



Welsh-Wood

Arboricultural Consultancy

Pre-Development Site Survey

Arboricultural Report

BS5837:2012 Trees in Relation to Design,
Demolition and Construction

Regarding:

Centre 67
Rhosddu Road, Wrexham
LL11 2NW

Ref: NEB 19014 AIA & AMS Ver 1 (Demolition)

Executive Summary

- S1** Welsh-Wood Arboricultural Consultancy have been instructed by Mr. Gareth Evans, Principal Architectural Assistant of the Housing and Economy Department at Wrexham County Borough Council, to undertake a tree survey in relation to the demolition of Centre 67. Centre 67 was historically a vicarage however has most recently been used by adult services. The structure is centred on site and surrounded by an access driveway. A narrow grass strip containing two trees borders pedestrian access along the south west boundary.
- S2** A site visit was undertaken on 27th May 2020. In total 4 individual trees were recorded, although only two are on-site. The species includes Horse chestnut, Birch and Lime. The trees are generally of a good condition, capable of making a lasting contribution to the landscape, although the recent management of T2 in the form of a crown removal will necessitate cyclical works to manage re-growth. The two off site trees are situated in the adjacent church yard of St James Church and have been recorded as their canopies overhang the access driveway. It is unlikely that they will hinder demolition however that will be dependent on the size of the heavy plant required for the demolition.
- S3** It will be possible to retain and protect all trees throughout the demolition process by means of Tree Protection Fencing, while still permitting sufficient space for demolition works and associated operations.
- S4** It must be noted that trees provide essential habitat for birds and bats and as such any proposed works must be carried out in full consideration of the law. Birds, bats and their habitats are afforded protection within the Wildlife and Countryside Act 1981 and The Conservation of Habitats and Species Regulations 2010 (as amended).

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1.0 Introduction

- 1.0.1 This report details the findings of a tree survey at the listed address (the site) and has been prepared in compliance with BS5837: 2012 'Trees in Relation to Design, Demolition and Construction – Recommendations'.

1.1 *Brief/Instruction*

- 1.1.1 Welsh-Wood Arboricultural Consultancy has been instructed by Mr. Gareth Evans, Principal Architectural Assistant of the Housing and Economy Department at Wrexham County Borough Council, to undertake a survey of all trees on the site in order to facilitate demolition of the existing structure.
- 1.1.2 The site, formerly a vicarage subsequently utilised by adult services, contains the structure in the interior. It is serviced by an access driveway circling the entirety of the structure, which also acts as shared access to the adjacent structures to the west of the site. A narrow grass strip containing two trees borders pedestrian access along the south west boundary.
- 1.1.3 This report is concerned solely with the demolition of the structure, ensuring appropriate consideration and protection of all trees and relevant vegetative features such as hedgerows through the demolition process.

1.2 *Qualifications and experience of surveyor*

- 1.2.1 The author holds the Higher National Certificate in Arboriculture, and LANTRA Professional Tree Inspector qualifications, and has worked in the arboricultural industry for 18 years as a Local Authority Tree Officer, Arboricultural Consultant and Lecturer in Arboriculture.

1.3 *Documents Provided in Advance*

- 1.3.1 The following documents were provided prior to the tree survey:
- Site plan indicating the structure scheduled for demolition

1.4 *Relevant background information & scope of this report*

- 1.4.1 This report has been commissioned to support the demolition of the structure.

- 1.4.2 The survey is intended to appraise the quality of the tree stock and identify which trees, if any, should be removed and how retained trees should be protected in order to make a positive landscape contribution to the site in future years.

1.5 Caveats and Limitations

- 1.5.1 This report relates specifically to the condition of the trees upon the day that the inspection was carried out.
- 1.5.2 Inspection was carried out from ground level, with use of binoculars where necessary. No climbing inspection was conducted. Where access to parts of the site or trees on adjacent land was not possible, estimates have been made regarding tree dimensions. This will be made clear in the tree and group schedules where relevant.
- 1.5.3 No detailed analysis of soil samples was undertaken. Root areas and possible underground conflict interaction were only investigated insofar as a surface visual inspection.
- 1.5.4 All legal documentation and information given to and used for the purposes of this report by Welsh-Wood Arboricultural Consultancy is presumed accurate.
- 1.5.5 The report is valid only for typical weather conditions. Healthy trees, or parts of healthy trees, may fail in unusually high or unpredictable winds or violent storms and as such the consequences of such weather phenomena are unforeseeable. It follows that Welsh-Wood Arboricultural Consultancy cannot be held liable for any such failures.
- 1.5.6 Where trees fall under the protection of the Local Council, permission may be required before works begin.
- 1.5.7 All rights in this report are reserved. No part of it may be reproduced or transmitted, in any form or by any means; electronic, mechanical, photocopying, recording or otherwise, or stored in any retrieval system of any nature, without the written permission of Welsh-Wood Arboricultural Consultancy. Its content and format are for the exclusive use of the addressee in dealing with this claim / site / situation. It may not be sold, lent, hired out or divulged to any third party not directly involved in this claim / site / situation without written consent from Welsh-Wood Arboricultural Consultancy.

2.0 Data collection

2.0.1 Tree survey data included:

- Tree reference number
- Species listed by common name
- Height in metres to the nearest 0.5m
- Stem diameter in mm, measured in accordance with Annex C of BS5837:2012
- Branch spread in metres at 4 cardinal points
- Height above in metres ground level of:
 - First significant branch and direction of growth
 - Lowest part of the canopy
- Life stage (newly planted / young / semi-mature / mature / over-mature / veteran)
- General observations
- Preliminary management recommendations
- Estimated remaining contribution in years (<10 / 10+ / 20+ / 40+)
- Category grading (U, A, B or C)

2.0.2 The trees were surveyed using current visual tree assessment (VTA) methods and where necessary sounded with a rubber-ended mallet to ascertain the need to investigate further defects or issues regarding structural stability/longevity.

2.0.3 The Visual Tree Assessment methodology (VTA) as devised by Prof. Dr. Claus Mattheck is an internationally recognised industry standard for tree inspection.

2.0.4 These suggestions are the author's professional recommendations and in no way hold any legal or official capacity.

N	A new or recently planted tree established for no more than 5 years in its present location.
Y	A young tree planted/established for no more than 10 years in its present location.
SM	A semi-mature tree which is well established but with some growth to make before reaching its full potential size.
M	A mature tree at or near its potential maximum size which is still growing vigorously.
OM	An over mature tree in decline.
V	A veteran tree; in the advanced stage of its life and displaying numerous characteristics such as unusually large girth, cavities, water pockets, large quantities of dead wood etc.

Table 1. The classification system used to describe each trees age class. The age class legend can be used in conjunction with individual tree data found in the sectional appendix of this paper. Please note this is a general age class classification and users should be aware that this information is species specific.

Report on Centre 67, Rhosddu Road, Wrexham LL11 2NW

Undertaken by N Brewin Welsh-Wood Consultancy, September 2020

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2.1 *Site Visit*

- 2.1.1 A site visit was undertaken by the author on 27th May 2020. The weather conditions during the site visit were sunny and posed no constraint to assessment.
- 2.1.2 Restrictions to assessment do exist in the form of dense ivy growth, epicormic growth and competing vegetation. No further action to address this constraint to survey is thought necessary at this time.

2.2 *Site description*

- 2.2.1 The listed address consists of an open access structure now closed. It is serviced by an access driveway which encompasses the building and provides access to neighboring structures. The site is bordered by public highway to the east, south and west, and St James Church to the north. There is a large area of hard standing at the front, north east, portion of the site which is the site's car parking facilities.
- 2.2.2 The topography of the site is flat and there is no evidence of a prevailing wind.
- 2.2.3 The trees included in this report exist as formal tree planting along the narrow grass verge and two off site trees that overhang the site from the adjacent church yard.
- 2.2.4 A grassed area containing two trees is situated to the south east of the site and separated from the site boundary by the egress route and highway. The two trees on this verge have not been included in the survey however it would be prudent to erect tree protection fencing along the edge of this feature as indicated on the Tree Protection Plan in Appendix 3 of this report.
- 2.2.5 There is a mature ivy feature dominating the north west wall of the structure. It is understood that ecological surveys of the structure have been undertaken, nevertheless it must be noted that ivy supports a variety of wildlife, including nesting birds, and as such should be assessed immediately prior to demolition.
- 2.2.6 All trees surveyed were classified in accordance with Table 2; the tree classification system set out in BS 5837: 2012 Trees in Relation to Design, Demolition and Construction (shown below).
- 2.2.7 As no topographical survey has been undertaken at this time the trees were plotted by hand and then compared with aerial imagery to provide as accurate a location as possible for the Tree Constraints Plan.

Category & definition	Criteria (including subcategories where appropriate)			Identification on plan
Trees unsuitable for retention				
Category U Trees in such a condition that they cannot realistically be retained as living trees in the context of current land use for >10 yrs	- 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 - Trees that are dead or showing signs of significant, immediate and irreversible decline - Trees infected with significant pathogens affecting health or safety, or very low quality trees suppressing trees of better quality <i>NOTE: these trees can have existing or potential conservation value making retention desirable</i>			DARK RED
	1 Mainly arboricultural qualities	2 Mainly landscape qualities	3 Mainly cultural values inc conservation	
Trees to be considered for retention				
Category A Trees of high quality with an estimated remaining life expectancy of >40 yrs	Particularly good examples of their species, esp if rare or unusual. Those that are essential components of groups or formal or semi-formal arboricultural features	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	LIGHT GREEN
Category B Trees of moderate quality with an estimated remaining life expectancy of >20 yrs	Trees that might be included in category A but are downgraded because of impaired condition such that they are unlikely to be suitable for retention for beyond 40 years; or trees lacking the special quality necessary to merit 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. Trees occurring as collectives but situated so as to make little visual contribution to the area.	Trees with material conservation or other cultural value	MID BLUE
Category C Trees of low quality with an estimated remaining life expectancy of >10 years, or young trees with a stem diameter <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 collective landscape value; and/or trees offering low or only temporary landscape benefits.	Trees with no material conservation or other cultural value.	GREY

Table 2 - Tree classification, adapted from table 1 of BS 5837:2012

3.0 Arboricultural Impact Assessment

3.1 General Statement

- 3.1.1 In total 4 individual trees were surveyed. All trees are situated within or adjacent to the site boundary and have been identified on the accompanying Tree Constraints Plan.
- 3.1.2 The individual trees consist of formal planting.
- 3.1.3 A full schedule for individual trees can be found in Appendix 1 however, relevant details and significant factors are discussed below.

3.2 Species and Age Distribution

- 3.2.1 The dominant tree species on site is Horse chestnut. The two off site trees included are Lime species (*Tilia spp.*) and Birch species (*Betula spp.*)
- 3.2.2 All trees on-site trees have been classified as semi mature and as such are capable of making a significant contribution to the landscape for many years to come. It should be noted that an age category relates to a period of years and as such even mature specimens can make a lasting contribution that may span decades, dependant on the individual species.

3.3 Tree Descriptions

- 3.3.1 T1 is a prominent Horse chestnut at the front of the site that dominates the area. It is one of two trees remaining from a row that grew here originally. Two other trees have been removed historically and are regenerating from the stumps.
- 3.3.2 T2, also a Horse chestnut, has been subject to severe pruning in the form of a crown removal at approximately 2.5m. The justification for this is unknown however such action is usually taken when the structural integrity of a tree has been compromised.
- 3.3.3 Both T1 and T2 are contained within a grassed strip, bisected by a boundary wall, and restricted on either side by a footpath, parking area and highway.
- 3.3.4 T3 and T3 are both off site trees situated within the adjacent church yard and are typical for their species and setting.

3.4 *Structural Condition*

- 3.4.1 Structural condition relates to the form of the trees, in particular specimens that have developed as multi stemmed from the base or may have developed poor branch structure that renders them susceptible to failure in the future.
- 3.4.2 As mentioned T2 has been subject to crown removal, or pollard type management. This has resulted in the typical multi stemmed re-growth. It must be noted that this type of management will necessitate cyclical pruning to re-move the growth prior to it exceeding its optimum size and as such becoming susceptible to failure as the branches compete with each other.

3.5 *Physiological Condition*

- 3.5.1 Physiological condition relates to the health of the trees surveyed.
- 3.5.2 No significant physiological defects were noted.

3.6 *Demolition Proposal Summary*

- 3.6.1 The proposal is to demolish the existing structure in its entirety. No proposal to remove the hard standing or access driveway surrounding the structure have been made at this time.

3.7 *Tree Categorisation & Constraints*

- 3.7.1 The tree constraints plan that accompanies this report shows the above ground constraints (branch spread) and the below ground constraints, i.e. the anticipated extent of tree roots based on a calculation using the stem diameter and consideration of any site conditions which may affect root growth.
- 3.7.2 Root protection areas (RPA) are usually shown as a circle centred on the base of the stem unless site conditions such as nearby structures indicate that the shape of the rooting area deviates from this format.
- 3.7.3 The RPA for all 4 trees has been modified due to on-site features such as a footpath, highway and hard standing as shown on the Tree Constraints Plan (Modified RPA)

included in Appendix 2.1 of this report. However a secondary Tree Constraints Plan (Appendix 2.2) has been included to indicate the potential spread without limiting features. This has been provided for future reference should the demolition extend to the hard standing and footpath at the site frontage. Given the age of the trees (T1 and T2) there is the potential for tree roots to have penetrated the subgrade soil and as such consideration needs to be made prior to demolishing all hard standing in this part of the site.

3.7.4 The trees surveyed for this report have been categorised as follows:

BS Category	Tree Reference	Number of Features
A (1,2,3)		
B (1,2,3)	T1, T3	2
C (1,2,3)	T2, T4	2
U		

3.8 Below ground constraints

3.8.1 Given the location of the trees there are no below ground constraints to demolition.

3.8.2 Should planning consent for demolition be granted it will be possible to erect Tree Protection Fencing for all trees within influence of the site while still permitting adequate space for the demolition works to proceed.

3.9 Above ground constraints

3.9.1 The tree canopy for T1 will likely extend outside of the tree protection fencing and therefore presents an above ground constraint to on-site operations, but not demolition. As such it may be prudent to extend the fencing in this portion of the site if possible to fully encompass the tree's canopy (see photograph titled – T1 and path at edge of grass strip).

3.9.2 There is also the potential for heavy plant to make contact with tree canopies for the two off site trees T3 and T4. Their overall average canopy height is 2m and their spread

over the site is limited however this should be assessed prior to commencing works to ensure no damage occurs to the trees.

3.10 Trees to be retained/ removed

3.10.1 All trees surveyed are to be retained during the demolition.

4.0 Arboricultural Method Statement

- 4.0.1 Recommended control measures for development works in or near to the root protection area (RPA) are discussed in this chapter. These chapters can be regarded as a method statement of works and can be utilised as the exact principle during the construction period.
- 4.0.2 Tree protection on development sites is of paramount importance if trees are to be retained successfully. The inevitable stress caused by development near an existing tree can, if provision for adequate protection is not made, be a stress that can severely damage the trees or even result in their death. Although the trees appear healthy during and on completion of the works, the full effects may not become apparent for several years after works have finished.
- 4.0.3 The Tree Protection Plan accompanying this report indicates all areas for protective tree fencing which is the only recommendation at this time.

4.1 *Protective Fencing*

- 4.1.1 Before the commencement of any works on site protective fencing must be erected to the dimensions and specification shown in Appendix 5 of this report and as indicated on the Tree Protection Plan in Appendix 3.
- 4.1.2 These protection measures will be in place for the duration of the development and on site monitoring is recommended to ensure that the fencing remains in place and intact promoting the successful retention of the subject trees.
- 4.1.3 Signs must be affixed to the fencing to inform on-site contractors of the importance of the fencing barriers (Appendix 6).
- 4.1.4 The root protection areas (RPAs) must be treated as sacrosanct and the following guidelines must be followed:
- NO mechanised excavations
 - NO movement of construction traffic or parking of vehicles
 - NO storage of building materials

- NO storage of chemicals or fuels
- NO fires to be lit in close proximity to trees

4.2 Access, Egress & Facilities

- 4.2.1 An arboricultural method statement would usually specify a point for access, egress and onsite facilities such as: contractor car parking, site huts and storage, and welfare facilities however, this section has been summarised given the on-site spatial constraints. Recommendations have been made where possible however need to be finalised and approved by the LPA.
- 4.2.2 Access and egress is likely to be via the current site access on the public highway Rhosddu Road to the east. It is recommended that the LPA are consulted regarding specific conditions pertaining to the limitations of the servicing highway network and any traffic management required during construction.
- 4.2.3 Contractor parking is not thought feasible on site and as such arrangements need to be made elsewhere.
- 4.2.4 The exact location proposed for storage of materials or heavy plant must be agreed in advance with the LPA. Under no circumstances can any facilities or storage be located within the RPA's for retained trees.

4.3 Responsibilities

- 4.3.1 It will be the responsibility of the main contractor to ensure that the planning conditions attached to planning consent are adhered to at all times and that a monitoring regime in regard to tree protection is adopted on site.
- 4.3.2 The main contractor will be responsible for contacting the Local Planning Authority at any time if issues are raised related to the trees on site.
- 4.3.3 If further pruning works are required permission must be sought from the Local Planning Authority and on approval carried out in accordance with BS3998 Tree Work - Recommendations 2010.

- 4.3.4 The main contractor will ensure the construction sequence is appropriate to make certain that no damage occurs to the trees during the construction processes. Protective fences will remain in position until completion of **ALL** construction works on the site.
- 4.3.5 The protective fencing and signs must be maintained in position at all times and checked on a regular basis by an on-site person designated that responsibility.

4.4 Arboricultural supervision

- 4.4.1 It is recommended that prior to development operations, a full consultation between the client, the Local Planning Authority, the Consultant Arboriculturalist and other relevant contractors take place on site to answer any questions related to the undertaking of this project.
- 4.4.2 In addition to the recommendation above, and supervised works discussed within this section, it is recommended that a number of short inspections of the subject trees should be undertaken by an Arboricultural Consultant familiar with BS5837: 2012 operations during the extent of the project as set out below.
- 4.4.3 On completion of each inspection a brief report with photographic evidence of the findings will be submitted to the Local Planning Authority via email and within 24 hours of the visit. If any unauthorised works are noted the LPA will be advised immediately by telephone.

Event/ Stage	Action
Pre Development Consultation Meeting	On site meeting between the client, the Local Planning Authority, the Consultant Arboriculturalist and other relevant contractors to answer any questions related to the undertaking of this project.
Installation of tree protection fencing	Arboricultural Consultant to check that protective tree fencing is in place as indicated on the Tree Protection Plan prior to commencement of any construction work including site preparation.
Construction Phase	Arboricultural Consultant to make periodic visits to site to check that the protective fencing is in place. supervisory visits are made every week for the duration of the development.
Completion of works	Arboricultural Consultant to confirm completion of all works in order to authorise removal of the tree protection fencing.

Appendix 1.1 - Tree Survey Data

Table 1 - Tree Survey Data

Date: 27/05/2020

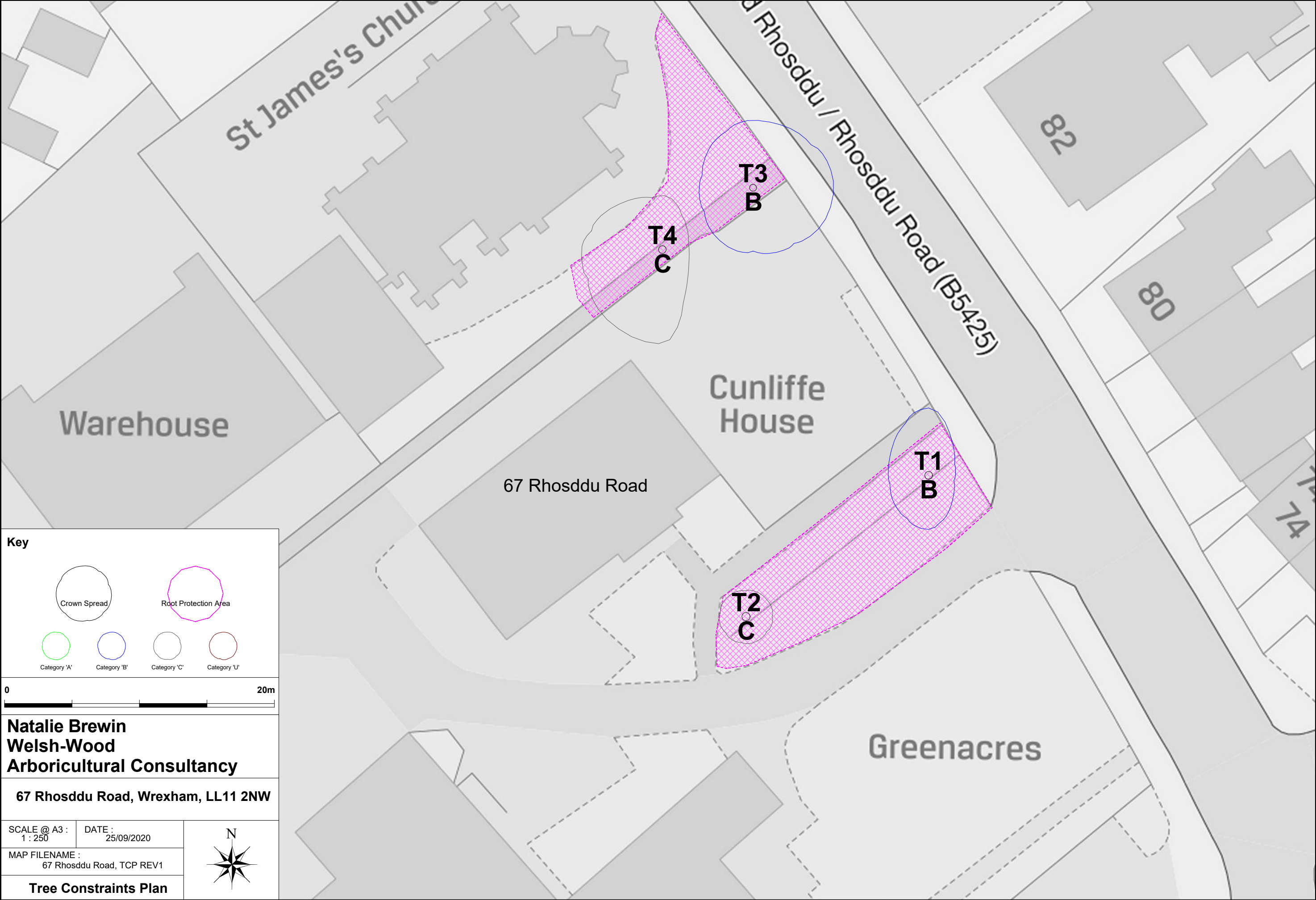
Site: Centre 67, Rhosddu Road, Wrexham, LL11 2NW

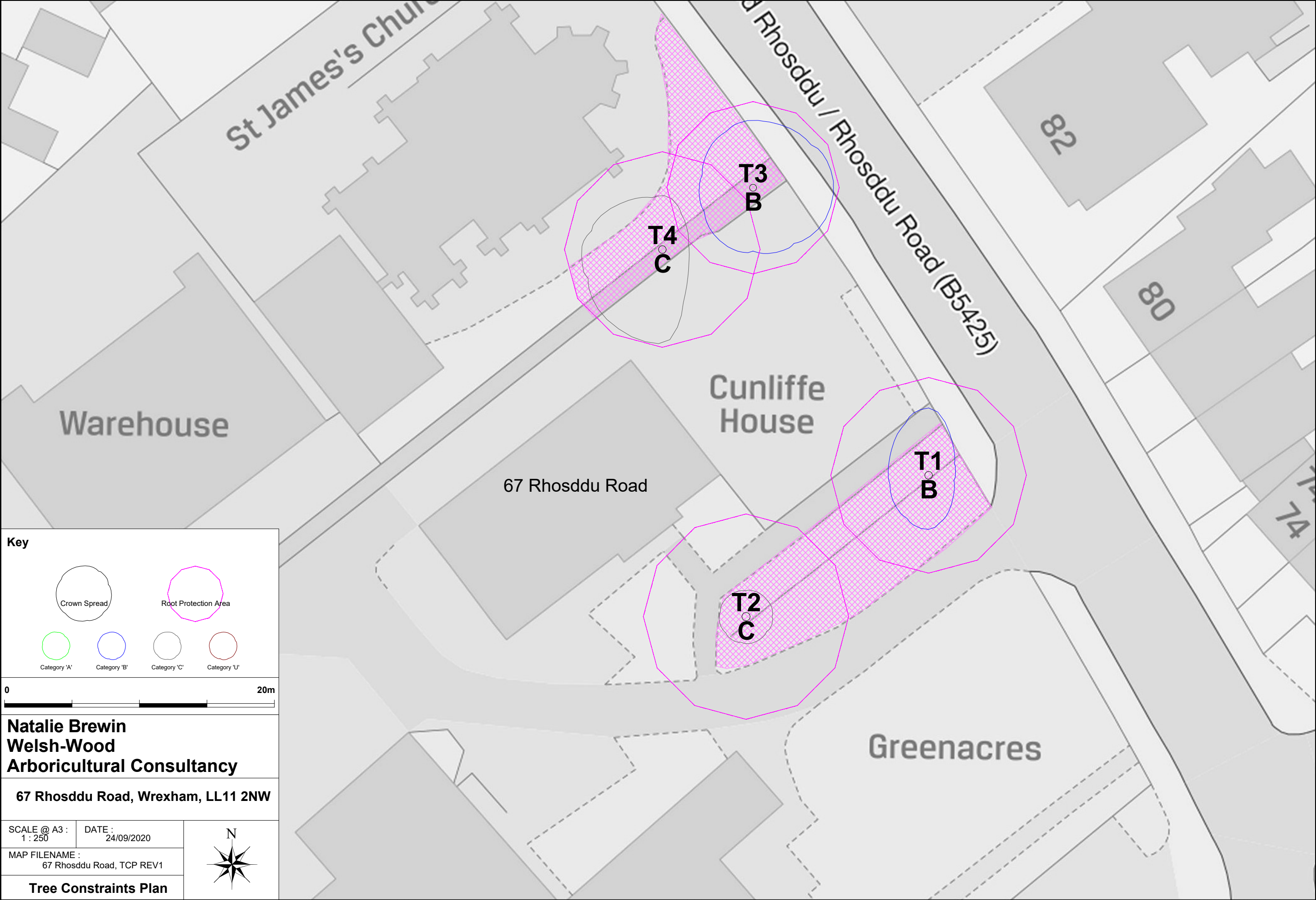
Key For Tree Survey Data

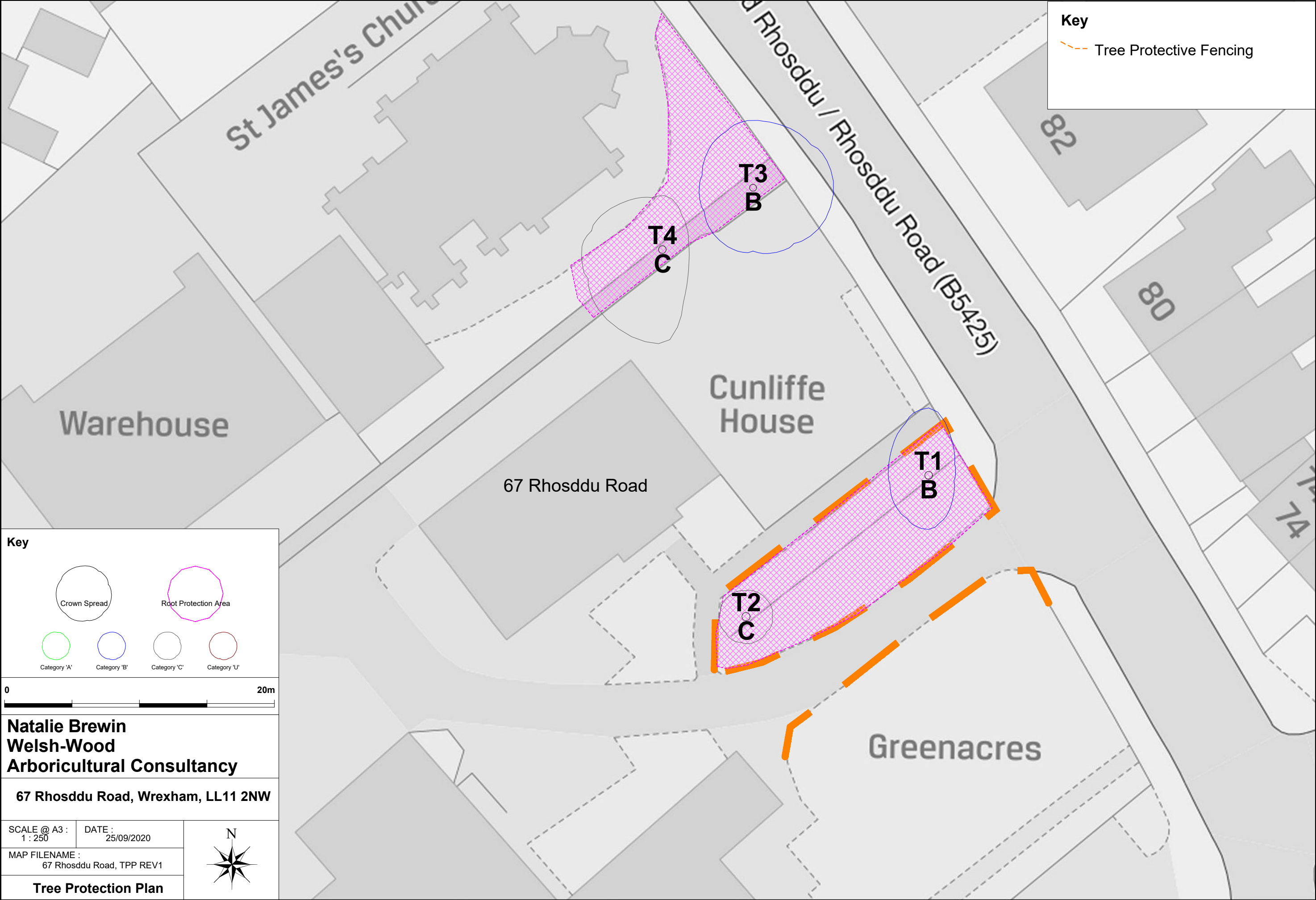
Tree ID	Numerical value assigned to the tree or tree group. * indicates offset RPA due to site conditions, please refer to accompanying plans and report.
Common & Botanical Name	Common and botanical name recorded
Height (m)	Height to the top of the central canopy
Stem Dia. (mm)	Depth of main stem measured at 1.5m
Crown Spread (m)	Measure of the spread of the canopy across the four cardinal compass points
Height & Orientation of First Significant Branch	Height and orientation on the main stem of the first significant branch
Avg. Canopy Height (m)	The average height of the canopy of the tree
Life Stage	Classified as young, semi mature, mature, over mature or veteran (See Table 1 section 2.0.4 for further classification)
General Observations	Significant structural and physiological defects noted
Preliminary Recommendations	Works recommendations to remedy or further investigate significant defects, or to facilitate development or site access.
Estimated Remaining Contribution (Years)	Taken from guidelines provided within BS 5837 (2012) Trees in Relation to Design, Demolition and Construction
BS5837: 2012 Category	Taken from guidelines provided within BS 5837 (2012) Trees in Relation to Design, Demolition and Construction
RPA Radius (m)	Root protection area - radius of RPA
RPA m²	Root protection area

Surveyor: N Brewin

Tree ID	Common Name	Botanical Name	Height (m)	Calc. / Actual Stem Dia. (mm)	Spread (m)				Height (m) & Orientation of First Significant Branch	Avg. Canopy Height (m)	Life Stage	General Observations	Preliminary Recommendations	Estimated Remaining Contribution (Years)	BS5837: 2005 Category	RPA Radius (m)	RPA m²
					N	E	S	W									
1*	Horse chestnut	Aesculus hippocastanum	17	590	5	2	4	3	N2	1	SM	Slight asymmetrical form to crown due to previous adjacent tree cover. Tree situated in retained bed consisting of a narrow grass strip. Stem epicormics and scale insect noted. Prominent tree.	No works required.	20+	B1	7.1	157
2*	Horse chestnut	Aesculus hippocastanum	5	620	2	2	2	2	N2	1	SM	Crown removed at approximately 2.5m in maturity with resultant maturing re-growth. Historic wound at stem base with good callus wood.	No works required.	10+	C1	7.4	174
3	Lime species	Tilia spp.	14	520	5	6	5	4	S2	2	SM	Off site tree. Stem epicormics and scale insect.	No works required.	20+	B1	6.2	122
4	Birch species	Betula spp.	13	590	4	2	7	6	S2	2	M	Off site tree. Damaged surface roots. Stem base epicormics. Restricted visual assessment due to dense ivy.	No works required.	10+	C1	7.1	157







Appendix 4 Photographs



T1 & T2 – Horse chestnut



Stump re-growth between T1 and T2



Wall bisecting grass strip



T1 and path at edge of grass strip



T3 and T4 overhang to site

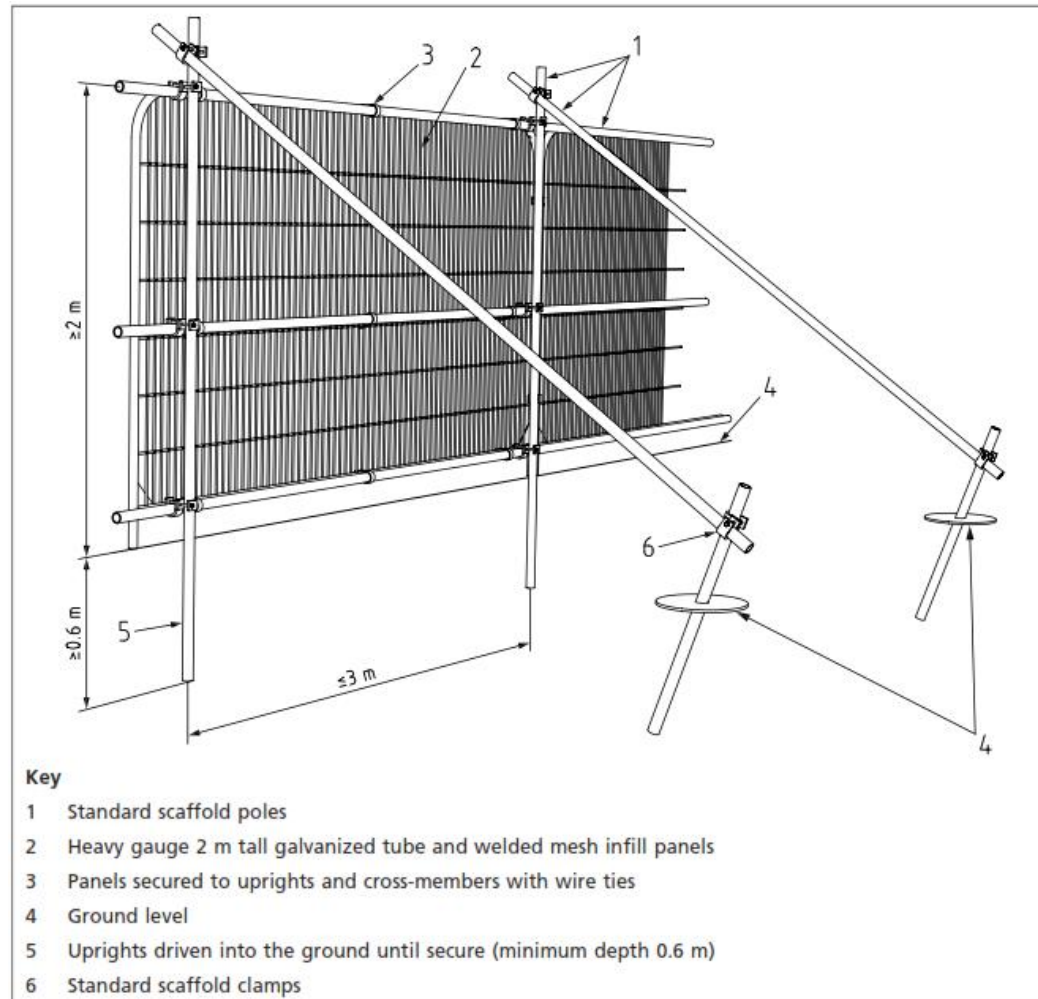


T3 and T4 in Church Yard



Mature ivy feature on structure

Appendix 5 - Tree Protection Fencing Specification



Appendix 6 - Tree Protection Fencing Signage



Appendix 7 - Bibliography

1. Davison M W. (1981). Field Guide to the Trees & Shrubs of Britain. Readers Digest, London.
2. Hirons A D & Thomas P A. (2018). Applied Tree Biology. John Wiley & Sons Ltd. Chichester
3. Lonsdale D. (1999). Principles of Tree Hazard Assessment and Management. 2007 Reprint. Office of the Deputy Prime Minister, London
4. Mattheck C & Breloer H. (2003). The Body Language of Trees - A Handbook for Failure Analysis. Office of the Deputy Prime Minister. London
5. More D & White J. (2003). Cassell's Trees of Britain and Northern Europe. Cassell, London
6. National Tree Safety Group (2011). Common Sense Risk Management of Trees. Forestry Commission, Edinburgh.
7. Roberts J Jackson N & Smith M. (2006). Tree Roots in the Built Environment. Office of the Deputy Prime Minister. London
8. Shigo A. (2003) Modern Arboriculture. Shigo & Trees Associates, New Hampshire, USA.
9. Strouts G R & Winter G T. (2005). Diagnosis of Ill-health in Trees. Office of the Deputy Prime Minister. London.
10. Thomas P A. (2000). Trees: Their Natural History. Cambridge University Press.
11. Weber K & Mattheck C. (2003). Manual of Wood Decays in Trees. The Arboricultural Association, Hampshire.