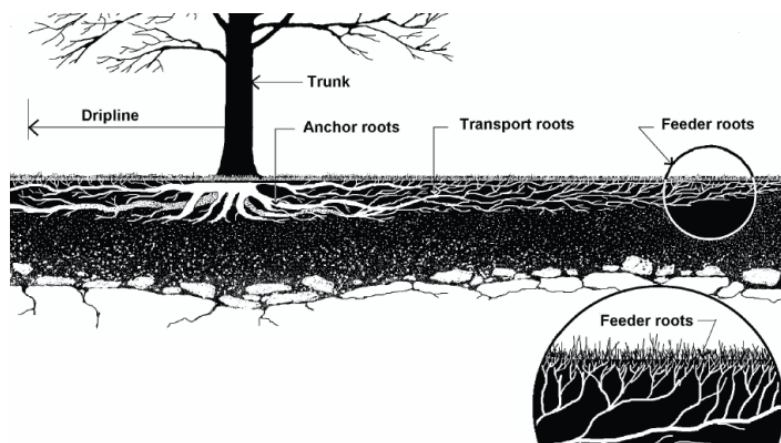


Image 3: Credit to District Department of Transportation Urban Forestry Administration

https://ddot.dc.gov/sites/default/files/dc/sites/ddot/publication/attachments/guidelines_tree_protection_during_construction.pdf

- 8.8 Rigid protective fencing would be required to fence off RPAs of retained trees during demolition and construction to prevent compaction of the soil within RPAs.

8.9 Within RPAs of retained trees, there must be no excavation, no soil piling, no storage of materials, no spillage of construction waste, and no spoil thrown out on or near RPAs. Site operations concerning protecting trees need to take into account the RPAs.

8.10 Measurements were estimated where access was limited. Trees have been positioned on the attached map plans using a GPS receiver.

Utilities and service runs

8.11 All new utility and service runs, if proposed, need to be located outside of RPAs (Root Protection Areas) of retained trees.

General Guidance

8.12 Tree removals should be avoided. As general guidance, removing large numbers of trees for development would not be acceptable. Developers are expected to take into account the merits of the existing trees. If trees are planned to be removed for development, tree planting would be required to replace any trees removed on the site. Sufficient space needs to be considered in the planning designs to accommodate new tree planting. LPAs (Local Planning Authorities) require more trees to be planted than those removed, to mitigate any trees lost to development, as part of their Planning Policies. A lack of space incorporated in the designs for new tree planting may result in the proposal being unacceptable. This needs to be fully considered at the feasibility of development and design stage.

Potential clay soil

8.13 The information from the Cranfield Soil and Agrifood Institute (2023) indicates the soil type in the area of the site is "Slowly permeable seasonally wet acid loamy and clayey soils". Some types of clay soil can be shrinkable. Trees taking up water through the soil in the growing season can cause some type of shrinkable clay soil to shrink, and heave in the wetter months. This soil movement can cause movement in foundations. As the soil database indicates there may be clay soil within the site, the subsidence potential needs to be taken into account and may require assessing if deemed necessary. Please see the NHBC guidelines for building on suspected highly shrinkable clay soils:

<https://nhbc-standards.co.uk/4-foundations/4-2-building-near-trees/4-2-4-the-effects-of-trees-on-shrinkable-soils/>

9.0 PHOTOGRAPHS OF THE SITE

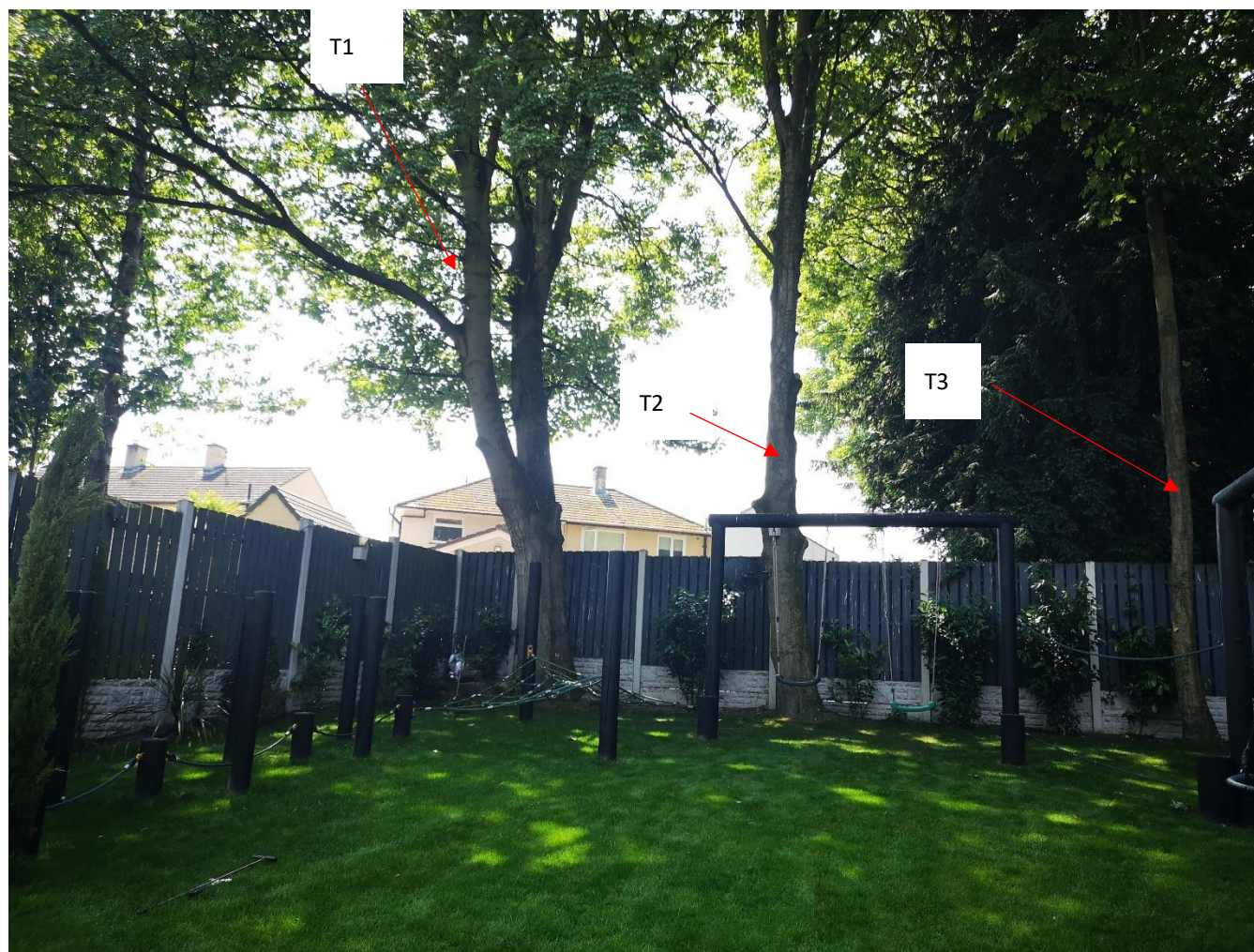


Photo 1: looking south

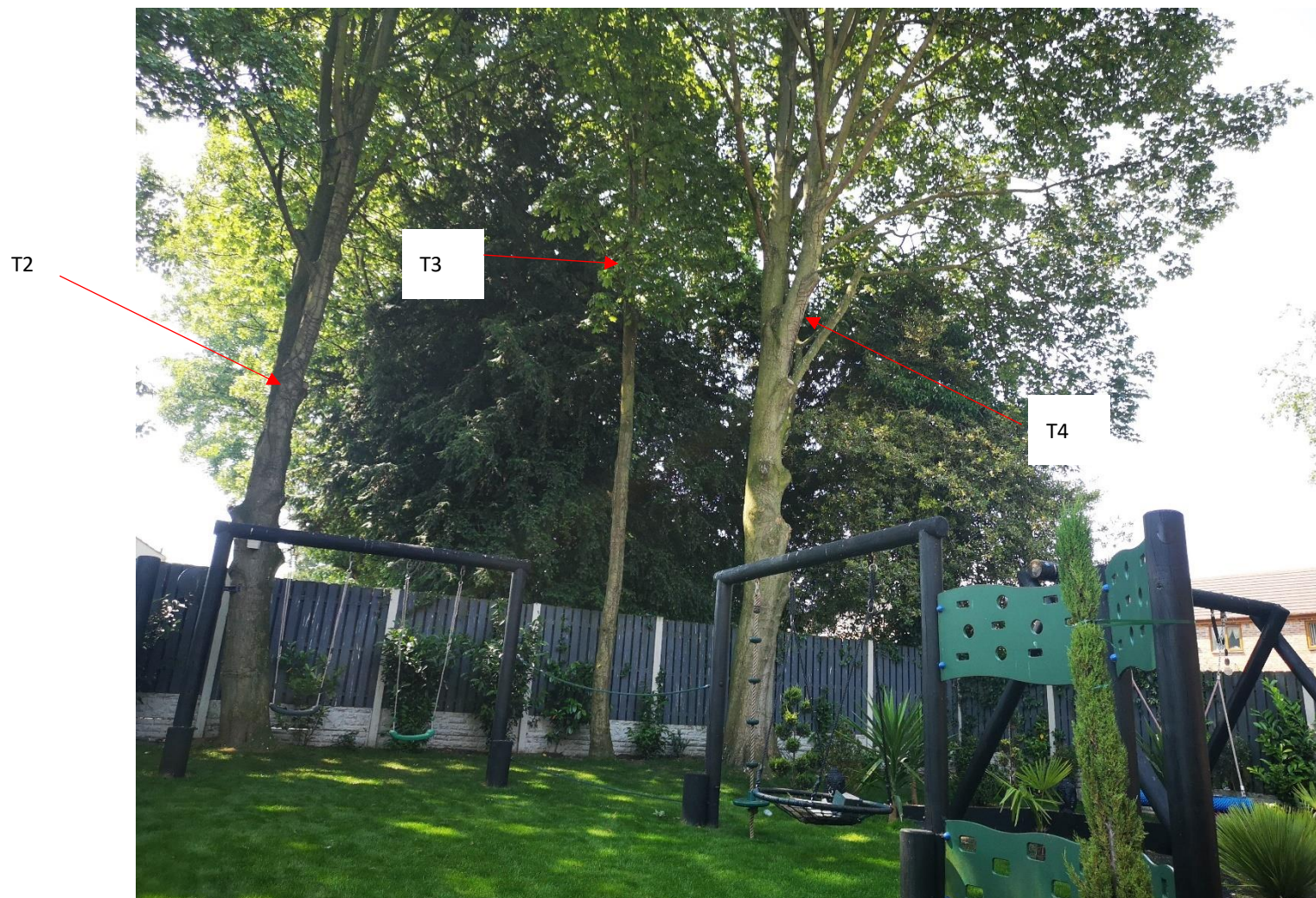


Photo 2: looking south



Photo 3: Looking northeast/ east



Photo 4: Looking north

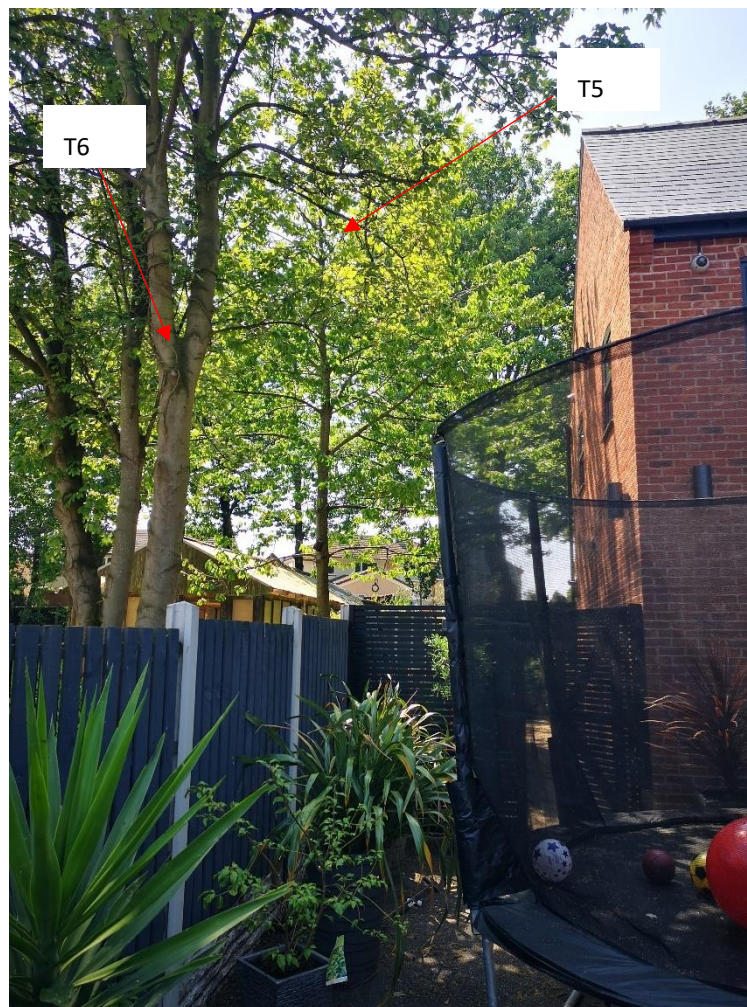


Photo 5: looking south

T6



T5

Photo 6: looking south



Photo 7: looking north

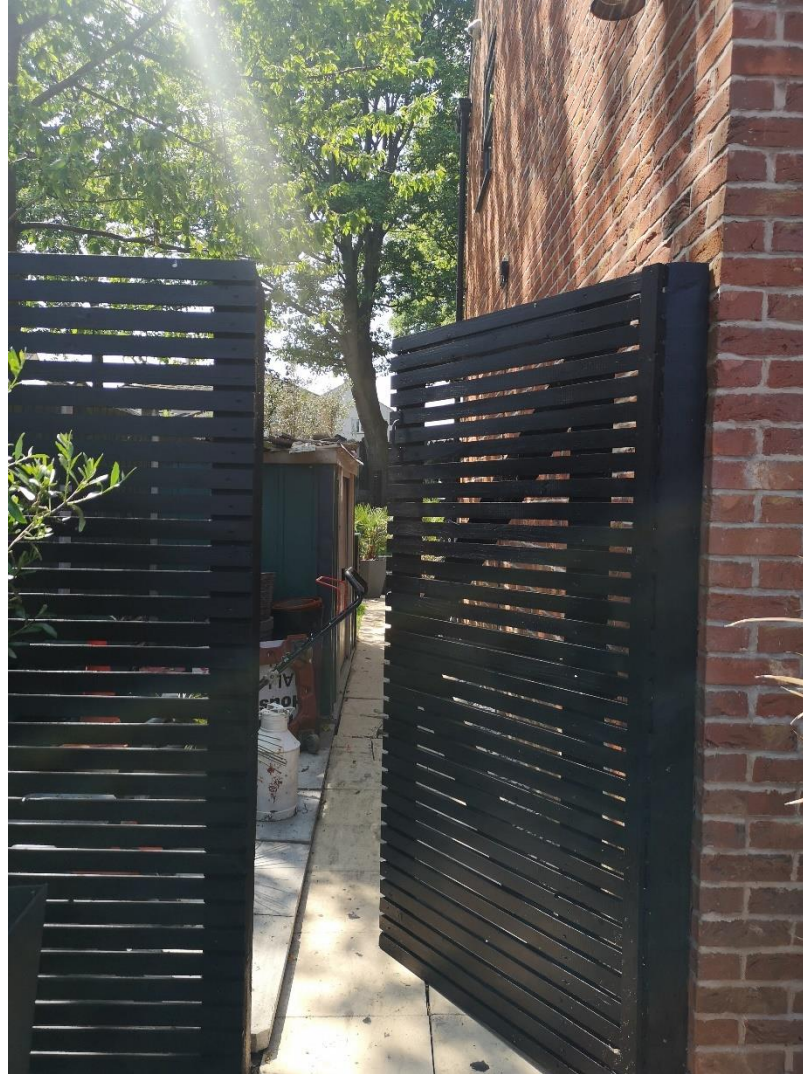


Photo 8: looking south down access way down eastern side of dwelling - paving slabs present



G1- there is sufficient clearance (on average 4m) over the existing tarmac driveway of the site

Photo 9: looking north up existing driveway



Photo 10: looking north down existing tarmac driveway

Existing
tarmac
driveway

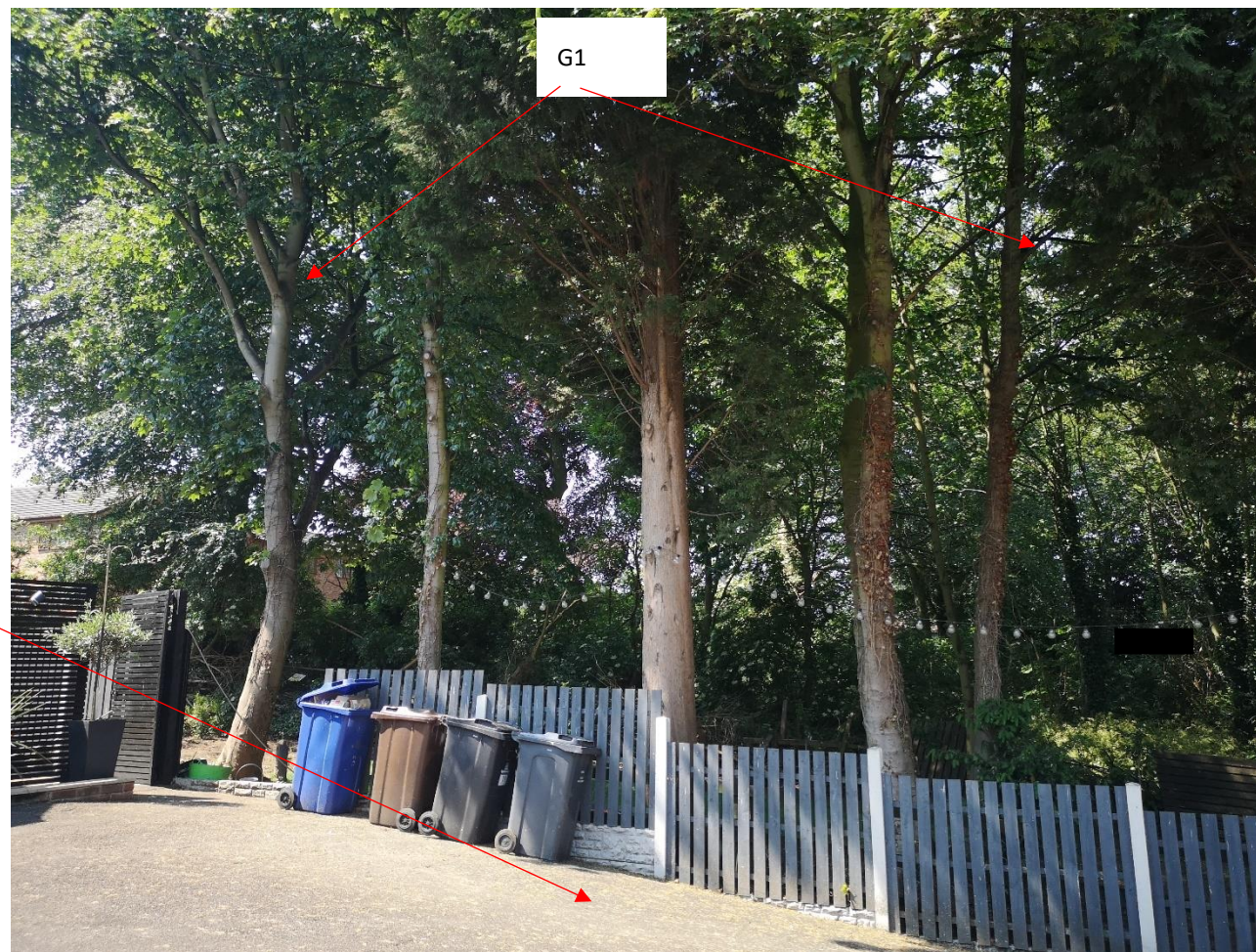


Photo 11: looking west at offsite group of trees G1. An existing tarmac driveway is present on the site up to the boundary

10.0 CONCLUSIONS

- 10.1 The table 'BS5837 Tree Survey Table Data' provides details regarding the trees surveyed. Tree work has been recommended for some trees regardless of development.
- 10.2 A **Tree Constraints Plan** is attached, showing the positions of the trees, the RPA spreads, and the crown spreads. RPA measurements and other tree measurements, are shown in the 'BS5837 Survey Table data'.
- 10.3 An Arboricultural Impact Assessment has not been compiled at the time of writing. One can be compiled as and when required following a design scheme.
- 10.4 The following appendices give some further general information including tree categorisation and root protection area calculations.

Report compiled by:

Rachel Selwyn

Signed.....  Date 13/06/2023

Report checked by:

Sam Selwyn

Signed.....  Date 13/06/2023

APPENDIX 1

British Standard BS 5837:2012 Table 1

Appendix 1 British Standard BS 5837:2012 Table 1 Cascade chart for Tree Quality Assessment

Trees for Removal			
Category and definition	Criteria		
<u>Category U</u> Those in such a condition that 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 or other U category 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. <i>NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve</i>		
Trees to be considered for retention			
Category and definition	Criteria- sub categories		
	1 Mainly Arboricultural Values	2 Mainly landscape values	3 Mainly Cultural values
<u>Category A</u> 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 area essential components of groups, or of formal or semi-formal Arboricultural features (e.g. the dominant and/ or principle trees within an avenue)	Trees, groups or woodlands of particular visual importance and /or landscape features	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (eg. Veteran trees or woodland pasture)
<u>Category B</u> Trees of moderate quality with an estimated remaining life contribution of at least 20 years	Trees that might be included in the high category but are downgraded because off impaired condition (e.g. presence of remedial defects including unsympathetic management and storm damage), such that they are unlikely to be beyond 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 benefits
Category C Those of low quality and value with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150mm	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 landscape value, and/or trees offering low or only temporary screening benefit	Trees with no material conservation or other cultural benefits

APPENDIX 2: BACKGROUND

- A2.1 Any development work on the site may detrimentally affect trees to be retained if those trees do not receive protection. The risk of damage to trees both above and below ground needs to be controlled by a strong physical barrier. The ground beneath the trees might be used by traffic or for storage of materials or be excavated, all of these will potentially be detrimental to the root systems.
- A2.2 The majority of tree roots generally occur in the top 90cm of soil, as at lower depths there is less access to water and oxygen. Contrary to popular belief mature trees do not have large taproots that obtain water from great depths. Tree roots need to take up water, oxygen, and minerals to survive. Therefore, any compromise to a tree's rooting area may affect a tree's stability, ability to function and survival.
- A2.3 Construction activity can significantly affect the rooting area by compacting soil around trees and thus reducing the pore spaces. Pores are very important in soil for holding water and oxygen. Compaction inhibits root growth and penetration as well as decreases the oxygen in the soil which is essential for the growth and function of the roots.
- A2.4 Damage caused to rooting environments can disrupt the balance between the roots and crown established by a tree over many years, and this could be potentially detrimental to the tree's health or may compromise the structural integrity or the stability of the tree.
- A2.5 Possibilities of damage to trees during and following construction processes include direct and indirect damage. Direct damage involves mechanical and physical damage to trees or their roots or root systems via machinery, soil excavation or hazards such as fire. Indirect damage involves an injury that occurs to a tree by activities that take place near the tree, such as compaction, level changes, soil damage or chemical contamination near the root plate.
- A2.6 For trees to be retained, light tree surgery work such as crown lifting and/or other tree protection methods along with implemented construction methods can reduce the risk of damage.
- A2.7 For protecting trees that are to be retained BS 5837:2012 – 'Trees in relation to Design, Demolition and Construction gives guidance on how to manage trees close to proposed works. BS 5837:2012 gives guidance on calculating the Root Protection Area (RPA) around a tree which estimates the area of soil needed to ensure the survival of retained trees.

- A2.8 The RPA gives guidance on the rooting area needed for a tree to survive. Once the RPA around trees to be retained has been set, no entry into the RPA by machinery should be allowed, nor should the RPAs be used for any type of storage or access pathway. Encroaching into an RPA should only be undertaken if agreed by the Local Planning Authority (LPA). By adopting such measures, lasting damage to existing trees can be avoided and the amenity values can be preserved.
- A2.9 RPAs may be subject to a 20% offset, but on one side only, in certain circumstances. The offset must be accounted for on the remaining sides and must take into account the tree conditions and the context of the site.
- A2.10 By considering the RPAs and existing site features (including natural and man-made topography) and by adopting construction and tree protection techniques that minimise root disturbance, successful construction projects can be achieved.

Root Protection Area (RPA) Calculations

- A2.11 All trees in retention categories A, B and C have their RPA calculated and the RPA figure given represents the radial distance, from the tree's trunk, at which barriers should be erected. The calculation for the RPA is as per section 4.6 of BS 5837:2012.

For single-stem trees, the RPA should be calculated as an area equivalent to a circle with a radius 12 times the stem diameter. For trees with more than one stem, one of the two calculation methods below should be used. In all cases, the stem diameter(s) should be measured in accordance with Annex C, and the RPA should be determined from Annex D. The calculated RPA for each tree should be capped at 707 m².

- a) For trees with two to five stems, the combined stem diameter should be calculated as follows:

$$\sqrt{(\text{Stem diameter } 1)^2 + (\text{Stem diameter } 2)^2 \dots + (\text{Stem diameter } 5)^2}$$

- b) For trees with more than five stems (not illustrated in Annex C), the combined stem diameter should be calculated as follows:

$$\sqrt{(\text{mean stem diameter})^2 \times \text{number of stems}}$$

N.B. Where all stem diameters were not accessible, this averaging formula has been adopted.

The RPA for each tree should initially be plotted as a circle centred on the base of the stem. Modifications to the shape of the RPA should reflect a soundly based Arboricultural assessment of likely root distribution.

Any deviation in the RPA from the original circular plot should take account of the following factors whilst still providing adequate protection for the root system: a) the morphology and disposition of the roots, when

influenced by past or existing site conditions (e.g. the presence of roads, structures and underground apparatus); b) topography and drainage; c) the soil type and structure; d) the likely tolerance of the tree to root disturbance or damage, based on factors such as species, age, condition and past management.

APPENDIX 3: SURVEY METHODOLOGY

- A 3.1 A ground-level visual survey was carried out using the Visual Tree Assessment technique described by Mattheck and Broeler (1994) and endorsed by the Arboricultural Association (LANTRA Professional Tree Inspection course, 2007).
- A 3.2 Physiological condition was assessed visually using bud formation and branch dieback indicators. The overall vigour of the tree was also taken into account.
- A 3.3 Structural condition was assessed by inspecting the stem and scaffold branches from all angles looking for weak branch junctions or symptoms of decay. Particular attention was paid to the stem base. Cavities were explored using a metal probe and nylon-sounding mallet to assess the extent of any decay. If this was not possible further inspection was recommended in the form of a climbed inspection or using specialist decay detection equipment.
- A 3.4 The physiological condition was assessed by inspecting the stem, branches and foliage for disease symptoms.
- A 3.5 Where the condition of a tree was deemed to be unacceptable, recommendations were made according to a scale of priority to reduce the liability of the owner. The position of the tree and its potential targets were taken into account. Recommendations use compass bearings and metres for the amount to be removed.
- A 3.6 Measurements were taken using diameter tape, laser height measurement and estimated where it wasn't practical to physically measure.
- A 3.7 Some trees were surveyed in groups.

APPENDIX 4: AUTHOR'S QUALIFICATIONS AND EXPERIENCE

Miss Rachel Selwyn BSc (Hons) Arboriculture and Urban Forestry, MArborA, QTRA registered.

Rachel is a consultant at Selwyn Trees and has 7 years of experience working in the role. She has a BSc (Hons) degree in Arboriculture & Urban Forestry from the University of Central Lancashire. She is a professional member of the Arboricultural Association and is a registered user of the Quantified Tree Risk Assessment methodology. Her work ranges from detailed tree assessment using specialist technology to producing a range of tree reports for development projects and providing tree protection solutions to BS5837 standards.

Mr Sam Selwyn Dip Arb L4 (ABC), ISA Certified arborist, TecharborA

Sam has over ten years of experience working as a climbing arborist and is certified by the International Society of Arboriculture. He has the Level 4 Diploma in Arboriculture, is a technical member of the Arboricultural Association and has the Lantra Professional Tree Inspection (PTI) qualification. Sam prepares reports for development sites and undertakes aerial inspections of trees. He also assists with undertaking condition surveys and detailed tree assessments using specialist technology.

APPENDIX 5: GLOSSARY OF TERMS

Arboriculture	The culture of trees singly or in small groups
Arborist	Alternative term for tree-work contractor, now sometimes used (following usage in the US) to include other arboriculturists.
Adaptive growth	The growth of new wood in response to a stress concentration in the structure of a tree.
Branch collar	Where a branch joins another branch or trunk that is created by the overlapping vascular tissues from both the branch and the trunk. Typically enlarged at the base of the branch.
BS 3998:2010	The British Standard regulating some of the technical operations carried out by a tree surgeon.
Cabling	Installation of steel or synthetic cable in a tree to provide supplemental support to weak branches or crotches.
Callus	The undifferentiated tissue developing in response to a wound, in trees soon becoming woody (wound wood).
Crotches	Branch union or fork
Cavity	A void in a woody stem or root that may or may not be open to the exterior, generally created by decay and excavated to some extent by saproxylic (dependant on wood decay) animals.
Co- dominate stem	Forked branches nearly the same size in diameter, arising from a common junction and lacking a normal branch union.

Crown/ Canopy	The branches, shoots, and foliage of a tree, are considered collectively. The shape of the crown is partly determined by growth habit, and partly by site factors.
Crown lift	The removal of lower branches of a tree, whether complete branches or those arising from the lower limbs, to increase the headroom to the base of the crown.
Crown reduction	A form of pruning in which the extent of the crown is decreased without (primarily) decreasing its density, to reduce loading, balance the crown, mitigate a nuisance etc.
Deadwood	Dead and decomposing wood including dead trees (whether standing, snapped or fallen), branches of any size, stumps and roots.
Decay	The progressive decomposition of wood is caused by specialized fungi, which consume it as a food source. The main modes of decay are white rot, brown rot, simultaneous rot and soft rot outdoors, and wet rot and dry rot in wood in service.
Defect	Any feature of a tree that is likely to make it less safe (in the case of a structural defect) or otherwise to reduce its health, longevity, landscape prominence or conservation value for any other reason.
Epicormic shoots	Shoots arise from dormant buds in a tree's main stem or framework branches.
Formative pruning	Pruning of young trees to modify their form at maturity, either to avoid future structural defects (for instance by singling a twin stem) or to create a desired cultivated tree form.
Fungus	Group of organisms from the kingdom Fungi, including yeasts, moulds, mushrooms, and smuts. Typically multicellular, saprophytic, or parasitic and lacking vascular tissue and chlorophyll. Reproduces by spores borne in fruiting bodies
Girdling root	Woody roots may strangle each other if they cross each other or are tangled at outplanting when they remain fixed in this configuration.
Included Bark	Areas of bark on adjacent parts of a tree, typically on the inner faces of a narrow fork, which become grown over to occupy part of the internal joint. Included bark develops where two or more stems grow closely together causing weak, under-supported branch angles. Bark often grows around the branching stem attachment and into the union between the two stems. The bark does not have strong supportive fibre strength as wood does, so the connection is much weaker than a union without included bark.
Limb	Large primary branch of a tree
Lion tail pruning	Poor pruning practice in which an excessive number of branches are thinned from the inside and lower part of specific limbs or a tree crown, leaving mostly terminal foliage. Results in poor branch taper, poor wind load distribution, and a higher risk of branch failure.
Mycelium	Vegetative body of a fungus. Network of branched, fungal filaments (hyphae)
Mycorrhizae	Symbiotic association between certain fungi and the roots of a plant.
Pollarding	Specialty pruning technique in which a tree with a large-maturing form is kept relatively short. Starting on a young tree, internodal cuts are made at a chosen height, resulting in the development of callus knobs at the cut height. Requires regular (usually annual) removal of the sprouts arising from the cuts.
Prune/pruning	Removing branches (or occasionally roots) from a tree or other plant using approved practices, to achieve a specified objective.

Ram's Horn Growth	Ram's horn growth is when a tree attempts to compartmentalize a damaged area along the trunk, by curling the wood inwards to try to close off the decay. The callus tissue begins to rub together and ultimately creates this formation that looks like a ram's horn. This can create areas of trapped decayed wood inside the tree, even when the ram's horn growth has seemingly closed a cavity. This usually forms when callus formation is too rapid. When callus formation is too rapid, the callus ribs turn inward and form a "ram's horn." When this occurs, the wound never closes or compartmentalizes, creating conditions perfect for wood-inhabiting pathogens. Ram's horns can be found on if woundwood curls inwards into an opening or cavity formed by a wound or decay, or, if thick bark forms on opposing ribs of woundwood, preventing their confluence (Figure 5 Shigo 1989) (Luley, 2015). Ram's horns usually prevent the wound from eventually sealing (Shigo 1989) and could keep the wound aerated, favouring internal decay.
Reaction wood	Wood formed in leaning or crooked stems or on lower or upper sides of branches as a means of counteracting the effects of gravity.
Ring bark	To cut a ring of bark from a woody stem down to the vascular cambium (ie. entirely severing the phloem), so that transport from the aerial part to the roots is largely prevented.
Root collar	Flared area at the tree trunk base where the roots and trunk come together.
Root zone	(1) horizon or layer within the soil profile where roots exist. (2) volume of soil containing tree roots. (3) horizontal spread of tree roots from the trunk.
Sail area	The area of a tree's aerial part that intercepts wind, broadly varies with wind direction, leafiness etc.
Soil compaction	Compression of the soil, often as a result of vehicle or heavy equipment traffic, breaks down soil aggregates and reduces soil volume and total pore space, especially macro-pore space.
Sonic tomography (SOT)	The use of multiple sensors placed around a trunk or limb to record sound waves traveling through the wood, with measurements resulting in a picture of internal density characteristics. Typically used to measure the extent of decay.
Soft rot	The decay of plant tissues is characterised by the breakdown of tissues within the cell walls.
Subsidence	Broadly, the downward movement of ground and an affected foundation influenced by soil properties, weather, foundation depth and nearby vegetation.
Sucker	Shoot arising from the roots
Suppressed growth	A tree that is shaded, overtopped or otherwise dominated by neighbouring trees, so that its vigour is low and its form is often distorted. Individual branches may also become suppressed.
Topping	Inappropriate pruning technique to reduce tree size, cutting back a tree to a predetermined crown limit, often at internodes. Topping often results in fast growing emergency shoots from the pruning wounds. These shoots grow quicker than normal growth, therefore the tree does not assign the same amount of strengthening wood as it would under normal growing conditions. They also often form tight unions, in which decay can develop. Hence such growth can be weakly attached, and as they become larger and heavier, these branches formed from topped areas can have an elevated risk of failure.
Vigour	Overall health. Capacity to grow and resist stress.

VTA	Method of assessing the structural integrity of trees using external symptoms of mechanical stress (such as bulges, reactive growth, etc) and defects (cracks, cavities, etc).
White rot	Fungal decay of wood in which both cellulose and lignin are broken down.
Windthrow	The fall of a tree in a high wind, with the breakage of the outer roots, so that the tree is uprooted.
Wound wood	In woody stems, the new wood develops in response to a wound, often resulting in swelling (as round a pruning wound) which gradually occludes the wound.

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