MURRAY
TREE CONSULTANCY

# ARBORICULTURAL REPORT (BS 5837:2012)

PROPOSED DEVELOPMENT

AT

THE GREEN
HOLT ROAD
ROSSETT
LL12 0DS

October 2024

PM/FULL/25/10/24

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TABLE OF CONTENTS


| | Contents | Page No. |
|---|---|---|
| 1.0 | INTRODUCTION | 3 |
| 1.1 | Professional Details | 3 |
| 1.2 | Tree Survey | 3 |
| 2.0 | FINDINGS | 4 |
| 2.1 | The Site | 4 |
| 2.2 | The Soils | 4 |
| 2.3 | The Trees | 4 |
| 2.4 | Standard of Work | 4 |
| 2.5 | Statutory Controls | 5 |
| 2.6 | Wildlife | 5 |
| 3.0 | DISCUSSION | 5 |
| 4.0 | ARBORICULTURAL IMPLICATIONS ASSESSMENT | 6 |
| 5.0 | MITIGATING PROPOSALS | 8 |
| 5.1 | Tree Removal and Replacement Planting | 8 |
| 5.2 | Development | 8 |
| 6.0 | METHOD STATEMENT | 8 |
| 6.1 | Tree Works | 8 |
| 6.2 | Protective Fencing | 8 |
| 6.3 | Additional Precautions Outside Fenced Areas | 10 |
| 6.4 | Services | 10 |
| 6.5 | Site Buildings | 10 |
| 6.6 | Summary of Methodology for the Protection of Trees | 11 |
| 6.7 | Conclusion | 11 |

APPENDIX A – Glossary of Terms and Table 1 of BS 5837:2012
APPENDIX B – Arboricultural Data & Digital Photographs
APPENDIX C – Key References
APPENDIX D – NJUG 10 Section 4.0
APPENDIX E – Site Notice for Tree Protective Fencing
APPENDIX F - Site Plans


*Disclaimer*
*The tree(s) referred to in this report are living entities and are therefore subject to natural processes. They will also be subject to changes to their environment caused by human's activities and to exceptional weather conditions. The inspection undertaken by our qualified staff relies on visual attributes of tree health and structure which can be assessed from a ground based inspection. Hidden defects which are not readily visible may not be detected. We therefore cannot wholly guarantee the condition and safety of the trees inspected beyond what can be reasonably assessed from the procedure used. We would recommend that the trees are regularly inspected and our staff will advise on the suitable frequency of these inspections.*

# 1.0 INTRODUCTION

## 1.1 Professional Details

1.1.1 My name is Peter Murray and I have been working and studying in the Arboricultural Industry since 1989. I have many years practical and consulting experience as a Local Authority arboriculturalist and more recently as a private sector practitioner.

1.1.2 I so far hold the Higher National Diploma in Arboriculture and am a professional member of the Arboricultural Association. I keep up to date with the latest research and best practice by attending relevant courses and seminars.

## 1.2 Tree Survey

1.2.1 I was recently instructed by 'Apex Architecture & Design Ltd' on behalf of their clients to carry out a site visit at The Green, Holt Road, Rossett, LL12 0DS and survey all significant trees that may be affected by proposed development in accordance with *BS 5837:2012 trees in relation to design, demolition and construction – Recommendations.*

1.2.2 The survey on which the findings of this report are based was undertaken on Thursday 3rd October 2024 and the weather was dry.

1.2.3 This report should be read in conjunction with the attached Arboricultural Data and Site Plans of Appendix B and F.

1.2.4 The trees were inspected from ground level only and all comments and recommendations made have taken into account their location, surroundings and likely impact on persons or property.

1.2.5 The limitations of this report are restricted to the persons, time, information made available and purpose for which this report has been prepared. This report does not deal with any existing tree root/building conflicts and no information has been provided regarding soil type and no analysis undertaken by this company.

## 2.0 FINDINGS

### 2.1 The Site & Proposal

2.1.1 The site in question is a disused church building within a village and the grounds consist of mainly surfacing and grass.

2.1.2 The proposal is to demolish the existing building and construct three detached dwellings using the existing access from Holt Road.

### 2.2 The Soils & Foundations

2.2.1 The soil of the site is described at http://www.landis.org.uk/soilscapes as being 'Freely draining slightly acid loamy soils'.

2.2.2 The following is taken from the NHBC Standards Chapter 4.2 Building near trees: The combination of shrinkable soils and trees, hedgerows or shrubs represents a hazard to structures that requires special consideration. Trees, hedgerows and shrubs take moisture from the ground and, in cohesive soils such as clay, this can cause significant volume changes resulting in ground movement. This has the potential to affect foundations and damage the supported structure. In order to minimise this risk, foundations should be designed to accommodate the movement or be taken to a depth where the likelihood of damaging movement is low.

### 2.3 The Trees

2.3.1 A total of two individual trees, two groups and one hedge were surveyed and plotted in order to assess their health and dimensions in accordance with the British Standard and the results are clearly detailed within the Appendices of this report.

2.3.2 In general the trees were found to be in reasonable condition for their age and species. Any works identified within the data tables should take place regardless of development in line with best practice. The quality rating for the trees on or affecting this site can be summarised as follows:

U – 1 group (G2)
A – 0 trees/groups
B – 1 tree (T2)
C – 3 trees/groups (T1, H1 & G1)

### 2.4 Standard of Work

2.4.1 Any tree work undertaken should be done in accordance with British Standard 3998:2010 and by competent contractors insured with public liability cover of at least two million pounds.

## 2.5 Statutory Controls

2.5.1 If the trees on site are subject to any Tree Preservation Orders (TPO's) or are encompassed within a Conservation Area, then statutory permission from the Local Planning Authority (LPA) will be required before any tree works take place.

## 2.6 Wildlife

2.6.1 All operations should take account of wildlife needs and be planned to take advantage of weather conditions and time of year for minimum damage and disturbance. If any protected species or nesting birds are present or discovered while the works are taking place all work should cease until contact has been made with Countryside Council for Wales for further advice. Countryside Council for Wales can be contacted on 01248 385500 or by e-mail to: Enquiries@ccw.gov.uk. Specific consideration should be given to the possible presence of roosting bats, which are protected by the Wildlife and Countryside Act 1981 (schedule 5) and included in schedule 2 of the Conservation Regulations 1994. Ideally, a survey should be carried out to identify any potential roost sites and if bats are found to be present advice should be sought form a person qualified and experienced in handling such matters and fully conversant with the implications of the Act.

## 3.0 DISCUSSION

3.1 The majority of the root system, of a tree, is in the surface 600mm of the soil, extending radially for distances frequently in excess of the trees height. Beyond the main structural roots (close to the base of the trunk), the root system rapidly sub-divides into smaller diameter roots: off this main system, a mass of fine roots develops.

3.2 The shape of the main structural roots develops in response to the need for the tree to have physical stability. Beyond these major roots, root growth and development is influenced by the availability of water and nutrients. Unless conditions are uniform around the tree, which would be unusual, the extent of the root system will be very irregular and difficult to predict. It will not generally show the symmetry seen in the branch system.

3.3 The parts of the root system, which are active in water and nutrient uptake, are very fine, typically less than 0.5mm diameter. They are short lived, developing in response to the needs of the tree, with the majority dying each winter. It is *essential* that conditions in the soil remain conducive to the healthy growth of these fine roots so that the water and nutrients necessary for healthy tree growth can be absorbed.

3.4 All parts of the root system, but especially the fine roots, are vulnerable to damage. Once they are damaged, water and nutrient uptake will be restricted until new roots have regenerated. Vigorous young trees will be capable of rapid regeneration, but over mature trees will respond slowly, *if at all*.

3.5 In order to live and grow, roots need oxygen from the soil. Respiration by the roots and other soil organisms depletes this oxygen and increases carbon dioxide levels in the soil; a correct balance of these gases is normally maintained by diffusion between the soil and the atmosphere. Anything, which disturbs this balance, will affect the condition of the root system.

3.6 The factors that most commonly affect this diffusion adversely, and therefore damage roots, are the following: -

a) Compaction of the ground, which reduces the space between soil particles. This is particularly important on clay soils. A single passage by heavy equipment on clay soils or storage of heavy materials can cause significant damage.
b) Changing soil levels, even for a few weeks.
c) Covering the root area with impervious surfaces.
d) A rise in the level of the water table. Roots can tolerate submersion for short periods. But a permanent rise will deplete the soil of oxygen.

3.7 Serious damage is often caused during preliminary site works by stripping the topsoil. For this reason, such works should be avoided until protective fencing has been erected.

3.8 Excavations in the rooting area can sever roots. As the majority of roots are in the surface 600mm, even shallow excavations can cause damage.

3.9 Excavations for foundations, landscaping or service trenches are usually sufficiently deep to sever most of the roots, and it should therefore be assumed that all parts of the root system beyond the excavation would no longer serve the tree.

3.10 Excavation or soil stripping which sever or damage the roots may impair the stability of the tree and make it dangerous.

## 4.0 ARBORICULTURAL IMPLICATIONS ASSESSMENT

4.1 The purpose of this section is to assess the implications, if any, the proposed development will have on the trees identified in the Tree Survey of 3rd October 2024 carried out by Murray Tree Consultancy (see Appendix B) and advise on arboricultural measures, which would be likely to mitigate any damage resulting from the development.

4.2 The Site Layout Plan within Appendix F identifies the trees in relation to the proposed development.

4.3 In order to fully assess the impact of the development an Implications Table has been created, which gives details of the proximity of the associated works to the trees.

4.4 The below Implications Table details the Root Protection Area (RPA) in accordance with the British Standard 5837:2012 *Trees in relation to design, demolition and construction – Recommendations*. This is an area that should be left undisturbed in order to provide adequate rooting area for retained trees. This is also illustrated on the Site Plan of Appendix F.

4.5 This information can then be used in accordance with BS 5837:2012 to determine whether the development will have a detrimental impact on the health of the trees. Once this has been determined remedial measures can be detailed to reduce the impact the proposals will have.

4.6 Implications Table: -

| Tree No. | Species | Root Protection Area ($m^2$) | Circle Radius (m) | Distance to any proposed construction or surfacing (m) | Can the Tree be Successfully Retained |
|---|---|---|---|---|---|
| T1 | Rowan | 14.66 | 2.16 | Remove for development | |
| H1 | Beech | 1.13 | 0.60 | 1.0+ | Yes |
| G1 | 3 Birch | <13.07 | <2.04 | 2.5 | Yes |
| G2 | Hazel/Sycamore | 1.63 | 0.72 | Remove for condition | |
| T2 | Weeping Willow | 289.53 | 9.60 | 13.0 | Yes |

4.7 To assess the implications of the proposed development each tree can be categorised in the following way: -

| | Trees to be Retained | | Trees to be removed | |
|---|---|---|---|---|
| | With No Impact | Impact within shown RPA | Due to Condition | Due to Development |
| Tree No. | H1, G1 & T2 | n/a | G2 | T1 |

## 5.0 MITIGATING PROPOSALS

### 5.1 Tree Losses and Replacement Planting

5.1.1 The loss of any tree is always regrettable, although in this instance the tree losses are minimal requiring the removal of one minor Rowan (T1) and a scrub group of very low quality (G2).

5.1.2 There is plenty of scope within the new development to increase the tree, shrub and hedge population significantly.

### 5.2 Development

5.2.1 As shown above, the Implications Table identifies that the trees shown for retention should not be impacted on by development provided that they are properly protected during construction.

5.2.2 A clear tree works specification and details of all tree protective measures can be found in the following Arboricultural Method Statement.

## 6.0 METHOD STATEMENT

### 6.1 Tree Works

Before any form of development commences on the site the following works should be undertaken: -

| Tree No. | Proposed Works |
|---|---|
| T1 & G2 | Fell and remove stumps. |

**Recommended works should be carried out to the *British Standard Recommendations for Tree Work, BS 3998:2010***

### 6.2 Tree Protective Fencing

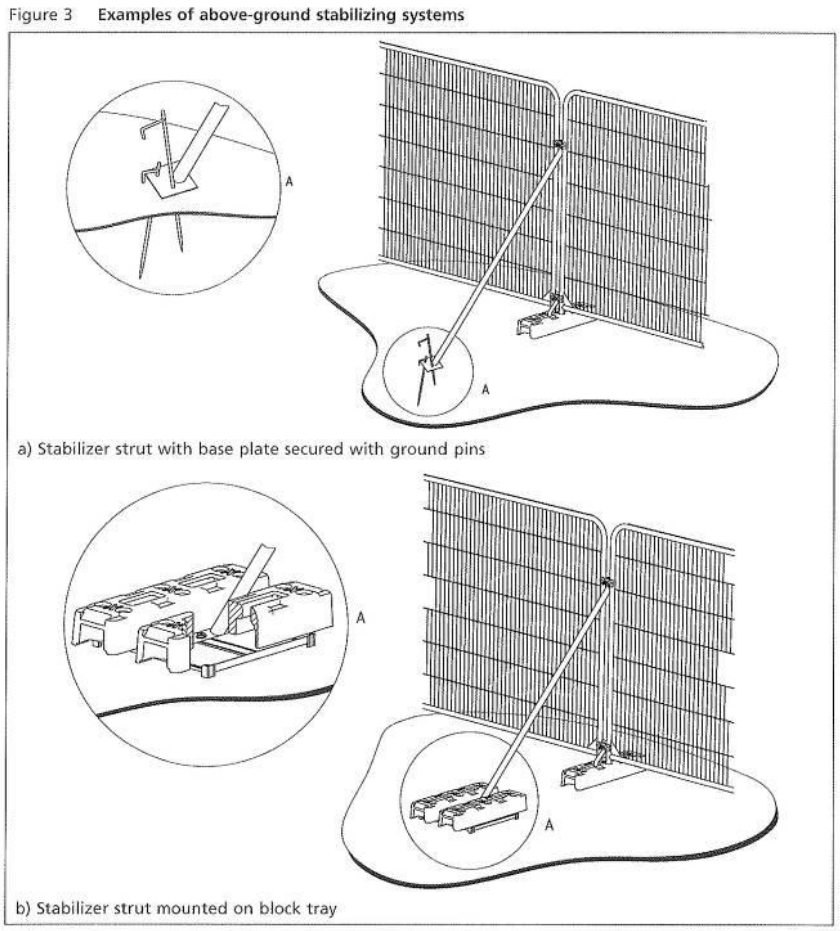
6.2.1 Construction Exclusion Zones (CEZs) shall be enclosed by Temporary Protective Fencing and/or, where necessary, Temporary Ground Protection. All fencing used on the site should fully comply with *BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations*.

6.2.2 The fencing should be strong and suitable for local conditions. It should also take into account the degree of construction activity on the site.

6.2.3 In this circumstance the location for the protective fencing should be as shown on the Tree Protection Plan of Appendix F and of the following specification:

6.2.4 Temporary protective fencing panels shall be weldmesh "Heras" panels of at least 2.0 metres in height. The panels shall stand on rubber or concrete feet and butt together and be joined together using a minimum of two anti-tamper couplers, installed so that they can only be removed from inside the fence. The panels shall be supported on the inner side by stabiliser struts, which shall be clamped to the scaffold framework at a 45º angle and extend back into the CEZ and shall be attached to a block tray base (Figure 3b). No fixing shall be made to any tree and all possible precautions shall be taken to prevent damage to tree roots when locating posts.

Figure 3(a): Type 2 Fencing (BS5837:2012 above-ground strut stabilising system with ground pins)




6.2.5 No storage of materials or any construction operations should occur within the fenced area. Additionally, when designing the site layout, account should be taken of the route/installation method of underground services/drains and, the route/construction method of new access roads/driveways in relation to the retained trees. It would be advisable to mark out the optimum position of the protective fencing on the ground prior to finalisation of any design proposal.

6.2.6 Notices should also be erected on the fencing stating, 'Protected Area - No operations within fenced area'. An example can be found in Appendix E, which should be laminated and attached to the fencing at regular intervals.

6.2.7 The positioning of the protective fencing is also very important and should be erected in the proposed location identified on the site plan of Appendix F. Once the fence has been erected it should never be crossed and particular care should be taken not to store any materials or soil within the protected area.

## 6.3 Additional Precautions Outside Fenced Areas

6.3.1 Oil, bitumen, cement or other material likely to cause damage to the tree will not be stacked or discharged within 10m of the trees stem or within the protective area. Also, materials in general will not be stacked or discharged within the exclusion zone.

6.3.2 Concrete mixing and washing will not be carried out within 10m of any retained trees.

6.3.3 Fires will not be lit beneath the foliage or in a position where the flames could extend to within 5m of the foliage, branches or trunk. If the fire is large, then this may necessitate a distance of at least 20m.

6.3.4 Trees that are to be retained will not be used as anchorage for equipment.

6.3.5 Notice boards, telephone cables, or other services will not be attached to any part of the retained tree.

6.3.6 Care should be taken when using cranes or other equipment near the canopy of the retained trees. Also, any trees to be felled in proximity to the retained trees should be done so with particular care.

## 6.4 Services

6.4.1 Where possible all service trenches should be dug outside of the Root Protection Area.

6.4.2 Should this not be possible then the guidelines within 'NJUG 10' *Guidelines for the Planning, Installation and Maintenance of Utility Services in Proximity to Trees* should be adopted, in particular Section 4.0, which is included within Appendix D of this report.

## 6.5 Site Buildings

6.5.1 Site cabins, compounds and welfare should all be placed outside of the protection areas of retained trees.

6.5.2 Where this is not possible further advice should be sought from the appointed arborist and in some circumstances, it may be possible to construct temporary ground protection and adjust fencing, but this is only to be considered as a last resort.

6.5.3 On larger sites of more intensive development where this is little open spaces for site buildings then alternative arrangements off site should be considered or part of the site should remain undeveloped until the final stages when less site storage is needed.

## 6.6 Summary of Methodology for the Protection of Trees

1. **Remedial tree works carried out in accordance with this report and by a competent and fully insured arboricultural contractor and in accordance with BS 3998:2010.**

2. **Erection of Tree Protective Fencing in accordance with this Method Statement and Tree Protection Plan of Appendix F and to be supervised and checked by a competent arboriculturalist before commencement of works.**

3. **The construction of the development.**

4. **The removal of Protective Fencing is only to be done with the agreement of a competent arborist or the LPA.**

5. **New landscape scheme.**

## 6.7 Conclusion

Provided that all the tree protective measures are put in place as outlined above it is considered that all significant trees can be successfully retained and protected.

Signed



Peter Murray (HND. ARB, M, Arbor A)
Consulting Arborist

25th October 2024

# APPENDIX A - Glossary of Terms & Table 1 of BS 5837:2012

The following terms are concurrent with best Arboricultural practice and within the guidelines set by the International Society of Arboriculture (ISA), the Arboricultural Association (AA) and the British Standards Institute (BSI).

***Dbh:*** Diameter at Breast Height is measured at 1.5m and recorded in millimetres. Where a tree becomes multi-stemmed below 1.5m the diameter of each stem is measured at 1.5m and added together. Where a tree has low branching or has swelling the stem is measured at the narrowest point below.

***Height:*** Height was estimated and recorded in metres.

***Age Range:*** Age is site specific and categorised:

| | |
|---|---|
| Young (Y) | Out-planted trees that have not yet established. |
| Semi-Mature (SM) | Established trees up to 1/3 of expected height and crown. |
| Early Mature (EM) | Between 1/3 and 2/3 of expected height and crown. |
| Mature (M) | Between 2/3 and full expected height and crown. |
| Fully Mature (FM) | Full expected height and crown. |
| Over Mature (OM) | Crown beginning to break-up and decrease in size. |
| Senescent (S) | Crown in advanced stage of break-up. |

***Crown Spread:*** Measured in metres at four cardinal points (N, E, S & W).

***Crown Clearance:*** Measured in metres from the ground to the first branch tip on development side only.

***Condition -*** Assessment of current physiological condition and structural morphology incorporating vigour and vitality and categorised:

Good (G) - Tree needing little, if any attention
Fair (F) - Tree with minor, but rectifiable defects, or in the early stages of physiological stress
Poor (P) - Tree with significant structural and physiological flaws and/or extremely stressed
Dead (D) - Tree that is dead, biologically/physically moribund or dangerous

***Desirability To Retain –*** As Outlined in Table 1 of BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations (see below).

<u>Definition of Physiological & Morphological Terms</u>

***Adaptive Growth*** - The process whereby wood formation is influenced both in quantity and in quality by the action of gravitational force and mechanical stresses on the cambial zone.

***Bifurcation*** – Forked or divided union.

***Brown Rot*** - Form of decay where cellulose is degraded, while lignin is only modified.

***Cankers*** (target or tumerous) - A localised area of dead bark and cambium on a stem or branch, caused by fungal or bacterial organisms, characterised by woundwood development on the periphery. This may be annual or perennial.

***Cavity*** - An open wound, characterised by the presence of extensive decay and resulting in a hollow.

***Chlorotic Leaf*** - Lacking in chlorophyll, typically yellow in colour.

***Compartmentalisation*** - The physiological process that creates the chemical and mechanical boundaries that act to limit the spread of disease and decay organisms.

***Coppicing*** - Is an ancient form of woodland management that involves repetitive felling on the same stump, near to ground level, and allowing the shoots to re-grow from that main stump. (Also known as the coppice stool).

***Crack*** - Longitudinal spilt in stem or branch, involving bark and/or underlying wood. These may be vertically and horizontally orientated.

***Decay*** - Process of degradation of woody tissues by fungi and bacteria through decomposition of cellulose and lignin.

***Deadwood*** - Deadwood is often present within the crown or on the stems of trees. In some instances, it may be an indication of ill health, however, it may also indicate natural growth processes. If a target is present beneath the tree, deadwood may fall and cause injury or damage and should be removed, otherwise deadwood can remain intact for conservation purposes (insects, fungi, birds etc.).

***End Weight*** - The concentration of foliage at the distal ends of stems and deficient in secondary branches.

***Girdling Root*** - Root which circles and constricts the stem or roots causing death of phloem and/or cambial tissue.

***Hazard Beam*** - An upwardly curved branch in which strong internal stresses may occur without the compensatory formation of extra wood (longitudinal splitting may occur in some cases).

***Included Bark Union*** - Pattern of development at branch junctions where bark is turned inward rather than pushed out. Potential weakness due to a lack of a woody union.

***Ivy Growth*** - Ivy growth may ascend into the tree's crown, increasing wind resistance, concealing potential defects and reducing the tree's photosynthetic capacity. Ivy growth is often acceptable in woodland areas as a conservation benefit.

***Live Crown Ratio*** - The relative proportion of photosynthetic mass (leaf area) to overall tree height.

***Reaction Wood*** - Specialised secondary xylem, which develops in response to a lean or similar mechanical stress, attempting to restore the stem to the vertical.

***Root Plate Lift*** - The physical movement of the rooting plate causing soils to shift and crack. May occur during adverse weather conditions. Trees may become unstable.

***Structural Defect*** - Internal or external points of weakness, which reduce the stability of the tree.

***Suppressed*** - Trees which are dominated by surrounding vegetation and whose crown development is restricted from above.

***Topping*** - A highly disfiguring practise, likely to cause severe xylem dysfunction and decay in major structural parts of the wood.

***White Rot*** - Form of decay where both cellulose and lignin are degraded.

***Wound*** - Any injury, which induces a compartmentalisation response.

***Woundwood*** - Wood with atypical anatomical features, formed in the vicinity of a wound and a term to describe the occluding tissues around a wound as opposed to the ambiguous term "callus."

***Woodland Structure -*** The vertical and horizontal arrangement of trees within a group or woodland i.e. Dominant - trees with a crown above the upper layer of the canopy, Co-dominant trees that define the general upper edge of the canopy, Intermediate trees that have been largely overgrown by others, Suppressed trees that have been overgrown and occupy an under storey position and grow slowly, often severely asymmetrical.

*Note:* The definitions described above, may not necessarily be included within the Arboricultural Survey Data.

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

| Category and definition | Criteria (including subcategories where appropriate) | | |
|---|---|---|---|
| **Trees unsuitable for retention (see note)** | | | |
| **Category U**<br>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 U category trees (i.e. where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning)<br>• Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline<br>• Trees infected with pathogens of significance to the health and/or safety of other trees nearby (e.g. Dutch elm disease), or very low quality trees suppressing adjacent trees of better quality<br>**Note** – *Category U trees can have existing or potential conservation value which it might be desirable to preserve; see 4.5.7.* | | |
| | **1 Mainly arboriculture qualities** | **2 Mainly landscape qualities** | **3 Mainly cultural values, including conservation** |
| **Trees to be considered for retention** | | | |
| **Category A**<br>**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 arboriculture 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) |
| **Category B**<br>**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 minor 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 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 |
| **Category C**<br>**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 | Tree with no material conservation or other cultural value |

# APPENDIX B – Arboricultural Data

**Arboricultural Data Sheet:** The Green, Holt Road, Rossett, LL12 0DS **Date of Survey:** 03/10/24 **Weather:** Dry **Surveyor:** PM

Crown C = Crown Clearance; Cond R = Condition Rating; ERC (Yrs) = Estimated Remaining Contribution; TQRA = Tree Quality Category Rating; RPA ($m^2$) = Root Protection Area ($m^2$)
Recommended works should be carried out to the *British Standard Recommendations for Tree Work, BS 3998:2010*

| Tree No. | Species | Dbh (mm) | Height (m) | Age | Crown Spread | | | | Crown C | Cond R | Observations and Comments | Preliminary Recommendations | ERC (Yrs) | TQCR | RPA ($m^2$) | RPA Circle Radius (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | N | E | S | W | | | | | | | | |
| T1 | Rowan | 180 | 4.5 | SM | 2.5 | 2.5 | 2.5 | 2.5 | 1.2 | F | An individual multi-stemmed tree with reasonable form and vigour. | **n/a** | 10+ | C2 | 14.66 | 2.16 |
| H1 | Hedge - Beech | 50 | 2 | EM | 0.5 | 0.5 | 0.5 | 0.5 | 0 | F | A short length of boundary hedge. Previously maintained at 1.8m. Has been clipped on neighbours side. | **n/a** | 10+ | C2 | 1.13 | 0.60 |
| G1 | Group - 3 Himalayan Birch | <170 | <8 | SM | 4 | 4 | 4 | 4 | 2.5 | G | A co-dominant group located within the adjacent property. No view of lower stem or bases but appear in good health. | **n/a** | 10+ | C2 | <13.07 | <2.04 |
| G2 | Group - Hazel & Sycamore | 60 | <4 | Y | 1 | 1 | 1 | 1 | 0 | P | A narrow strip of scrub sapling growth along fence line. Low potential. | **n/a** | 5-10 | U | 1.63 | 0.72 |
| T2 | Weeping Willow | 800 | 13 | FM | 7 | 7 | 7 | 7 | 1.5 | F | A fully-mature specimen located within the adjacent property. No view of base or stem. Previously topped at approximately 6-7m. Profuse re-growth. Stem swamped in Ivy. Forked at 2.5m. | **n/a** | 20+ | B1 | 289.53 | 9.60 |

G1



T2



T1



H1



# APPENDIX C – Key References


1. *British Standard BS 5837: (2012) Trees in relation to design, demolition and construction - Recommendations. ISBN 978-0-580-69917-7*

2. *Lonsdale, D. (199) Principles of tree hazard assessment and management, Research for amenity trees N0. 2. HMSO, London. ISBN 0-11-753355-6*

3. *Mattheck, C. and Belier, H. (1994) The body language of trees. Research for amenity trees No. 4. HMSO, London. ISBN 0-11-753067-0*

4. *Shigo, A. L. (1989a) A new tree biology. Shigo and Trees Associates, Durham, NewHampshire ISBN 0-943563-04-6*

5. *Stouts R. G. and Winter T. G. (1994) Diagnosis of ill-health in trees, Research for amenity trees No. 2. HMSO, London. ISBN 0-11-752919-2*

6. *British Standard BS 3998: (2010) Tree Work-Recommendations. ISBN 978-0-580-53777-6*

# APPENDIX D

# NJUG 10 Section 4.0

# 1. HOW TREES ARE DAMAGED

Trees are complex living organisms, which are susceptible to damage from a wide range of physical agents or activities. Trees do not heal, damage caused to a tree will remain for the rest of its life. Even minor damage may set up circumstances leading to serious long term decay.

Contrary to popular belief, the root system of a tree is not a mirror image of the branches, nor is there usually a 'tap root'. The majority of the root system of any tree is in the surface 600mm of soil, extending radially in any direction for distances frequently in excess of the tree's height. Excavation or other works within this area are liable to damage the roots.

## 1.1 The Root System

The base of a trunk typically flares out in buttresses extending into the main lateral structural roots. These rapidly subdivide into the mass of smaller roots which serve to anchor the tree into the soil and transport water and nutrients. Even at a short distance (3m) from a large mature tree, most roots will be less than 10mm in diameter, but these may extend to well beyond the branch spread of the tree. A mass of fine roots, less than 1 mm in diameter, develop off all parts of this root system. These fine roots also absorb the water and nutrients, which are essential for the growth of the tree.






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The main structural roots (close to the trunk) develop as the tree grows in response to the need for physical stability. Beyond these major roots growth is influenced by the availability of water, air and nutrients in the soil. Disturbance of soil provides ideal conditions for root growth. Apparatus is often cooler than the surrounding soil encouraging moisture within the soil to condense on its surface stimulating root growth close to the apparatus. For all these reasons root growth is often most prolific within the backfilled trench and in the soil around the apparatus.

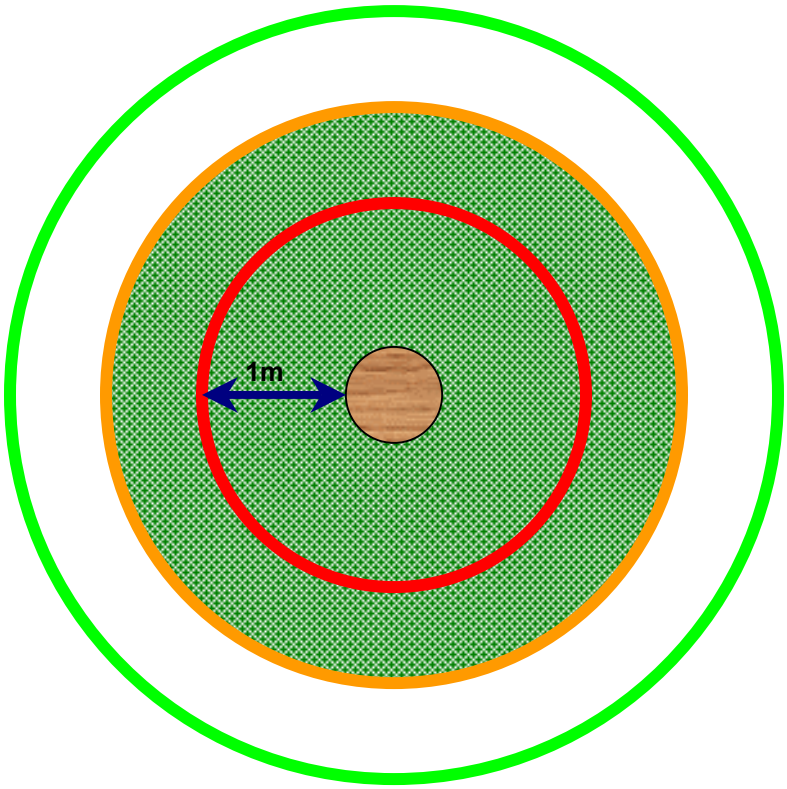
There are certain areas around trees, illustrated in Figure 1 – 'Tree Protection Zone', where excavation either must not be undertaken or only undertaken under strict conditions in order to avoid or minimise any damage to a tree's root system.

For the purposes of this guideline document they are called zones;

- the Prohibited Zone (1m from the trunk)
- the Precautionary Zone (4 x the tree circumference)
- the Permitted Zone (outside of the Precautionary Zone)


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## FIGURE 1 – Tree Protection Zone




**Key**

Trunk of tree

Canopy or branch spread

**PROHIBITED ZONE – 1m from trunk.** Excavations of any kind must not be undertaken within this zone unless full consultation with the local authority Tree Officer is undertaken. Materials, plant and spoil must not be stored within this zone.

**PRECAUTIONARY ZONE – 4 x tree circumference.** Where excavations must be undertaken within this zone the use of mechanical excavation plant should be prohibited. Precautions should be undertaken to protect any exposed roots. Materials, plant and spoil should not be stored within this zone. Consult with the local authority Tree Officer if in any doubt.

**PERMITTED ZONE – outside of the precautionary zone**. Excavation works may be undertaken within this zone, however caution must be applied and the use of mechanical plant limited. Any exposed roots should be protected.


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## 1.2 Below Ground

### 1.2.1 **Root systems can be damaged by;**

- the severance of a root, for example by trenching will destroy all parts of the root beyond that point. Even roots less than 10mm in diameter may be serving the fine roots over a wide area. The larger the root severed, the greater the impact on the tree.




**Typical root damage caused by excavation works**

- damage to the bark on the root. The bark protects the root from decay and is also essential for further root growth. It is loosely attached and easily damaged. If damage to the bark extends around the whole circumference the root beyond that point will be killed.

- damage to surface roots. Care must be taken when using mechanical plant. Materials and vehicles must never be stored within the Prohibited Zone and ideally should not be stored within the Precautionary Zone.


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- compaction of the soil. Incidental compaction may occur from storage of materials and / or the passing of heavy equipment over the roots. This can restrict or even prevent gaseous diffusion through the soil, and thereby asphyxiate the roots. The roots must have oxygen for survival, growth and effective functioning.



**Poor site management within the Precautionary Zone**

- alterations in soil level. Lowering the level will strip out the mass of roots near the surface. Raising levels will have the same effect as soil compaction.

- the application of herbicide - frequently used to clear weed growth on operational land (e.g. substations). The wide-ranging root system of a tree may extend into the operational land and absorb herbicides, which have been applied to the ground. Herbicide absorbed in one part of the root system can kill the whole tree.


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*NOTE: The selection and application of herbicides must be undertaken by a competent person in accordance with Control of Substances Hazardous to Health (COSHH) regulations.*

- spillage of oils or other materials (e.g. diesel oil, cement, resins). Spillage can permeate into the soil and damage root systems (see sub-section 4.3 – 'Chemical Damage to Trees').

1.2.2 **If roots are damaged;**

- close to the trunk. The anchorage and stability of the tree may be adversely affected rendering the tree immediately hazardous.

- anywhere along their length. The distal portion including the fine roots they serve, will be destroyed. Damage to fine roots by severance of a main root, or by compaction or alteration of ground levels, will prevent fine roots from absorbing the water and nutrients which are essential for the well-being, growth and anchorage of the tree.

- by successive excavations. Multi-utility excavations close to a tree can cumulatively damage a root system.

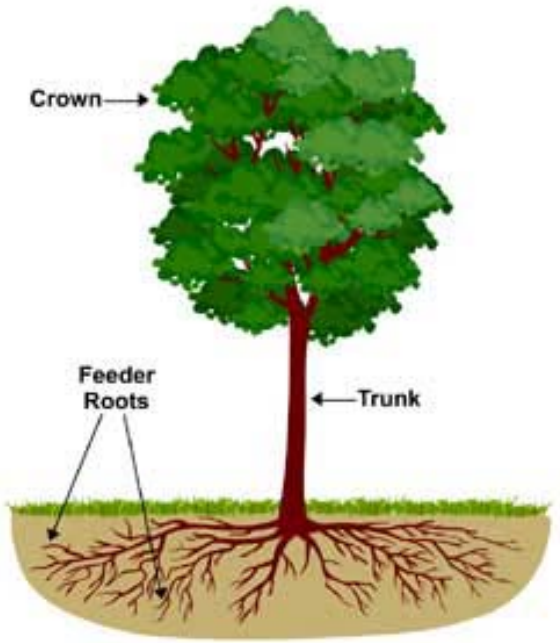



**Figure 2 - Typical Tree Structure**


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### 1.2.3 **Symptoms**

Trees with damage may not show any immediate symptoms. Such symptoms may range from minor branch dieback to deterioration and ultimate death and collapse of the tree dependent on the severity of damage and the ability of the roots to regenerate.

If a root of 25mm diameter or over is severed, as a precautionary measure, a local authority tree officer / arboricultural officer should be contacted immediately.

## 1.3 Above Ground

Trees have a single or multi-stemmed trunk supporting a framework of branches and twigs. These structures are protected by a layer of bark, the purpose of which is to protect the functional tissues immediately beneath.

**Trees can be damaged by:**

- Direct impact by plant or machinery
- Fire and scorching.
- Poor pruning
- Abrasion by overhead apparatus
- Chemicals and fuel oils
- Storage of materials within the Prohibited and Precautionary Zones

### 1.3.1 **Abrasion**

The tree may be damaged by abrasion with overhead apparatus. Initially this only removes the outer bark. If the abrasion continues it can expose the underlying wood which may increase the risk of fire or eventual collapse of the branch or the tree.

If trees are growing in proximity to overhead apparatus it should be possible to prevent the development of problems by timely pruning and tree management. This requires knowledge of the growth pattern of the many different species of tree, consideration of the effects of the pruning on the appearance of the tree and application of the correct pruning techniques. All pruning should be in accordance with BS 3998 (see sub-section 8 – ‘Other Useful Publications’). All operatives should be authorised and competent.

For all works other than emergency or urgent works, notification and consultation with all interested parties is necessary before work commences (see section 5 – ‘How to Avoid Damage to Apparatus by Trees’).


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1.3.2 **Permissions / Notifications**
Any work to trees adjacent to an area of operations that extends beyond what is absolutely necessary for operational requirements may require either written permission from the local planning authority (in respect to tree preservation orders) or six weeks' notification to the local planning authority (in respect to trees in conservation areas)(see also section 6 – 'Sites with Designated Status').

## 2. HOW APPARATUS IS DAMAGED

The positioning and type of underground apparatus are detailed in NJUG publication **Volume 1 – 'NJUG Guidelines on the Positioning and Colour Coding of Underground Utilities' Apparatus'.**

Construction methods and utility service materials are subject to change and any cluster of utility services is likely to consist of a variety of historic and modern materials constructed to various specifications. In general utility apparatus includes the following:

Pipes
Cables
Ducts
Chambers
Poles/Towers/Masts/Satellite dishes
Above ground installations

### 2.1 Below Ground

Underground apparatus (especially those less than 600mm deep) may be affected by tree roots. The risk will depend on the ability of the apparatus, in particular any joints, to resist or tolerate distortion.

2.1.1 **Direct damage**
Direct damage is caused by the annual increase in root thickness resulting in eventual contact with apparatus. However, it is usually either the root or the adjacent soil that will distort rather than the apparatus itself. The potential for damage depends on how much the root thickens and is greatest in the main structural roots within 3 metres of the tree. Roots may grow around an apparatus to form a sheath but this will rarely exert sufficient pressure to cause any damage. Surface wrappings inadequately attached to an apparatus, if non-toxic, may be colonised by roots and eventually lifted off.


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### 2.1.2 **Indirect damage**

Indirect damage is restricted to shrinkable soils, mainly clays but also peat and some silts. Such soils shrink as they dry with the potential to distort any apparatus supported by the soil. Vegetation growing within the same area of soil may increase the drying effect.

The degree of the shrinkability of the soil will affect the amount of movement caused by drying and thus the potential for damage to occur. In situations where apparatus passes from a shrinkable soil into a rigid structure there is the possibility of extreme distortion taking place. Regular seasonal movement can also cause damage even in the absence of roots, particularly with short segmented pipes (see sub-section 3.1.4 – 'Shrinkable Soils').

### 2.1.3 **Root incursion**

Intact apparatus will not generally be penetrated by roots. However roots can exploit existing defects such as;

- defective pipe joints
- cracks in foul or surface water drains
- inadequate or degraded pointing of inspection chambers.

Where internal conditions are moist and aerated and therefore most conducive to root growth, root proliferation may occur and ultimately block the apparatus. If root thickening occurs where it passes into apparatus, root related enlargement of a defect may occur. This is unlikely at distances 3 metres or more from the trunk.

### 2.1.4 **Trees and Wind Movement**.

The potential for damage to apparatus close to a tree may increase due to movement of the lower trunk and a structural root as the tree sways in strong winds. Such movement may result in direct pressure being applied to the apparatus. Furthermore, if a tree is uprooted, any apparatus passing across or through the disturbed root plate may also be displaced. Such events are unlikely and are restricted to situations where apparatus is in close proximity to the trunk of the tree, but the potential may be increased if other structural roots are severed. Encasing apparatus in lean mix or course concrete can exacerbate this problem as fine roots may penetrate the material providing a greater 'hold' on the apparatus unless an appropriate root barrier material is used to separate the apparatus from the root system.


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### 2.1.5 Mechanical Removal of Trees and Stumps

The mechanical removal of tree stumps by grinding or grubbing may disturb or damage apparatus passing across or through the root plate of the tree. Using a mechanical digger to uproot a tree scheduled for removal is very likely to damage apparatus within and also close to the Prohibited or Precautionary Zones as the roots will apply pressure to the apparatus as they are uprooted.

## 2.2 Above Ground

If overhead apparatus come into contact with trees they may be damaged as a result of:

- Abrasion when the tree and / or apparatus move in the wind bringing them into contact. The resultant abrasion can damage wires affecting their efficiency, strength and causing interference or loss of supply.

- The collapse of a branch or a whole tree which could bring down overhead lines.

# 3. PLANNING OF WORKS

The inherently variable nature of trees, and also the generally low incidence of damage to underground apparatus, makes it neither practical nor justifiable to impose absolute limits on the proximity of trees to apparatus. Therefore site specific liaison and agreement between the asset owner and other interested parties is essential.

With respect to overhead apparatus there are minimum established clearances which must be maintained. Details of these clearances can be obtained from the utility network operator.

Before new trees are planted the advice of a local authority tree officer or arboriculturist should be obtained.

## 3.1 Special Considerations when Planning the Installation of Underground Apparatus

### 3.1.1 New / Renewal of Apparatus - New Trees

In considering the location of new or renewed apparatus in conjunction with a new tree planting scheme early consultation is essential between the relevant


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professional organizations e.g. local authorities, utility companies, developers and landowners

### 3.1.2 New / Renewal of Apparatus - Existing Trees

When planning the installation or renewal of apparatus the position of existing trees should be considered as one of the primary factors which could affect the siting, depth, method of installation and future maintenance of that apparatus.
Consultation with the relevant interested parties will identify any conflict and consideration should be given to apparatus diversion or felling and re-planting. This decision should be influenced by the value of the tree and the extent of the additional diversionary works.

### 3.1.3 Existing Apparatus - New Trees

Early consultation with utilities should take place before any tree work, including planting, is undertaken to ascertain the position of existing apparatus. Records of underground apparatus should be obtained from utilities and used in conjunction with on site apparatus detection techniques. The guidance contained within Health and Safety Executive guidance note HSG47 – 'Avoiding Danger from Underground Services' should be followed when excavating. In addition, when planning new tree planting, there should be liaison with the utilities, local authority and landowner so that the risks trees may pose to utility apparatus in the future are minimised.

### 3.1.4 Shrinkable Soils

Apparatus laid in clay or peat should be constructed to tolerate movements of the subsoil caused by root activity. Special precautions for differential movement should be incorporated where apparatus joins rigid structures founded at a different depth to the apparatus (e.g. pipe connections to chambers). See sub-section 2.1.2 'Indirect Damage'.

## 3.2 Precautions when Repairing Existing Apparatus

Where apparatus requires repair the location of the excavation is often defined by the location of the fault. The nature of the work usually requires open excavation. Excavation within the Prohibited and Precautionary Zones should be in accordance with sub-section 4.1 'Below Ground' except for emergency or urgent works.

Where emergency or urgent works may have caused damage to roots with a diameter in excess of 25mm, interested parties should be informed immediately. They may choose to consult a local authority tree officer or arboriculturist regarding whether remedial treatment to the tree is necessary.


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If roots have grown into a drain or duct and proliferated so as to cause a blockage, the removal of the root mass from within the drain or duct will only provide temporary relief. If the root, which originally penetrated the drain, is still present it will regenerate and recreate the same problem. Roots of other plants may have a similar effect. Permanent relief can only be obtained by the proper repair of the original defect e.g. by replacement or refurbishment.

Utility apparatus may be refurbished by the use of pre-fabricated, slip lined or cured-in-place lining systems or pipes. Pre-fabricated and slip lined systems and pipes are generally resistant to root growth / intrusion, but cured-in-place linings may deform and ultimately collapse from the incursion of root growth. Following pre-survey (e.g. CCTV), it is essential that any roots are removed from the bore of the apparatus as far as practicable prior to lining, by the use of proprietary root removal systems (e.g. high-pressure water, flails, or rotating blade cutters).

## 3.3 Special Considerations when Planning the Installation of Above Ground Apparatus

The aerial parts of a tree are constantly growing larger and are prone to bend and flex in windy conditions. As a result parts of a tree may come close to or into contact with above ground apparatus.

### 3.3.1 **Electricity**

The overhead apparatus belonging to the electricity supply industry is subject to minimum clearances from adjacent trees and other structures. This is to ensure the safety of the public and protect against flashover and loss of supply. Local conditions may require an increase in the clearances specified in current electricity industry standards.

Part IV of The Electricity Supply Regulations covers the construction of power lines above ground. Schedule 4(9) of the Electricity Act 1989 enables electricity companies to require the felling or lopping of trees which obstruct or interfere with the working of their lines or constitute an unacceptable source of danger.

In addition to the above reference should be made to the Energy Networks Association (ENA) document Engineering Recommendation G55/1- Safe Tree Working in Proximity to Overhead Electric Lines (see section 8).

### 3.3.2 **Communications**

Communication operators run their systems under the Telecommunications Act 1984 (as amended by the Communications Act 2003) in accordance with The


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Telecommunications Code (Schedule 2). Paragraph 19 of the Telecommunications Code enables operators to require the lopping of trees which overhang the street and obstruct or interfere with the working of their lines.

## 4. HOW TO AVOID DAMAGE TO TREES

This section gives general guidance on methods of work to minimise damage to trees. The local authority (or for privately owned trees, the owner or their agent), should be consulted at an early stage prior to the commencement of any works. This will reduce the potential for future conflict between trees and apparatus.

### 4.1 Below Ground

Wherever trees are present, precautions should be taken to minimise damage to their root systems. As the shape of the root system is unpredictable, there should be control and supervision of any works, particularly if this involves excavating through the surface 600mm, where the majority of roots develop.

#### 4.1.1 **Fine Roots**

Fine roots are vulnerable to desiccation once they are exposed to the air. Larger roots have a bark layer which provides some protection against desiccation and temperature change. The greatest risk to these roots occurs when there are rapid fluctuations in air temperature around them e.g. frost and extremes of heat. It is therefore important to protect exposed roots where a trench is to be left open overnight where there is a risk of frost. In winter, before leaving the site at the end of the day, the exposed roots should be wrapped with dry sacking. This sacking must be removed before the trench is backfilled.

#### 4.1.2 **Precautions**

The precautions referred to in this section are applicable to any excavations or other works occurring within the Prohibited or Precautionary Zones as illustrated in Figure 1 – ‘Tree Protection Zone’.

#### 4.1.3 **Realignment**

Whenever possible apparatus should always be diverted or re-aligned outside the Prohibited or Precautionary Zones. Under no circumstances can machinery be used to excavate open trenches within the Prohibited Zone.


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The appropriate method of working within the Precautionary Zone should be determined in consultation with the local authority (or for privately owned trees the owner or their agent) and may depend on the following circumstances;

- the scope of the works (e.g. one-off repair or part of an extensive operation)
- degree of urgency (e.g. for restoration of supplies)
- knowledge of location of other apparatus
- soil conditions
- age, condition, quality and life expectancy of the tree

Where works are required for the laying or maintenance of any apparatus within the Prohibited or Precautionary Zones there are various techniques available to minimise damage.

Acceptable techniques in order of preference are;

**a ) Trenchless**

Wherever possible trenchless techniques should be used. The launch and reception pits should be located outside the Prohibited or Precautionary Zones.
In order to avoid damage to roots by percussive boring techniques it is recommended that the depth of run should be below 600mm. Techniques involving external lubrication of the equipment with materials other than water (e.g. oil, bentonite, etc.) must not be used when working within the Prohibited Zone. Lubricating materials other than water may be used within the Precautionary Zone following consultation and by agreement.

**b) Broken Trench - Hand-dug**

This technique combines hand dug trench sections with trenchless techniques if excavation is unavoidable. Excavation should be limited to where there is clear access around and below the roots. The trench is excavated by hand with precautions taken as for continuous trenching as in (c) below. Open sections of the trench should only be long enough to allow access for linking to the next section. The length of sections will be determined by local conditions, especially soil texture and cohesiveness, as well as the practical needs for access. In all cases the open sections should be kept as short as possible and outside of the Prohibited Zone.


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### c) Continuous Trench - Hand-dug

The use of this method must be considered only as a last resort if works are to be undertaken by agreement within the Prohibited Zone. The objective being to retain as many undamaged roots as possible.

Hand digging within the Prohibited or Precautionary zones must be undertaken with great care requiring closer supervision than normal operations.

After careful removal of the hard surface material digging must proceed with hand tools. Clumps of roots less than 25mm in diameter (including fibrous roots) should be retained in situ without damage. Throughout the excavation works great care should be taken to protect the bark around the roots.

All roots greater than 25mm diameter should be preserved and worked around. These roots must not be severed without first consulting the owner of the tree or the local authority tree officer / arboriculturist. If after consultation severance is unavoidable, roots must be cut back using a sharp tool to leave the smallest wound.

## 4.1.5 **Backfilling**

- Any reinstatement of street works in the United Kingdom must comply with the relevant national legislation (see: **Volume 6 – 'Legislation and Bibliography'**). In England this relates to the requirements of the code of practice – 'Specification for the Reinstatement of Openings in Highways' approved under the New Roads and Street Works Act 1991. Without prejudice to the requirements relating to the specification of materials and the standards of workmanship, backfilling should be carefully carried out to avoid direct damage to roots and excessive compaction of the soil around them.

- The backfill should, where possible, include the placement of an inert granular material mixed with top soil or sharp sand (not builder's sand) around the roots. This should allow the soil to be compacted for resurfacing without damage to the roots securing a local aerated zone enabling the root to survive in the longer term.

- Backfilling outside the constructed highway limits should be carried out using the excavated soil. This should not be compacted but lightly "tamped" and usually left slightly proud of the surrounding surface to allow natural settlement. Other materials should not be incorporated into the backfill.


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### 4.1.6 **Additional Precautions near Trees**

- Movement of heavy mechanical plant (excavators etc.) must not be undertaken within the Prohibited Zone and should be avoided within the Precautionary Zone, except on existing hard surfaces, in order to prevent unnecessary compaction of the soil. This is particularly important on soils with a high proportion of clay. Spoil or material must not be stored within the Prohibited Zone and should be avoided within the Precautionary Zone.

- Where it is absolutely necessary to use mechanical plant within the Precautionary Zone care should be taken to avoid impact damage to the trunk and branches. A tree must not be used as an end-stop for paving slabs or other materials nor for security chaining of mechanical plant. If the trunk or branches of a tree are damaged in any way advice should be sought from the local authority tree officer / arboriculturist.

See TABLE 1 –'Prevention of Damage to Trees Below Ground' below for summary details regarding causes and types of damage to trees and the implications of the damage and the necessary precautions to be taken to avoid damage.


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## TABLE 1 - Prevention of Damage to Trees Below Ground

| Causes of Damage | Type of Damage | Implications to Tree | Precautions |
|---|---|---|---|
| Trenching, mechanical digging etc. | Root severance | • The tree may fall over<br>• Death of the root beyond the point of damage<br>• Potential risk of infection of the tree<br>The larger the root the greater the impact on the tree. | Hand excavate only within the Precautionary Zone. Work carefully around roots. Do not cut roots over 25mm in diameter without referring to the local authority tree officer. For roots less than 25mm in diameter use a sharp tool and make a clean cut leaving as small a wound as possible. |
| Trenching, mechanical digging, top soil surface removal etc. | Root bark damage | • The tree may fall over<br>• If the damage circles the root it will cause the death of the root beyond that point<br>• Potential risk of infection of the tree<br>The larger the root the greater the impact on the tree. | Do not use mechanical machinery to strip the top soil within the Precautionary Zone.<br>Hand excavate only within the Precautionary Zone. Work carefully around roots. Do not cut roots over 25mm in diameter without referring to the local authority tree officer. For roots less than 25mm use a sharp tool and make a clean cut leaving as small a wound as possible. |
| Vehicle movement and plant use. Material storage within the precautionary area. | Soil compaction & water saturation | Restricts or prevents passage of gaseous diffusion through soil, the roots are asphyxiated and killed affecting the whole tree. | Prevent all vehicle movement, plant use or material storage within the Precautionary Zone. |
| Top-soil scouring, excavation or banking up. | Alterations in soil level causing compaction or exposure of roots. | Lowering levels strips out the mass of roots over a wide area. Raising soil levels asphyxiates roots and has the same effect as soil compaction. | Avoid altering or disturbing soil levels within the Precautionary Zone. |
| Use of herbicides. | Poisoning of the tree via root absorption | • Death of the whole tree<br>• Death of individual branches<br>Damage to leaves and shoots. | The selection and application of herbicides must be undertaken by a competent person in accordance with COSHH regulations. |
| Spillage of oils or other materials. | Contamination of soil | Toxic and asphyxiation effects of chemicals, oils, building materials (cement, plaster, additives etc.) on the root system can kill the tree. | Never store oils, chemicals or building materials within the Precautionary Zone or within the branch spread of a tree, which ever is the greater. |
| Placement or replacement of underground apparatus. | Various | Death of all or part of the tree. | Effective planning and liaison with local authority tree officer, taking into consideration the position of trees, and their future growth potential and management |


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## 4.2 Above Ground

### 4.2.1 **Damage by Pruning**

Trees (including shrubs and hedges) can be damaged by inappropriate or excessive pruning. Reference should be made to the Energy Networks Association (ENA) document "Engineering Technical Report 136 Vegetation Management near Electricity Equipment – Principles of Good Practice" (see section 8 – 'Other Useful Publications') or appropriate company specific documentation for guidance on pruning.

See TABLE 2 – 'Prevention of Damage to Trees Above Ground' below for summary details regarding causes and types of damage to trees and the implications of the damage and the necessary precautions to be taken to avoid damage.


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## TABLE 2 - Prevention of Damage to Trees Above Ground

| Causes of Damage | Type of Damage | Implications for the Tree | Precautions |
|---|---|---|---|
| Impact by vehicle or plant<br><br>Physical attachment of signs or hoardings to the trunk<br><br>Storage of materials at base of tree<br><br>Rubbing by winch or pulling cables | Bark bruising,<br>bark removal,<br>damage to the wood,<br>damage to buttress roots,<br>abrasion to trunk | Wounding with the potential for infection ultimately resulting in death of all or part of the tree.<br><br>Structural failure of the tree | Surround the trunk with protective free-standing barrier. Exclude vehicles, plant or material storage from the Precautionary Zone. Ensure sufficient clearance of cables or ropes. |
| Impact by vehicle or plant<br><br>Rubbing by overhead cables | Bark damage to branches,<br>breakage and splitting of branches,<br>abrasion to branches | Structural failure of the branch.<br><br>Wounding or loss of a branch with the potential for infection ultimately resulting in death of all or part of the branch or tree. | Exclude vehicles, plant or material storage from the Precautionary Zone. Ensure sufficient clearance of cables or ropes.<br>All pruning should be carried out in accordance with BS3998 *(prune affected branches to give appropriate clearance from cables)* |
| Inappropriate siting of overhead apparatus, such as CCTV, lighting fixtures and communications masts and dishes. | Inappropriate pruning, unnecessary tree removal | Severely pruning tree to acquire line of sight signal for communications dish etc. | Effective planning and liaison with local authority tree officer / arboriculturist, taking into consideration the position of trees, and their future growth potential and management. |
| Lack of forethought in design and location of apparatus and services entries on new developments | Complete tree removal | The tree is removed unnecessarily | Agree the location and installation of services at the design stage. Consideration should be given to the creation of dedicated service routes wherever possible. |
| Use of herbicides | Poisoning of the tree via absorption through bark, leaves and shoots | Death of the whole tree, death of individual branches,<br>damage to leaves and shoots | The selection and application of herbicides must be undertaken by a competent person in accordance with COSHH regulations. |


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### 4.3 Chemical Damage to Trees

Chemical damage to trees adjacent to utility premises and operational land can be avoided if;

- the risk is identified when planning any work involving herbicides or other chemicals ensuring that only appropriate chemicals are used. Particular care should be exercised when considering the use of herbicides recommended for “non crop areas” as many of these also specify “do not use where there may be roots of desirable plants”,

- herbicides are applied only at the rate and in the manner recommended by the manufacturer,

- follow-up applications are not undertaken until weeds reappear on the operational land,

- alternative methods of weed control are considered.

## 5. HOW TO AVOID DAMAGE TO APPARATUS BY TREES

### 5.1 Consultation with Utilities

The potential for future conflict between trees and above-ground apparatus can be reduced by appropriate planning. Early consultation with utilities should therefore take place before any tree work including planting is undertaken to ascertain the position of existing apparatus. Records of underground apparatus should be obtained from utilities and used in conjunction with on site apparatus detection techniques. Specific care must be taken when removing the stumps of existing trees. In addition when planning new tree planting there should be liaison with the utilities, local authority and landowner so that the risks trees may pose in the future are minimised.

### 5.2 Precautions during Planting

Every possible precaution should be taken to ensure that the existing apparatus is not damaged during excavation works. Health and Safety Executive guidance note HSG47 – ‘Avoiding Danger from Underground Services’ and any specific guidance issued by the apparatus owner should be followed at all stages of the work.


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### 5.2.1 **Below Ground**

Before any excavation work begins, trial holes should be undertaken to validate the results of any detection surveys undertaken to confirm the actual position and depth of the apparatus.

### 5.2.2 **Above Ground**

Consideration should be given to the presence of satellite dishes and masts on commercial properties, poles and drop wires, as future tree growth may cause operational problems.

Reference should also be made to Energy Networks Association (ENA) document 'Engineering Technical Report 136 Vegetation Management near Electricity Equipment – Principles of Good Practice' (see section 8 – 'Other Useful Publications') or appropriate company specific documentation.

*NOTE: In all cases where definitive clearances are required, contact must be made with the appropriate electricity or communication company who will determine the clearance to be adopted.*

See also sub-section 3.3 – 'Special Considerations when Planning the Installation of Above Ground Apparatus'.

## 6. SITES WITH DESIGNATED STATUS

Certain sites may be specifically designated and will require consultation and / or permission from the relevant authority prior to undertaking any works. These sites include:

- Sites of Special Scientific Interest
- English Heritage Sites
- English Nature / Natural England
- National Trust Land
- Nature Reserves
- Conservation Areas
- Scottish Natural Heritage
- Areas of Outstanding Natural Beauty
- Countryside Council for Wales
- Historic Scotland
- Northern Ireland Environment and Heritage Service
- Cadw (Welsh Historic Monuments)


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## 6.1 Tree Preservation Orders and Trees in Conservation Areas

Section198 of the Town and Country Planning Act 1990 (the Act) gives local planning authorities powers to make trees and woodlands the subject of tree preservation orders (TPOs) in the interests of amenity. Trees protected by a TPO may not be willfully damaged or destroyed and cannot be cut down, uprooted, topped or lopped without the local planning authority's consent.

Additionally, under section 211 of the Act, anyone proposing to cut down, uproot, top, lop etc. a tree in a conservation area is required to give the local planning authority six weeks' notice before doing so. This gives the authority an opportunity of making a TPO in respect of the tree.

Certain statutory obligations imposed by Acts of Parliament may allow for the limited felling, topping or lopping of trees protected by a TPO in order to supply and maintain service. This does not preclude the requirement to consult with the owner.

See also: **Volume 5 – 'NJUG Guidelines on Environmental Good Practice'**

## 7. LEGISLATION

Reference should also be made to **Volume 6 – 'Legislation & Bibliography'.**

## 7.1 Primary Legislation

National Parks and Access to the Countryside Act 1949*
Health and Safety at Work Act 1974
Highways Act 1980**
Telecommunications Act 1984
Gas Act 1986
Electricity Act 1989
Town and Country Planning Act 1990 (Section 198 Tree Preservation Orders).
Water Industry Act 1991
The New Roads and Street Works Act 1991 (NRSWA)
The Streets Works (Northern Ireland) Order 1995
Communications Act 2003
Traffic Management Act 2004
Transport (Scotland) Act 2005
The Streets Works (Northern Ireland) (Amendment) Order 2007

* Under the National Parks and Access to the Countryside Act 1949 local authorities are given a general power to plant trees.


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** Under the Highways Act 1980 highway authorities may plant trees in the highway, or license others to do so. They need to ensure that trees do not overhang or cause a danger to roads or footpaths, and are given powers to prevent this from happening.

The above list is not exhaustive.

### 7.2 Secondary Legislation

Each Act of parliament in 7.1 will have various associated regulations that should be referred to.

## 8. OTHER USEFUL PUBLICATIONS

This is not an exhaustive list of available publications and is only valid at the time of issue.

BS 3998 Recommendations for Tree Work

- Provides general recommendations for tree surgery and other tree work.

BS 5837 Trees in Relation to Construction

- Gives advice on the integration of new development amongst trees.

Codes of Practice approved under the New Roads and Street Works Act 1991

- Co-ordination of Street Works and Works for Road Purposes and Related Matters
- Specification for the Reinstatement of Openings in Highways
- Safety at Street Works and Road Works
- Measures Necessary where Apparatus is Affected by Major Works (Diversionary Works)
- Inspections

Energy Networks Association publications:

- Engineering Technical Report 136 ‘Vegetation Management Near Electricity Equipment – Principles of Good Practice’
- Engineering Recommendation G55/1 – ‘Safe Tree Working in Proximity to Overhead Electric Lines’
- ENA-TS 40-80 – ENA Technical Standard for Overhead Line Clearances
- Engineering Recommendation G70 – Vegetation Control near Overhead Lines


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- ETR 132 – Improving Network Performance (under abnormal weather conditions by the use of a risk based approach to vegetation management near electric overhead lines)
- MNT/004 – UK Distribution Policy for the Inspection and Maintenance of Overhead Lines

HSE Arboriculture and Forestry Advisory Group publications

- AFAG 804 Electricity at work: Forestry and arboriculture
- AFAG 404 Electrical utility arboriculture

Manual for Streets (supercedes Design Bulletin 32 and Places, Streets and Movement)

- The Department for Transport and the Department for Communities and Local Government (DCLG), with support from the Commission for Architecture and the Built Environment (CABE), commissioned WSP , TRL , Llewellyn Davies Yeang and Phil Jones Associates to develop a Manual for Streets to give guidance to a range of practitioners on effective street design.

National House Building Council (NHBC) Standards Chapter 4.2. Building near trees

- Gives information on the design of new foundations in proximity to trees on shrinkable clay soils.

## 9. OTHER REFERENCES

### 9.1 Arboricultural

Arboricultural advice may be sought from the:

- Arboricultural Advisory and Information Service
- Arboricultural Association
- Arboriculture and Forestry Advisory Group
- International Society of Arboriculture
- Local authority Arboricultural Officer
- The Tree Advice Trust

### 9.2. Herbicides

Information on herbicides and their application may be obtained from the:

- British Agrochemicals Association

### 9.3 Utilities

Utility advice may be sought from the local utility contact or NJUG.


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# GLOSSARY

| | |
|---|---|
| **Apparatus** | Equipment such as valves, stopcocks, chambers, cabinets, transformer chambers etc and includes any structure for the lodging of apparatus. |
| **Arboriculturist** | A professional who cultivates and manages trees, hedgerows and shrubs and provides information and advice on specific tree related issues. |
| **Carriageway** | A way constituting or comprised in a highway, being a way (other than a cycle track) over which the public have a right of way for the passage of vehicles. |
| **Cycle track** | A way constituting or comprised in a highway over which the public have a right of way on pedal cycles with or without a right of way on foot. |
| **Desiccation** | The state of extreme dryness, the drying out of roots. |
| **Distal** | Situated farthest from the centre. |
| **Drop wires** | Overhead wire from telegraph pole to customer premises. |
| **Duct / ducting** | Structure (usually cylindrical) used to convey and protect apparatus. |
| **Fibre optic** | The use of very thin glass or plastic fibres through which light can be transmitted to carry information from a source to a receiver, especially for telecommunication, television and information technology systems. |
| **Footpath** | A highway over which the public have a right of way on foot only, not being a footway. |
| **Footway** | A way comprised in a highway which also comprises a carriageway, being a way over which the public have a right of way on foot only. |
| **GRP** | Glass Reinforced Plastic |
| **Herbicide** | A chemical that destroys plants. |
| **Main** | Structure (usually cylindrical) used to convey water or gas or oil generally greater than 50mm in diameter. |
| **NJUG** | National Joint Utilities Group Limited. |
| **Pipe** | Longitudinal structure (usually cylindrical) used to convey water, gas or oil. |
| **Root plate** | Formed just below the soil surface when shallow lateral growing roots predominate over the development of a deep taproot. |


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| | |
|---|---|
| **Service strip** | A strip of designated land alongside a carriageway or footway used to convey services. |
| **Sub-duct** | Longitudinal structure (usually cylindrical) laid inside ducts used to carry smaller diameter cables such as fibre optic. |
| **Tiles** | Impact resistant cover constructed of earthenware, concrete or polyethylene for protecting underground cables |
| **Utility** | An undertaker by statute that has a legal right to provide customer services (e.g. communications, electricity, gas, water) |
| **Verge** | A strip of land which may form part of the public highway alongside a carriageway or footway, which may contain services. |


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# APPENDIX E

# Site Notice For Protective Fencing



# TREE PROTECTION AREA
# KEEP OUT!

TREES ENCLOSED BY THIS FENCE ARE PROTECTED BY PLANNING CONDITIONS AND ARE SUBJECTS OF A TREE PRESERVATION ORDER
(TOWN & COUNTRY PLANNING ACT 1990)

**CONTRAVENTION** OF TREE PRESERVATION ORDER MAY LEAD TO **CRIMINAL PROSECUTION**

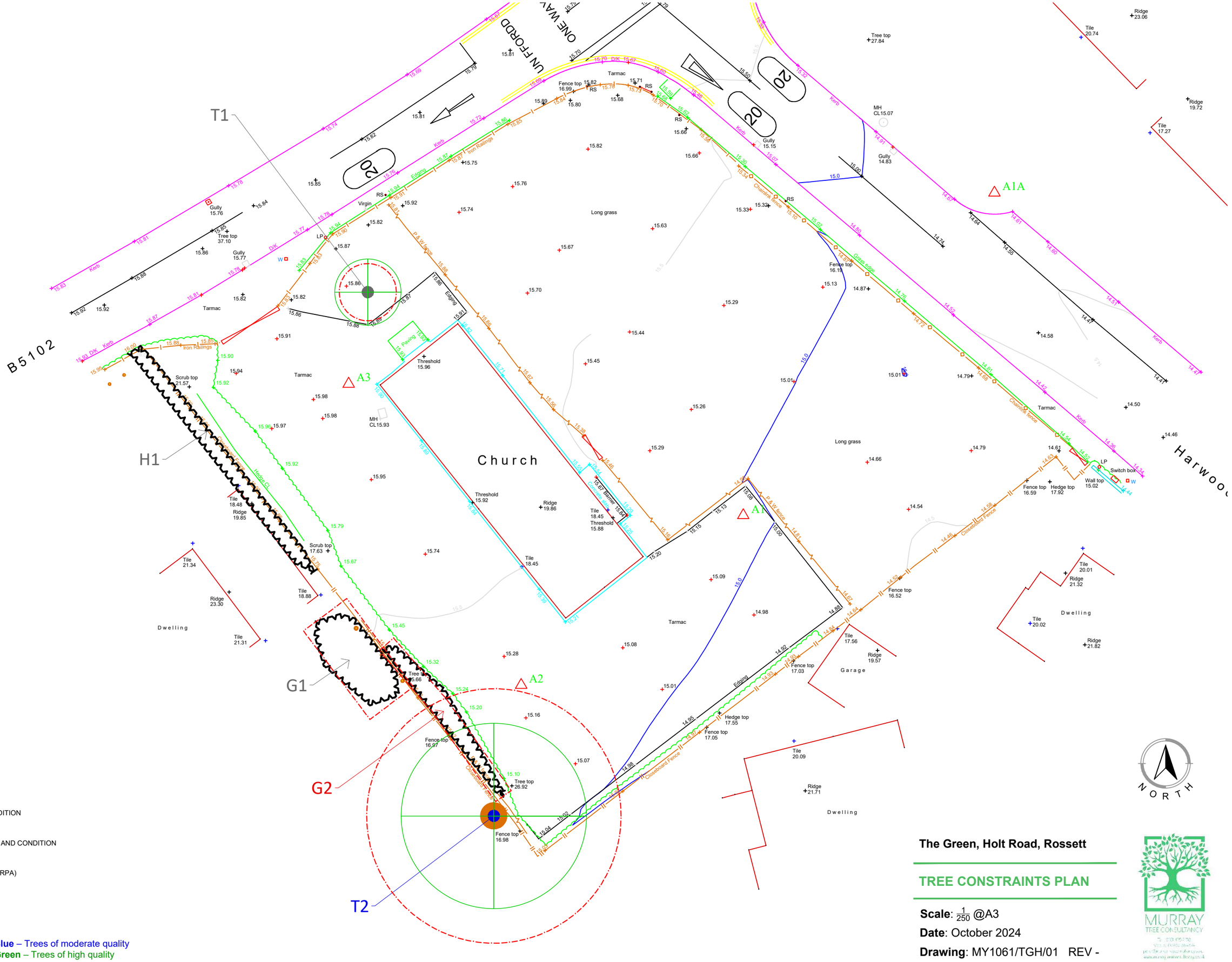
THE FOLLOWING **MUST** BE OBSERVED BY ALL PERSONS:-

- THE PROTECTIVE FENCING MUST NOT BE REMOVED
- NO PERSON SHALL ENTER THE PROTECTED AREA
- NO MACHINE OR PLANT SHALL ENTER THE PROTECTED AREA
- NO MATERIALS SHALL BE STORED IN THE PROTECTED AREA
- NO SPOIL SHALL BE DEPOSITED IN THE PROTECTED AREA
- NO EXCAVATION SHALL OCCUR IN THE PROTECTED AREA

**ANY INCURSION INTO THE PROTECTED AREA MUST BE WITH THE WRITTEN PERMISSION OF THE LOCAL PLANNING AUTHORITY**

# APPENDIX F

## Trees Constraints Plan
## Development Layout Plan
## Tree Protection Plan




## KEY

- TREE LOCATION AND CONDITION
- GROUP/ HEDGE LOCATION AND CONDITION
- ROOT PROTECTION AREA (RPA)
- CROWN SPREADS

**Key to Condition**

**Red** – Trees of poor quality **Blue** – Trees of moderate quality
**Grey** – Trees of low quality **Green** – Trees of high quality

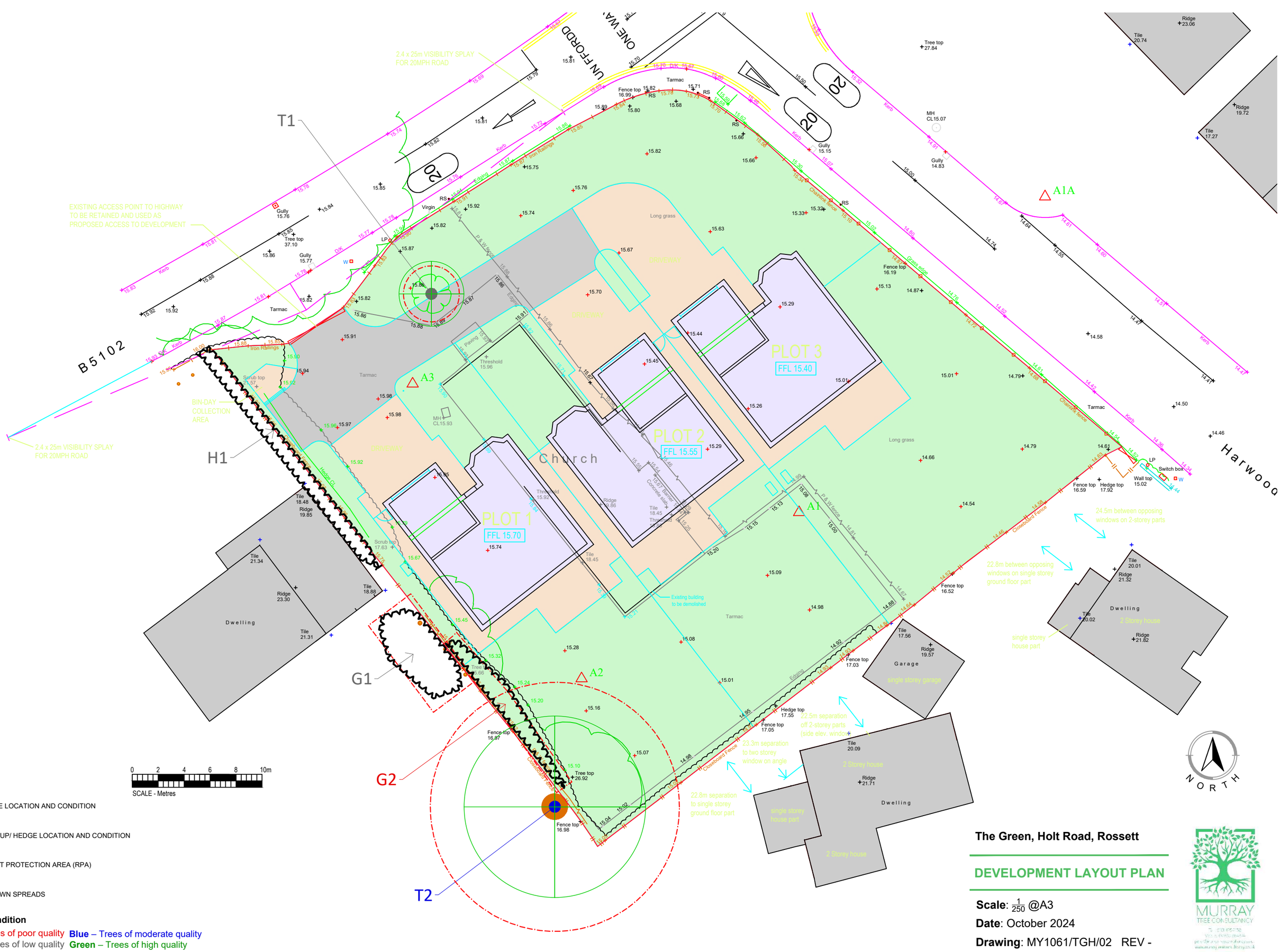
NORTH

**The Green, Holt Road, Rossett**

## TREE CONSTRAINTS PLAN

**Scale**: 1/250 @A3
**Date**: October 2024
**Drawing**: MY1061/TGH/01 REV -

MURRAY TREE CONSULTANCY




## KEY

- TREE LOCATION AND CONDITION
- GROUP/ HEDGE LOCATION AND CONDITION
- ROOT PROTECTION AREA (RPA)
- CROWN SPREADS

**Key to Condition**

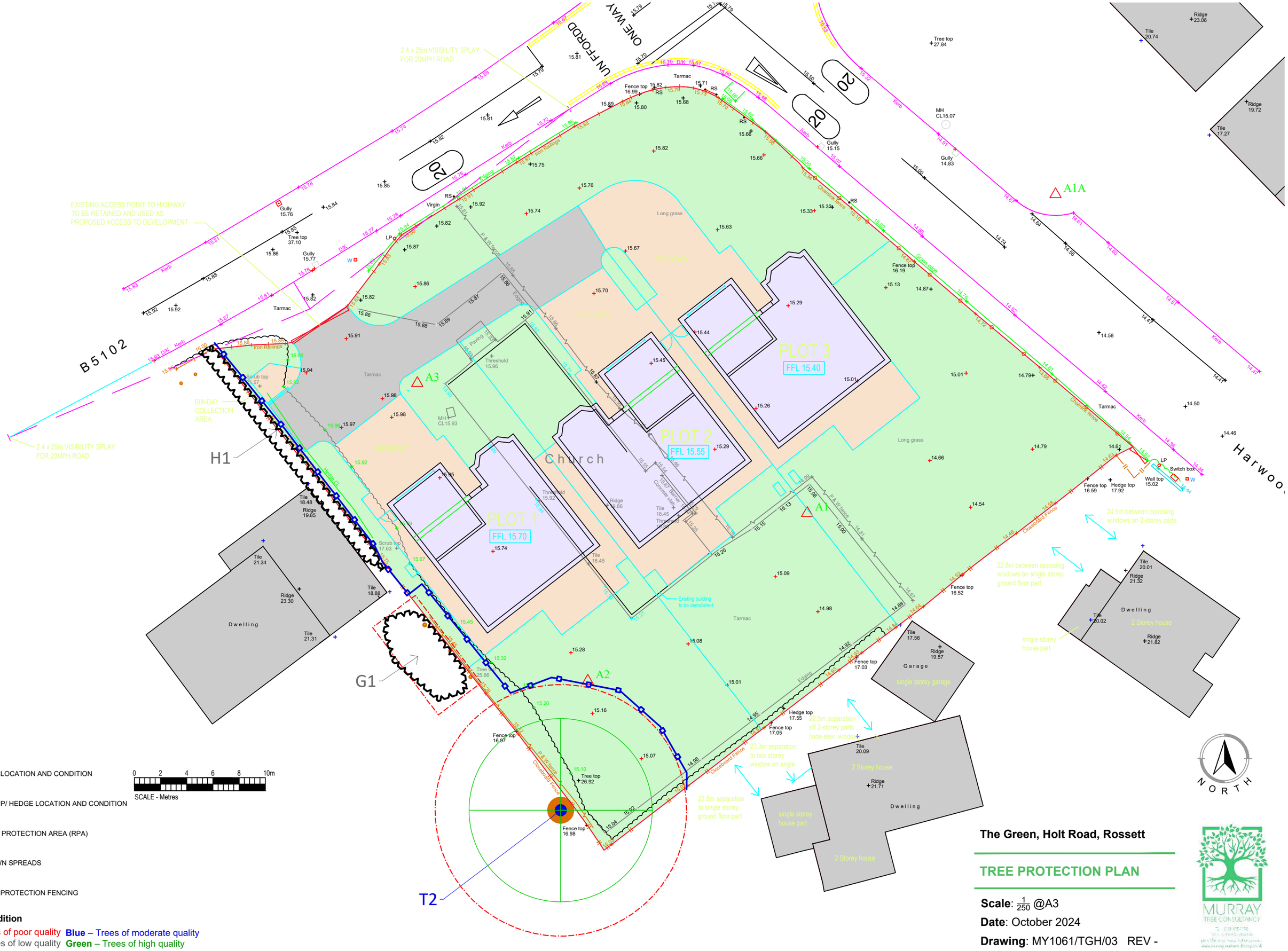
**Red** – Trees of poor quality **Blue** – Trees of moderate quality
**Grey** – Trees of low quality **Green** – Trees of high quality

**The Green, Holt Road, Rossett**

## DEVELOPMENT LAYOUT PLAN

**Scale**: $\frac{1}{250}$ @A3
**Date**: October 2024
**Drawing**: MY1061/TGH/02 REV -

MURRAY TREE CONSULTANCY




## KEY

- TREE LOCATION AND CONDITION
- GROUP/ HEDGE LOCATION AND CONDITION
- ROOT PROTECTION AREA (RPA)
- CROWN SPREADS
- TREE PROTECTION FENCING

0 2 4 6 8 10m

SCALE - Metres

**Key to Condition**

**Red** – Trees of poor quality **Blue** – Trees of moderate quality
**Grey** – Trees of low quality **Green** – Trees of high quality

**The Green, Holt Road, Rossett**

## TREE PROTECTION PLAN

**Scale**: $\frac{1}{250}$ @A3

**Date**: October 2024

**Drawing**: MY1061/TGH/03 REV -

MURRAY TREE CONSULTANCY