

A photograph of a river flowing through a lush green forest. The river is the central focus, with water that appears slightly turbulent. The banks are lined with dense, vibrant green trees and foliage. In the background, rolling hills or mountains are visible under a cloudy sky. The overall scene is a natural, scenic landscape.

**Comrie Flood Protection Scheme
Appendix 5.2**

**The Tree Inspector Arboricultural
Report Parts 1 and 2**

Document Control

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Tree Survey

*BS 5837:2012 Trees in Relation to Design,
Demolition and Construction-Recommendations*

Arboricultural Report: Part 1 Comrie Flood Protection Scheme



18th July 2018

Prepared for
SWECO UK

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THE TREE INSPECTOR (SCOTLAND)

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Introduction

This Arboricultural report was commissioned by SWECO UK to survey trees adjacent to the River Earn within the floodplain. The Tree Inspector (Scotland) is an independent arboricultural practice and the report presents an impartial assessment of the tree stock. The Tree Survey extent is shown on the site plan on page 4. The tree survey was conducted between 5th June & 11th July 2018.

The Tree Survey was conducted by C. A. Calvey, P.T.I., Tech.Cert (Arbor.A), Cert.Arb (RFS), BA Hons with support from Gavin Scott FDS, TechArborA, PTI.

The Tree Report is comprised of two separate documents due to the large size (325 pages) of the tree schedule, and it is intended these documents be considered together for referencing site data.

Survey Approach

The tree survey provides a comprehensive arboricultural picture of the project area. The level of detail is regarded as being necessary in order to inform decision making by project managers throughout the life of the project.

1. Two thousand seven hundred trees together with small groups of trees are provided as individual records and illustrated on the site plan. These records are presented in numerical order as a directory of trees in the **Tree Schedule Report**. *Any gaps in numbering relate to lost tree tags in the field.*
2. Tree schedules in Tree Schedule Report are produced in presentation format with colours relating to BS5837 Quality for ease of use and correspond to tree crown colours on the site plan.
3. Tree Groups are numbered continuously following the tree tag numbering system and prefixed with the letter 'G' for Group.
4. Woodland Group descriptions are reserved for larger tree groups usually where blocks of continuous cover blocks forming consistent stands of trees and individual records were not appropriate within the scope and timescales of the project
5. Trees were assessed and categorised in accordance with BS 5837:2012 *Trees in Relation to Design, Demolition and Construction-Recommendations*.
6. Trees in private gardens were tagged with the permission of residents and where a resident preferred non-tagging the numbering system continued to be applied without tags when necessary. Trees were not tagged where access to the tree stem was restricted or presented a risk to the surveyors and the relevant sequential number was allocated to the tree record.

Tree Maps

Tree maps shown in the report are illustrated at a scale of 1:1000. Due to the extensive geographical area covered, the twenty one plans in the report are used for illustrative purposes. Detailed assessment of smaller geographical areas requires the use of the Site Plan provided in CAD format.

Tree Plans show the position of trees, crown spread and maximum rooting zone illustrated by grey dodecagons. The crown spread of a tree is identified by a coloured circle and illustrates:

1. **Green for 'A'** (High quality trees)
2. **Mid blue for 'B'** (Moderate quality trees)
3. **Grey for 'C'** (Low quality trees)
4. **Dark Red for 'U'** (trees 'Unsuitable' for retention in the current land use).

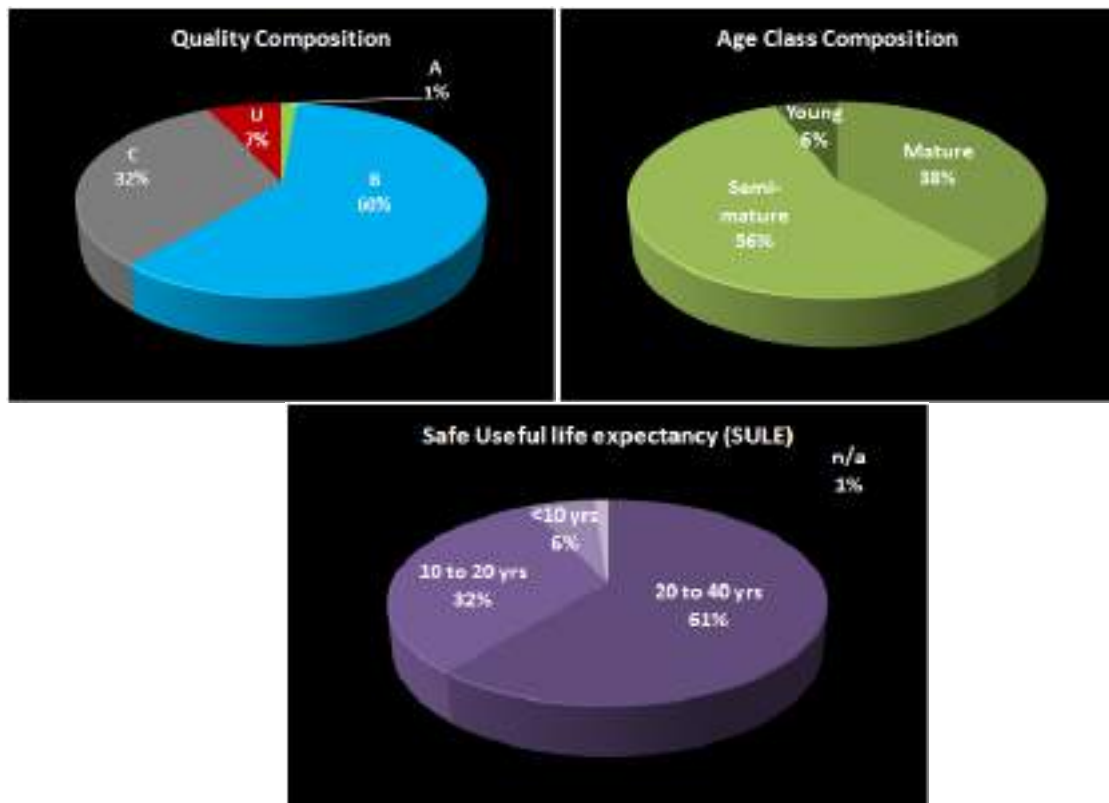
Tag numbers and group numbers are shown on maps as letters and numerals.

Tree Classifications

The charts below show the 'collective' data of all surveyed trees in order to provide a general appreciation of the overall tree stock. Collective assessments are illustrated diagrammatically under the criteria:

1. BS5837 Tree Quality
2. Age Class
3. Life Expectancy

Collective Assessments



High Quality Trees

43 trees are considered to be of very high quality and recorded as 'A' category trees shown on the Site Plan. All of these trees are mature and frequently in locations where they can be seen from the public domain. 163 'U' quality trees are recorded as in very poor condition and in circumstances where they are in falling range of property would normally require felling. Tree 462 is an example of a U category tree located at the Lawers Estate House adjacent to the Drummond Street Bridge (photograph below).

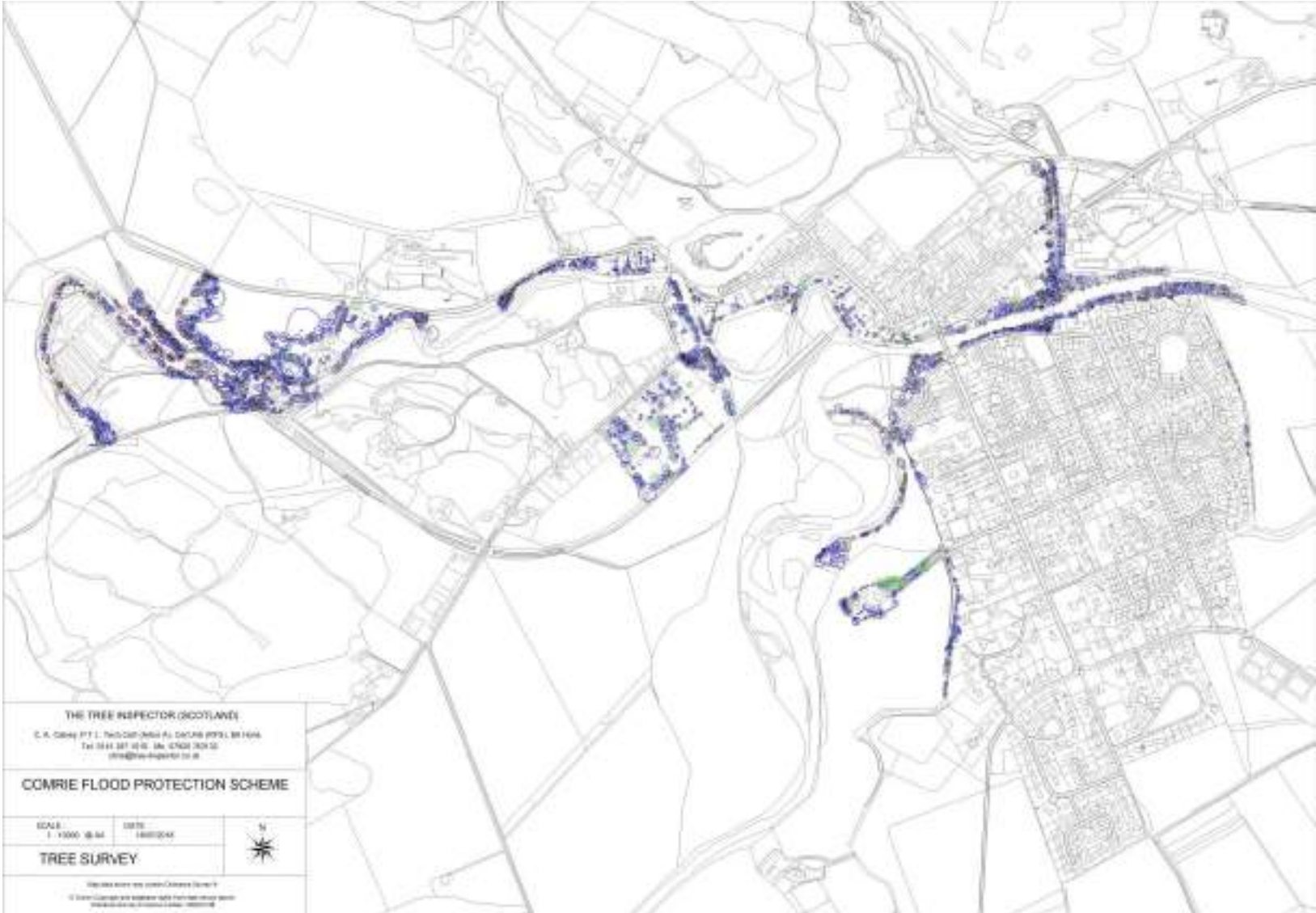
Ecological sensitivities

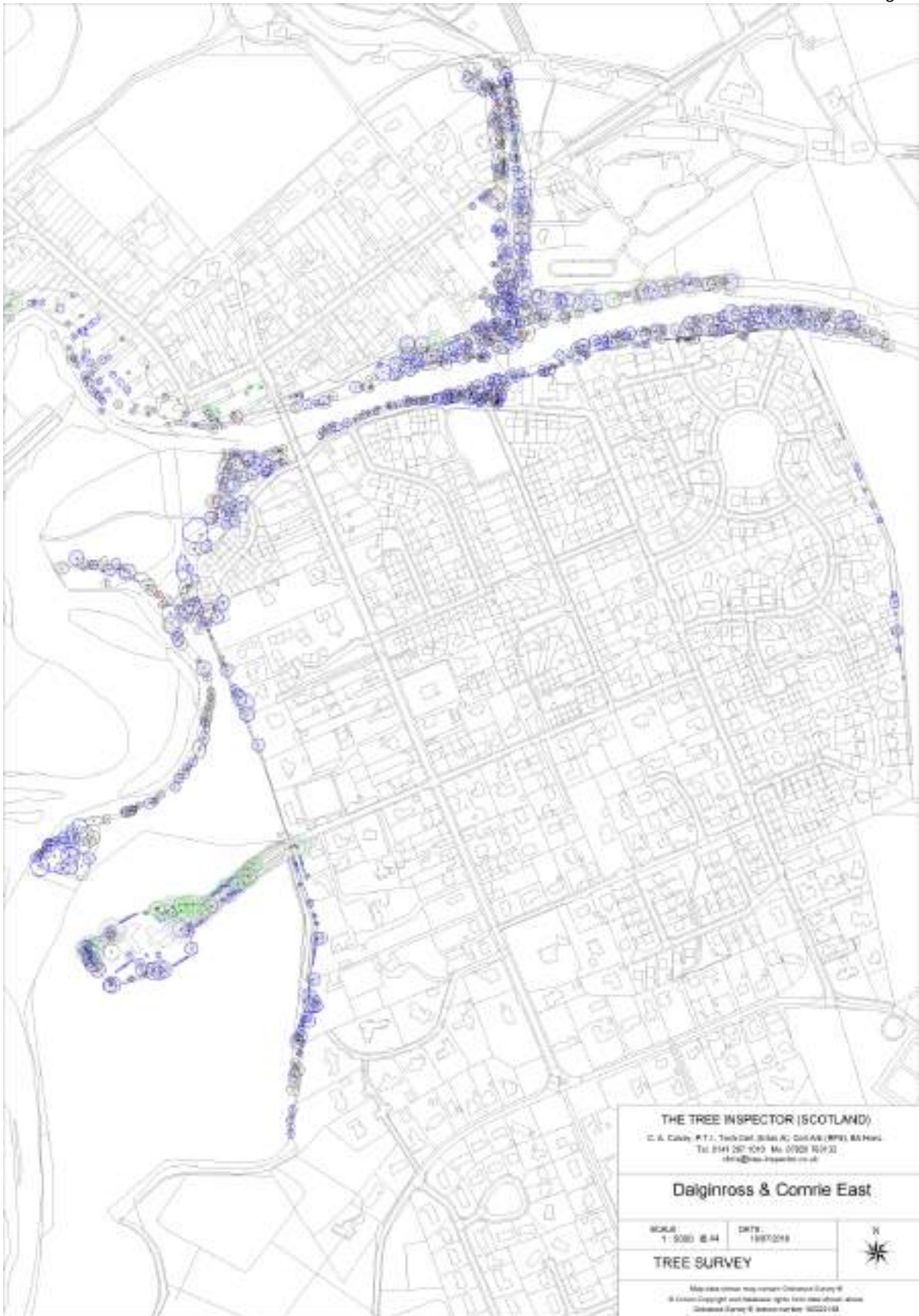
Biological records are not within the scope of the arboricultural survey however where significant species were observed during the tree survey the information is highlighted.

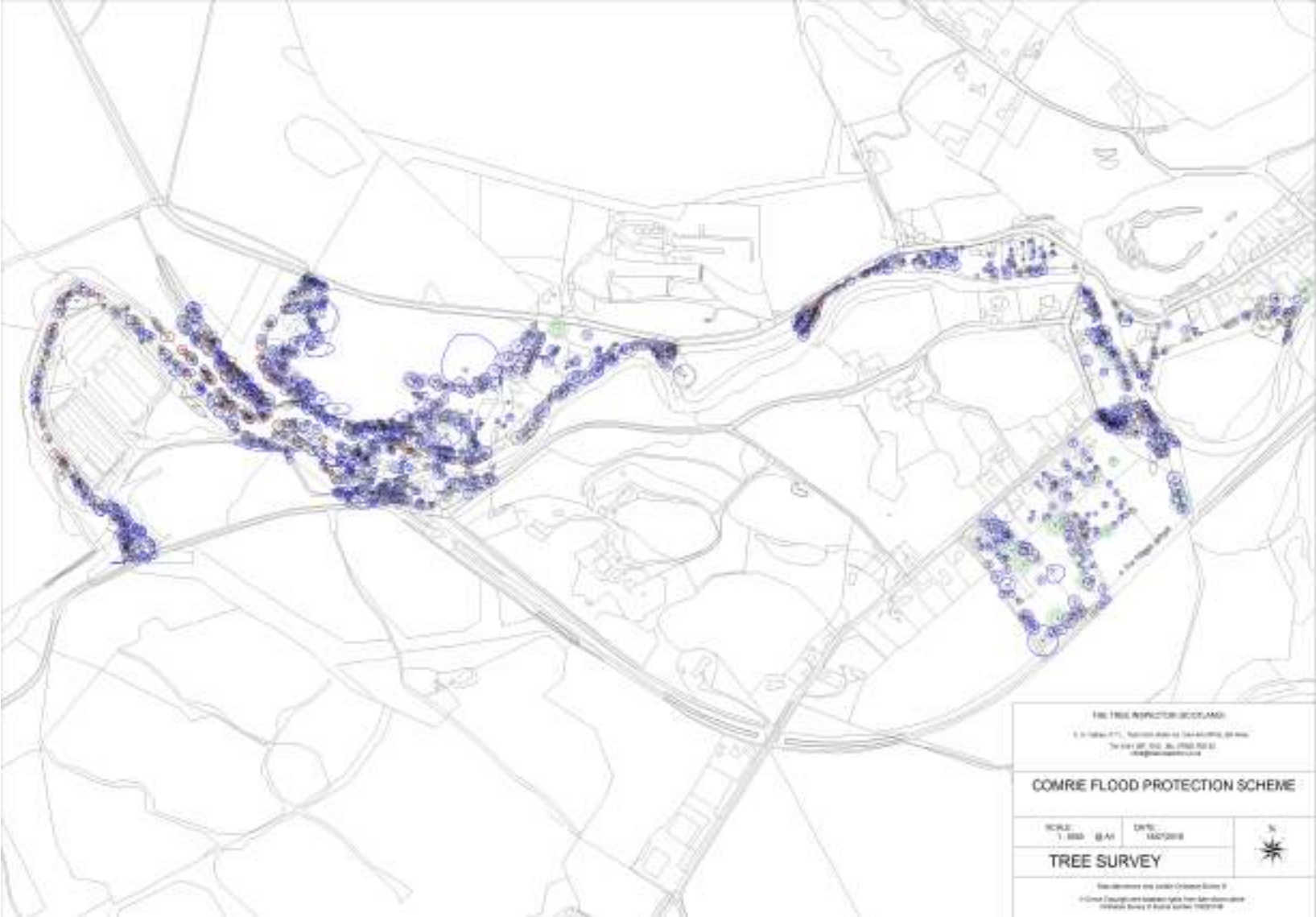
1. Garden; The Ross; Colony of 40 plus lesser butterfly orchids (*Platanthera bifolia*) E: 276779.1 N. 721655. B.orchid.
2. Fish Farm, Tullybanochter; European beaver (*Castor fiber*). Beaver activity is recorded across the area of the fish farm and a specific example is adjacent to tree 1272 on the site plan.
3. Tullybanochter & The Ross. Sparrowhawk (*Accipiter nisus*) and Buzzard (*Buteo buteo*) are recorded as breeding.
4. Otter (*Lutra lutra*). Recorded at Tullybanochter and assumed to be present in the riparian areas throughout the project area.
5. Japanese Knotweed. *Fallopia Japonica* is recorded throughout the tree survey extent.
6. American Skunk-cabbage (*Lysichiton americanus*) is recorded adjacent to tree 1392.



Tree Survey Extent







Map 1 (Scale 1: 1000): Dalginross east



Map 2 (Scale 1: 1000): Dalginross central, Comrie South



Map 3 (Scale 1: 1000): Lednock



Map 4 (Scale 1: 1000): South of Ancaster Lane, Comrie & north of Strowan Road Dalginross



Map 5 (Scale 1: 1000): West Dalginross and water of Ruchill



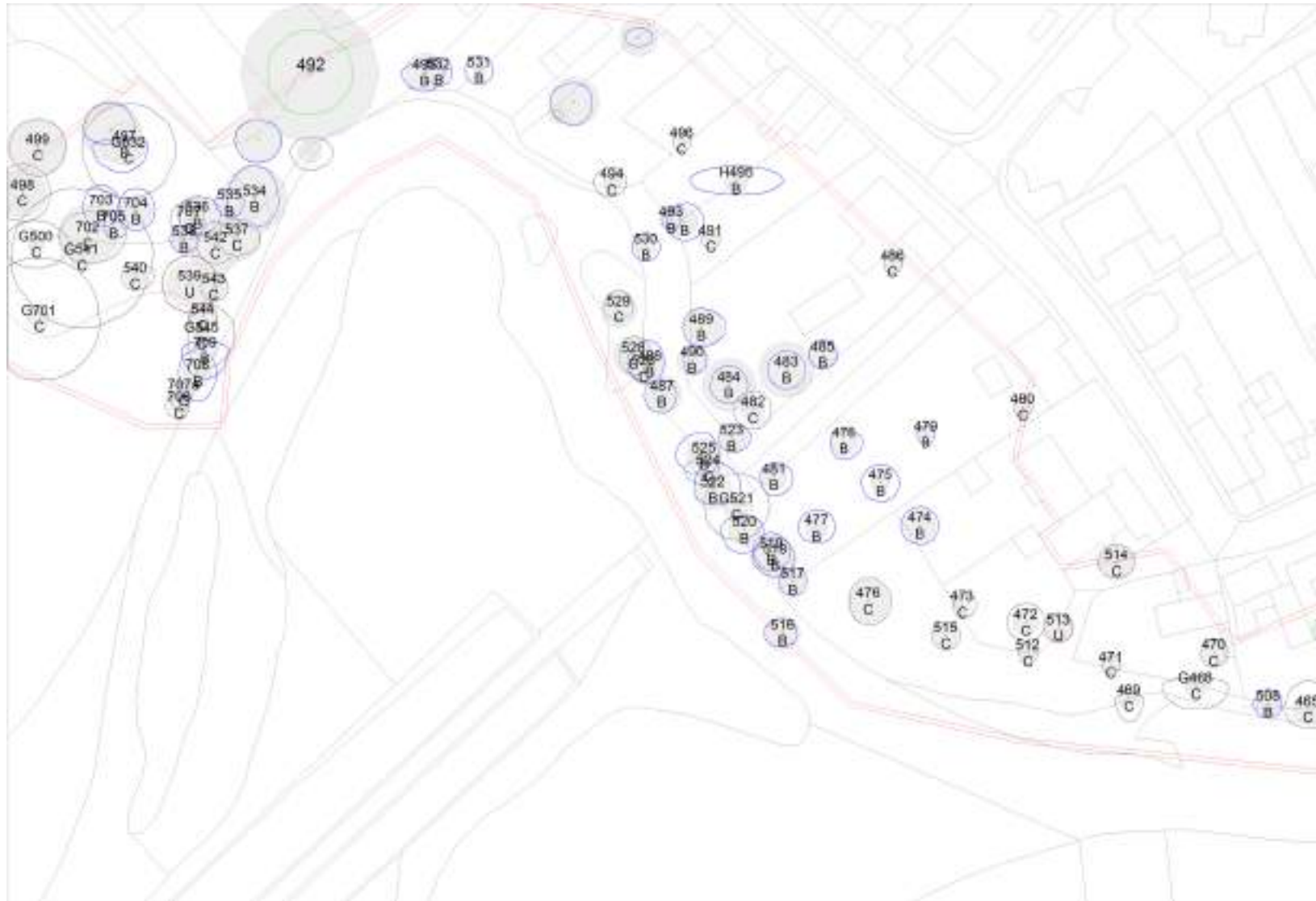
Map 6 (Scale 1: 1000): Water of Ruchill and Tomnagaske



Map 7 (Scale 1: 1500): Tomnagaske, Camp Road and Manor House



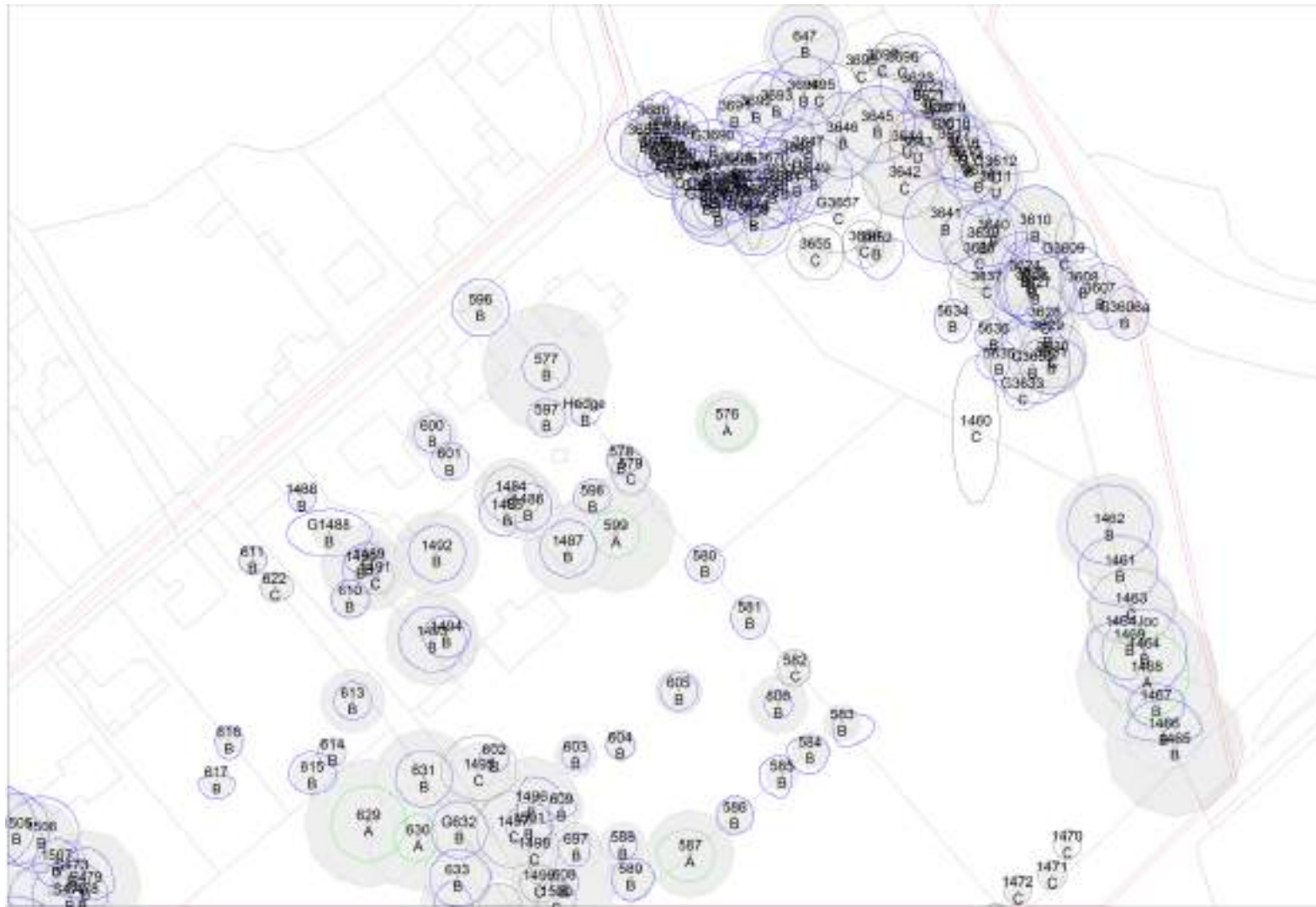
Map 8 (Scale 1: 1000): Comrie south of A85



Map 9 (Scale 1: 1000): Comrie south of Burrell St, towards the Ross



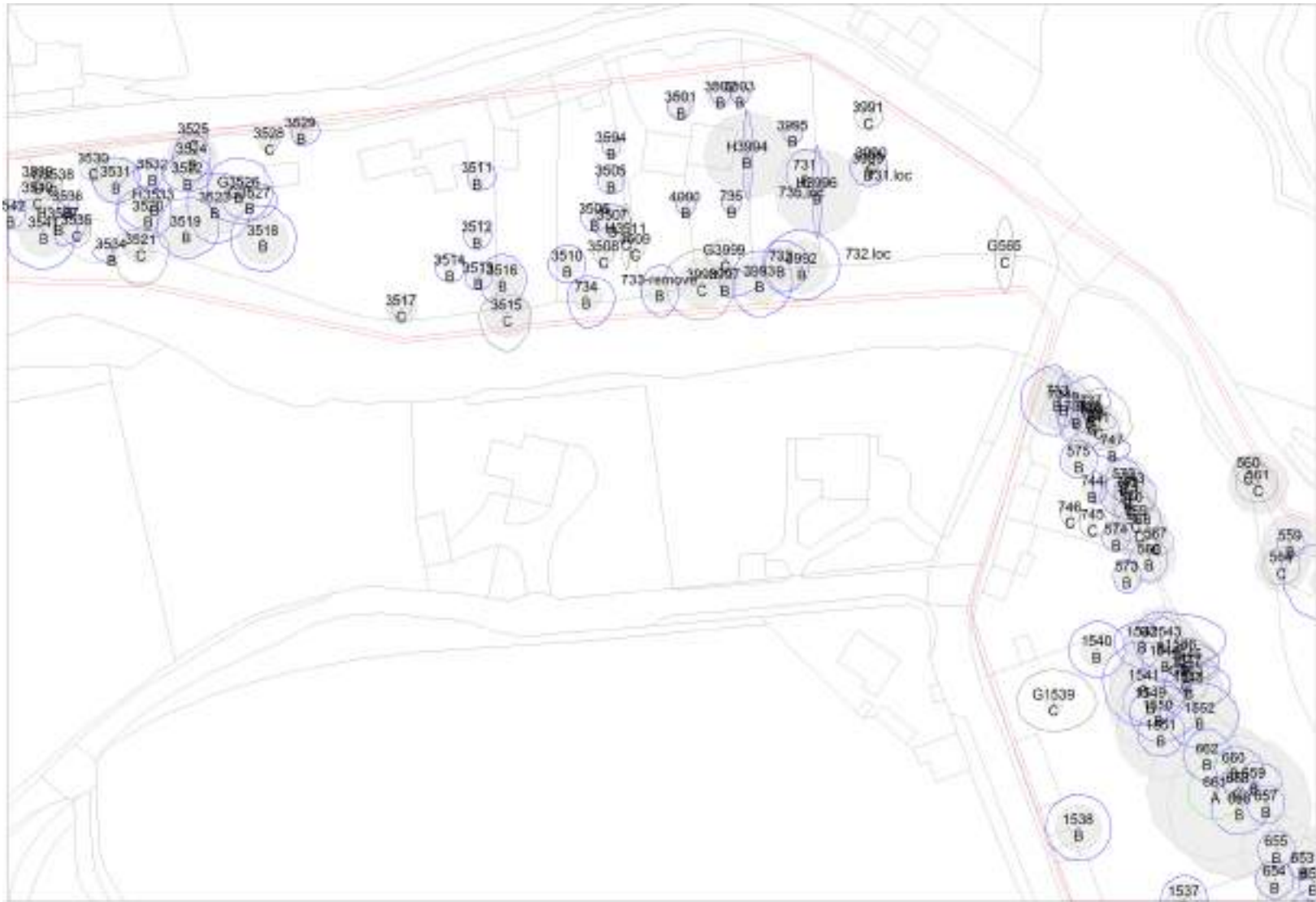
Map 10 (Scale 1: 1000): The Ross



Map 11 (Scale 1: 1000): South Ross



Map 12 (Scale 1: 1000): Comrie west south of A85



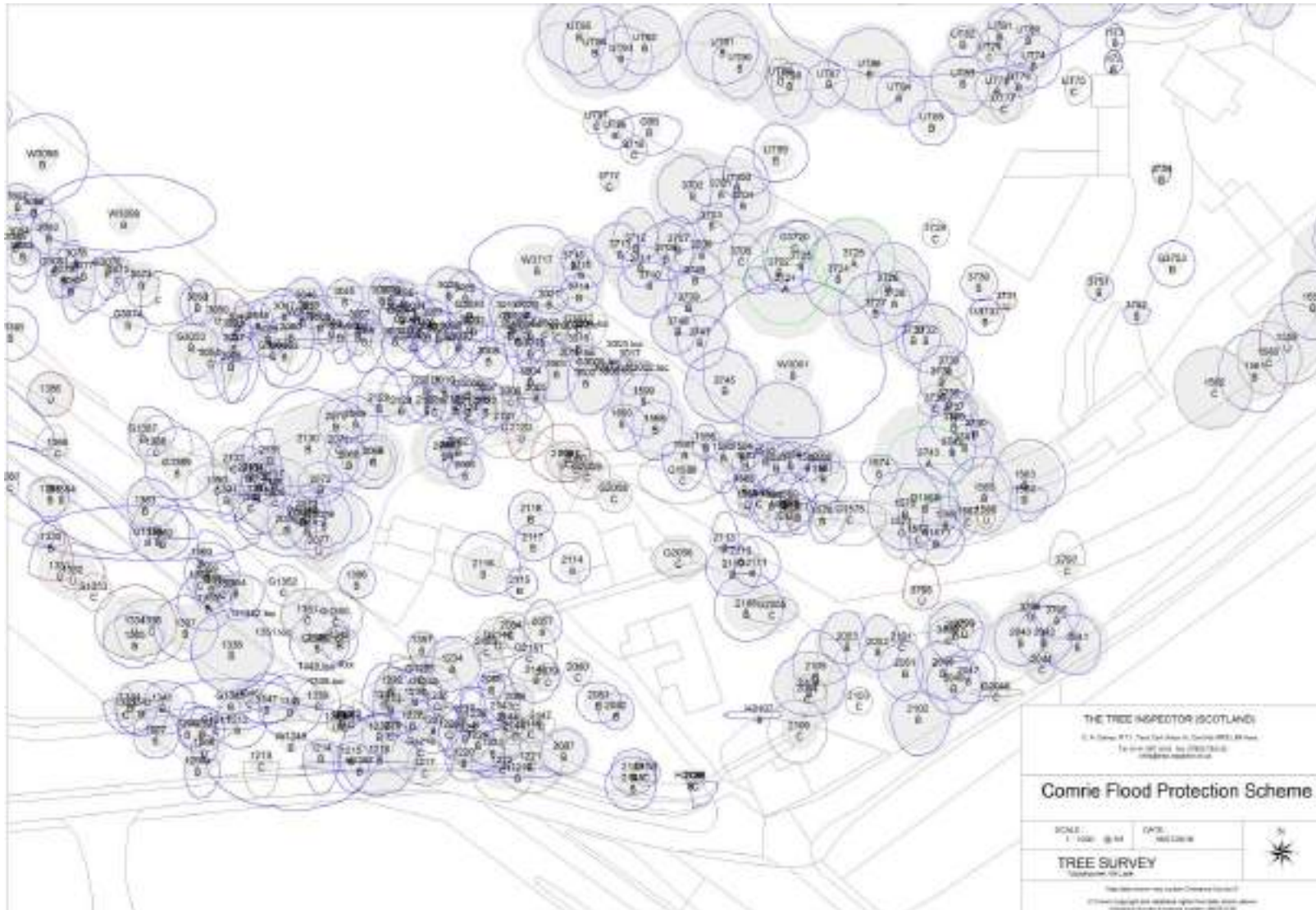
Map 13 (Scale 1: 1000): East of Tullybanochter, south of the A85



Map 14 (Scale 1: 1000): Tullybanochter



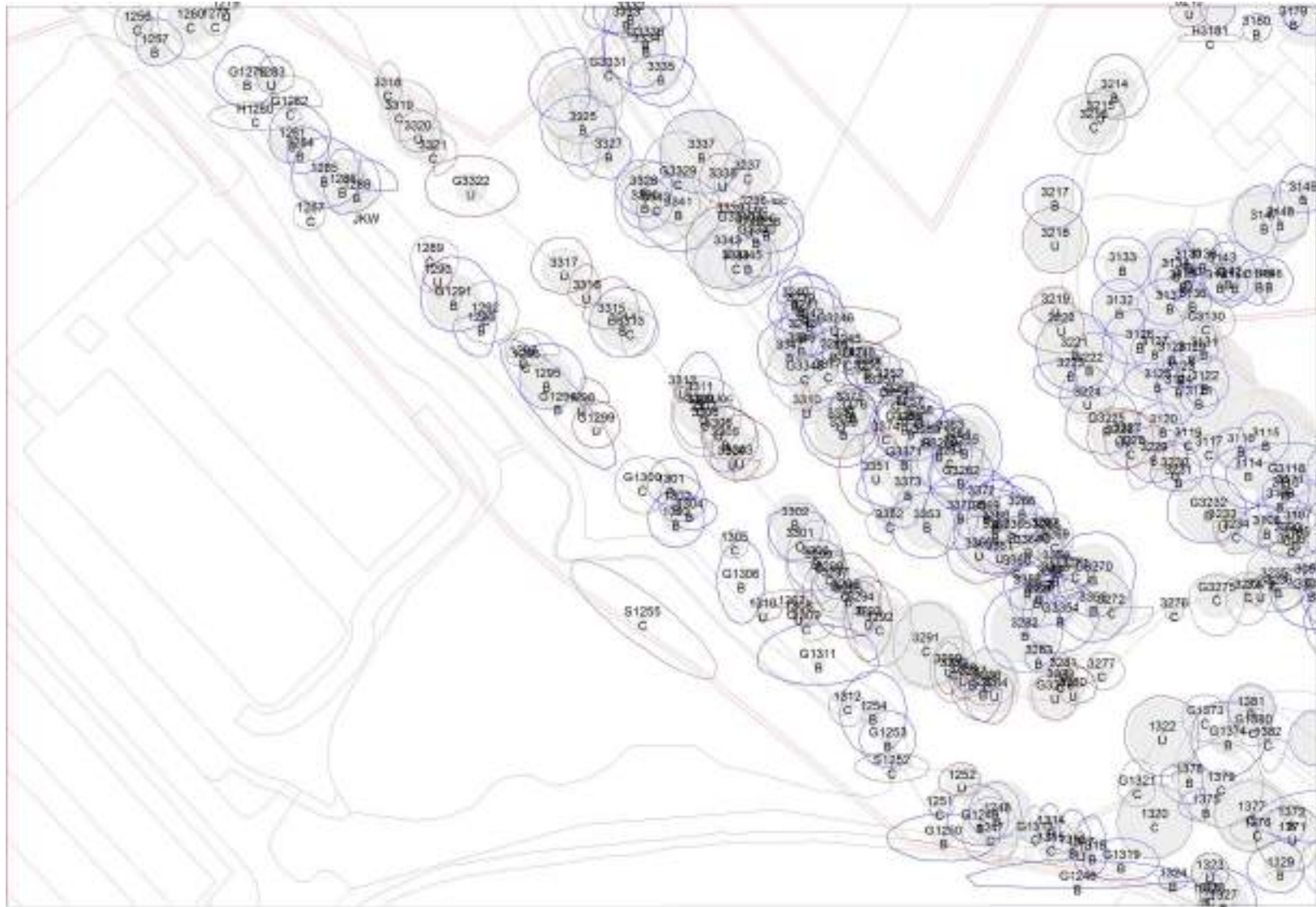
Map 15 (Scale 1: 1000): Tullybanochter, Mill Lade



Map 16 (Scale 1: 1000): West of Tullybanochter



Map 17 (Scale 1: 1000): Fish Farm East



Map 18 (Scale 1: 1000): Fish Farm North



Map 19 (Scale 1: 1000): Fish Farm south west



Photographs: Dalginross



Dalginross: View from south Earn bank near tree 53 north towards burn



Dalginross: trees and hedges on village eastern extent



Dalginross: view from eastern extent looking west along south Earn bank

Photographs: Dalginross South West



Dalginross South West view from garden of house on camp road towards Dalginross



Dalginross South West: View from Dalginross to garden of house on camp road



Dalginross South West: Garden on camp road. Large conifers - tree 3388

Photographs: Comrie East



Comrie east: north Earn bank looking east from tree 65



Comrie east: north Earn bank looking west from tree 88



Comrie east: north Earn bank looking west from tree 244



Comrie east: arboretum garden on north Earn bank



Comrie east: view from north Earn bank looking east opposite fire station



Comrie east: view from north Earn bank looking east from tree 271 adjacent to burn

Photographs: Comrie North



Comrie north: view from northern extent south along burn adjacent to churchyards



Comrie north view from near A85 Bridge north along burn adjacent churchyards



Comrie north view from near A85 Bridge north along burn adjacent churchyards

Photographs: Comrie West



Comrie West: view west along Earn north bank showing eroded roots



Comrie West: riverside garden with tree 3514



Comrie West: riverside garden with tree 3518



Comrie West: A quality Tree 492 in Churchyard

Photographs: Water of Ruchill



Water of Ruchill near tree 968



Water of Ruchill erosion fallen tree 978



Water of Ruchill at southern extent near tree 853 looking northeast



Water of Ruchill at southern extent near tree 853 looking east



Woodland group W869 east of Water of Ruchill



Water of Ruchill willow in woodland east of river

Photographs: Water of Ruchill



Water of Ruchill view from field north to trees on river and Dalginross west



Water of Ruchill view from field to trees in Dalginross west

Photographs: The Ross



The Ross view south toward mature Oak tree 1468



The Ross view north along Earn by tree 3690



The Ross view south along riverside path accessing paddock



The Ross woodland group adjacent path accessing paddock viewed from street to southwest



The Ross view south along riverside path accessing paddock



Photographs: Tullybanochter



Eastern Tullybanochter Woodland group
W1401



Mid Tullybanochter Embankment North view
from opposite bank



Mid Tullybanochter Embankment North
view from opposite bank



Mid Tullybanochter burn view from opposite
bank



Mid Tullybanochter view east along north
Earn bank by tree 3119



Mid Tullybanochter view west along north
Earn bank by tree 3119

Photographs: Tullybanochter



Mid Tullybanochter view west from woods adjacent cottage to tree 3157



Mid Tullybanochter woodland group W3160 east of cottage



Mid Tullybanochter view from road into driveway



Mid Tullybanochter burn side Alders viewed from field to west



Mid Tullybanochter Rail Embankment north with gap for former bridge viewed from field to east



Mid Tullybanochter view east along north Earn bank by tree 3272

Photographs: Tullybanochter



Mid Tullybanochter view north from tree 3272 burn side alders woodland behind



View south from west of embankment north of site Embankment and north Earn bank



Mid Tullybanochter burn side Alders viewed from Rail Embankment



view at top of Embankment



Right - Alders in poor condition on north Earn bank west of embankment.
Below – Rail Embankment north view from southeast.



Photographs: Rail Embankment South (Old Mill)



Rail Embankment South view west along mill lade adjacent tree 1231



Rail Embankment South view southwest from opposite embankment



Rail_Embankment_South_view_east_along_mill_lade_adjacent_tree_1347



Rail_Embankment_South_view_atop_embankment_adjacent_tree_1350

Photographs: Fish Farm



Fish Farm view –north from tree 888 southwest extent



Fish Farm S1176 island group



Fish Farm south Earn bank view north from tree 1195



Fish Farm view from within farm north to riverside bund



Fish Farm view from farm entrance woodland group to southwest



Fish Farm view from within farm woodland group to southwest

Tree Survey Assessment Criteria

The tree survey is undertaken in accordance with a range of criteria listed in BS 5837:2012 Trees in Relation to Design, Demolition and Construction-Recommendations.

Quality Category

Category A: (high quality with an estimated remaining life expectancy of at least 40 years).

Category B: (moderate quality with an estimated remaining life expectancy of at least 20 years).

Category C: (low quality with an estimated remaining life expectancy of at least 10 years).

Category U: (in such condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years).

Sub Categories: The BS 5837 subcategories for all recorded trees is category 1, mainly Arboricultural Qualities & category 2 combined; mainly Landscape qualities.

Tree Condition

Defects or diseases and relevant observations have been recorded under condition of Crown, Stem, Basal area and Physiological condition. It is important to appreciate that in BS5837 criteria only basic condition categories are recorded and the inspection process does not constitute a detailed tree condition survey.

The overall condition of a tree has been referred to as one of the following:

- Good: A sound tree needing little if any attention.
- Fair: A tree with minor but rectifiable defects or in the early stages of stress, from which it may recover.
- Poor: A tree with major structural and or physiological defects or stressed such that it would be very expensive and inappropriate to retain.
- Decline: Irreversible with death inevitable in the short term.
- Dead.

Age Class

Age Class and Life Expectancy are clearly related but the distinction is necessary due to the variation among tree species. Knowledge of the longevity of individual species has been applied to determine the relative age and life expectancy categories in which trees are placed.

Age class is classified as:

- Y: Young trees up to five years of age.
- SM: Semi-mature trees less than $\frac{1}{3}$ rd life expectancy.
- EM: Early Mature trees between $\frac{1}{3}$ rd and $\frac{1}{2}$ of life expectancy.
- M: Mature trees between $\frac{1}{2}$ and $\frac{2}{3}$ rd of life expectancy.
- LM: Late mature - A senescent or moribund specimen with a limited safe useful life expectancy.
- V: Veteran status - where a tree possesses certain attributes relating to veteran trees.

Safe Useful Life Expectancy (SULE)

The survey schedule identifies a Safe Useful Life Expectancy (SULE) for each tree. This is a subjective assessment of the number of years that the tree can be expected to survive without deteriorating to the extent that safety is compromised. The estimated remaining contribution is given in ranges of years (<10, 10 to 20, 20 to 40, >40).

It is important to note that SULE does not in any way suggest that regular inspection and remedial work can be ignored. SULE does not take into account routine management that will be required to deal with minor structural or cultural problems, or damage that may arise from climatic or other physical intervention. The SULE value given for each tree reflects the following opinion based on current tree condition and environmental considerations:

<10. The tree has very limited prospects, due to terminal decline or major structural problems. Its removal should be planned within the next 10 years, unless immediate removal is recommended for safety reasons.

10-20. The tree has obvious structural or physiological problems that cannot be rectified, and decline is likely to continue. Removal or major tree surgery work may be necessary within 20 years, or the species is approaching its normal life expectancy and decline due to senescence can be expected within this timeframe.

20-40. Relatively minor defects exist that are likely to increase safety risks or general tree health over a long period of time. At this stage it is impossible to fully predict the impact of such defects. Or the species is approaching its normal life expectancy and decline due to senescence can be expected within this timeframe.

>40. There is currently no health or structural problems evident and the tree can be expected to survive safely for 40 or more years.

Report limitations

Tree inspection reports are subject to limitations and qualifications.

1. The report forms part of the Feasibility and Planning Application and is therefore a pre-development report. The Report takes reference from BS 5837:2012 Trees in relation to design, demolition and construction –Recommendations.
2. The survey is only concerned with the arboriculture aspects of the site.
3. The report is based on visual inspections conducted from ground level with the purpose of categorising trees in relation to design, demolition and construction and does not provide reliable data on Tree Safety. This report is not, nor should it be taken to be, a full or thorough assessment of the health and safety of trees on or adjacent to the site, and therefore it is recommended that detailed tree inspections of trees to be retained are undertaken on a regular basis with the express purpose of complying with the land owner's duty of care and satisfying health and safety requirements.
4. The statements made in this report do not take account of the effects of extremes of climate, vandalism or accident, whether physical, chemical or fire.
5. The authority of this report ceases within one year from the date of the survey or when any site conditions change, soil levels are altered close to trees, tree work undertaken, or following severe weather occurrences which supersede the current validity of the report.
6. Remedial tree works in the recommendations will require being in accord with British Standard 3998: 2010 Tree works.
7. Tree positioning on site maps is subject to GPS technology and inaccuracies may occur. The Tree Inspector Scotland cannot take responsibility for inaccuracies caused by GPS technology.
8. The validity, accuracy and findings of this report will be directly related to the accuracy of the information made available prior to and during the inspection process.



Christopher Calvey

THE TREE INSPECTOR (SCOTLAND)



Consulting Arborist Society (Professional Member)

Accredited Expert Professional Tree Inspection (CAS)

Royal Forestry Society Certified Arborist

The Arboricultural Association (Arbor. A.)

Licensed User (Quantified Tree Risk Assessment)

Tree Valuation Accredited (CAS)

Arboricultural Method Statement - Information

Introduction

Where trees can be retained the Arboricultural Method Statement (AMS) proposes a range of protection measures to ensure as far as possible trees can continue to co-exist and interact in the future. Factors such as root protection, changes in levels, installation of services, material storage, are considered during the development layout. The Arboricultural Method Statement provides guidance taking into account the effects of any tree loss required to implement the design, and any potentially damaging activities proposed in the vicinity of retained trees. The method statement will require to be revised if the design plan develops or is amended.

In addition to the impact of the permanent works, account must be taken of the build-ability of the scheme in terms of how trees may be affected by access, adequate working space and provision for the storage of materials during the development.

Recommendations

- 1. The completed Method Statement should be communicated to all members of the Construction Team.*
- 2. Tree protection measures should be implemented.*
- 3. That consideration of contractor parking, and the storage of construction materials away from tree rooting zones requires consideration.*

Tree Constraints and Root Protection Area (RPA): Information

Tree root protection distances are calculated using BS5837:2012 recommendations. Where the precautionary distance is impeded for trees to be retained mitigation measures are advocated. In circumstances where a tree is to be removed for the design proposal to progress and no alternative is available tree felling require to be agreed by the Planning Authority prior to construction or demolition activity.

It is imperative that no materials, fuel or other material is stored within the rooting zones of any trees.

Below ground constraints to development are represented by the area surrounding the tree that contains sufficient rooting volume to ensure survival of each tree to be retained. This is referred to as the RPA and is shown as a 12 sided hatched circle (dodecagon) of a given radius, calculated using the formula below. The circle may be modified in shape to maintain a similar total area depending on the presence of surrounding obstacles. A RPA is equivalent to a circle with a radius 12 x the stem diameter for single stem trees and 10 x the basal diameter for trees with more than one stem arising less than 1.5 metres above ground level.

Table 1: Formula taken from 'Table 2: Calculating the RPA', British Standard 5837 (2012)

RPA (m²) = (stem diameter (mm) x 12 / 1000) ² x 3.142 This figure should be capped to 707m², equivalent to a circle with a radius of 15m, or a square with approximately 26m sides.

Root Protection Information

The rooting zone of trees is indicated by the grey dodecagons on site maps.

Construction access may take place within the RPA if suitable ground protection measures are in place. This may comprise single scaffold boards over a compressible layer laid onto geo-textile materials for frequent pedestrian movements. Vehicular movements over the RPA will require the calculation of expected loading and may require the use of proprietary protection systems.

Recommendations

1. *Tree Protection Plans shows Construction Exclusion Zones (CEZ) behind a Tree Protection Fence. Ground protection measures are therefore not required.*
2. *Ground protection measures comprising of heavy boards laid onto 100mm depth of woodchip or sand are to be used for the erection of scaffolding within the rooting zone of trees.*
3. *Where excavation is required through the rooting zone of trees to be retained a hand dig excavation through the root system is recommended. Unearthed roots should be severed using secateurs. Excavated trenches should be re-filled within 12 hours with soil. If operations require a longer period exposed roots should be wrapped with wet hessian and trenches covered over with plastic sheeting and refilled within 48 hours.*

Changes in levels: Information

Where it is shown that the construction of a walls or buildings encroaches within the RPA of a retained tree, the foundations of the wall or building will be excavated in such a manner so as to minimize the detrimental effect of the construction on the tree's roots.

In these situations any excavations within the RPA of an affected tree will only be undertaken following exploration of the existing root system by a hand dig approach and the necessary root pruning undertaken to allow excavation without unnecessary pulling and tearing of the roots to be retained. It is advised this work be conducted under the supervision of an arboriculturist.

Installation and layout of services - Information

In the situation that excavations within the RPA of a tree is required that has not been previously considered by the Implications Assessment, this should only be undertaken following exploration of the existing root system with an air spade and the necessary root pruning undertaken to allow excavation.

Overhead Services: Information

All routes for overhead services should they be required will aim to avoid the trees. Where this is unavoidable, any tree work will be agreed prior to commencement with the Arboricultural Officer. All service providers (Statutory Authorities) will be consulted prior to commencement of works with the aim of minimizing the number of service runs on the site.

Tree Protection Barriers Information

Retained trees require to be adequately protected during works. Measures to protect these should follow the best practice principles set out in British Standard 5837: (2012). These have been broadly summarised below:

All trees retained on site will be protected by barriers or ground protection where indicated in accordance with British Standard 5837: (section 4.6). Fencing will be erected prior to commencement of construction and before the erection of any temporary structures. Once set up, fences should not be removed or altered without prior consultation with the Arboricultural advisor.

Arrangements should be made for an arboriculturist to supervise works and tree protection where trees are particularly vulnerable or sited close to access points.

Pre-development tree works may be undertaken prior to the installation of fencing.

Any trees that are not retained should be felled prior to the erection of protective fencing. Particular attention needs to be given by approved contractors to minimise damage or disturbance to retained specimens. All tree works should follow best practice procedures as set out in British Standard 3998: 'Tree Work - Recommendations' (2010).

All trees should be maintained in good condition on site and be regularly inspected annually (where overall condition requires) and after any major storm events, with safety as a priority.

Recommendations

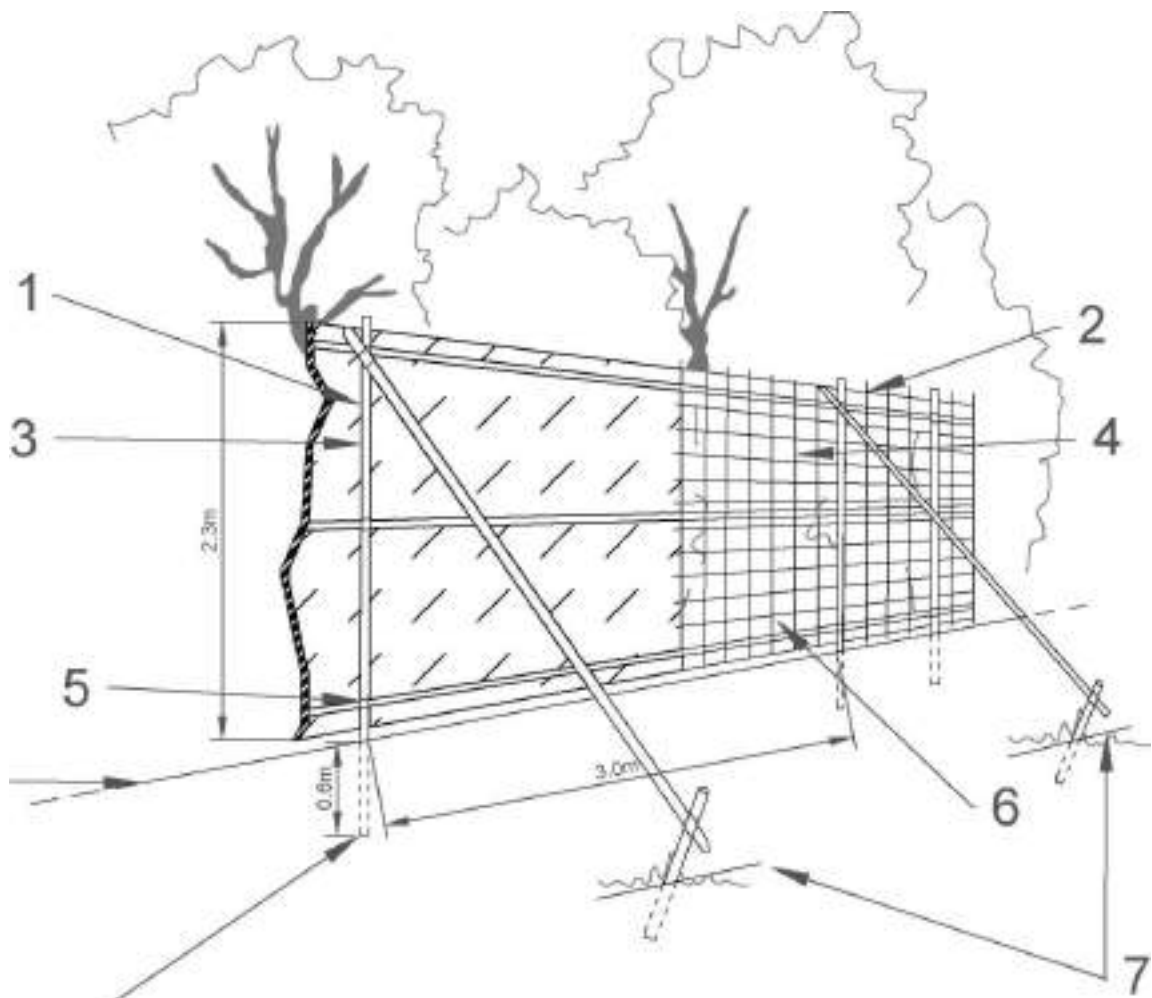
1. *Tree Protection fencing is required as shown on the Tree Protection Plan.*
2. *Fencing should be strong and suitable for the location, type and proximity of construction activity. Barriers must remain rigid and complete.*
3. *Fencing should comprise a scaffold framework comprising a vertical and horizontal framework. For particular areas where construction activity is anticipated to be intense higher fencing may be necessary. Typical fencing specifications are illustrated in Figure 1.*
4. *Following a change of land use trees should be inspected on a regular basis where they are in close proximity to frequently occupied spaces.*

Tree Protection Fencing

Tree protection fencing should remain in place throughout the period of construction. No heavy plant should access the RPA of any tree.

Figure 1: Protective Fencing Specifications Based on BS5837 (2012) - Recommendations

1. Standard scaffold poles.
2. Uprights to be driven into the ground.
3. Panels secured to uprights with wire ties and where necessary with standard scaffold clamps.
4. Weldmesh wired to the uprights and horizontals.
5. Standard clamps
6. Wire twisted and secured on the inside face of fencing to avoid easy dismantling.
7. Ground level.



Protection outside the exclusion zone

Once the areas around trees have been protected by the fencing, any works on the remaining site area may be commenced providing activities do not impinge on protected areas. Notices should be placed on fencing to indicate that operations are not permitted within the fenced area.

Wide or tall loads etc. should not come into contact with retained trees. Banksmen should supervise transit of vehicles, jibs, booms etc. where this is in close proximity to retained trees.

Oil, bitumen, cement or other material that is potentially injurious to trees should not be stacked or discharged within 10m of a tree bole. No concrete mixing should be done within 10m of a tree. Allowance should be made for the slope of ground to prevent materials running towards trees.

No fires should be lit where flames are anticipated to extend to within 5m of tree foliage, branches or trunk, taking into consideration wind direction and size of fire.

Notice boards, telephone cables or other services should not be attached to any part of a retained tree.

Protection of Trees Close to the Site: Information

All trees located outside the boundaries of the assessment site yet within close proximity to works should be adequately protected during the course of the development by barriers or ground protection around the calculated RPA. Any trees which are to be retained and whose RPAs may be affected by the development should be monitored to identify any alterations in quality with time and to assess and undertake any remedial works required as a result.

Protection for Aerial Parts of Retained Trees: Information

Where it is deemed necessary to operate a wide or tall load, plant bearing booms, jibs and counterweights or other such equipment, as part of construction works, and such equipment would have potential to cause injurious contact with crown material i.e. low branches and limbs, of retained trees within the RPA fencing, it is best advised that appropriate, but limited tree surgery, be carried out beforehand to remove any obvious problem branches. This is classed as 'Access Facilitation Pruning', British Standard 5837: (2012) paragraphs 8.8.1.2. Any such pruning should be undertaken in accordance with a specification prepared by an arboriculturist.

In the event of having caused any such branch or limb damage to retained trees it is strongly recommended that suitable tree surgery be carried out, in accordance with British Standard 3998: 'Tree Work - Recommendations' (2010), to correct the damage.

Recommendations

It is strongly advised that a pre-commencement site meeting is held with contractors who are responsible for operating machinery, as described above, to firstly highlight the potential for damage occurring to tree crowns and to ensure that extra care is applied when manoeuvring machinery during such operations within close proximity to retained trees to avoid any contact.

Demolition of existing buildings and surfaces: Information

Not applicable. *In advance of demolition to buildings and manmade surfaces tree protection fencing must be in place and a suitable location for spoil allocated.*

Exposure due to tree removal: Information

Not applicable. Wind throw (wind blow) is a consideration when trees are removed from any group.

Construction site access: Information

The access and egress for the operation should occur via existing hard standing or a new access created away from tree rooting zones unless otherwise agreed and protection measures put in place.

Recommendation

In the pre-construction briefing it should be made clear that parking or traversing heavy plant on areas adjacent to trees to be retained will damage tree roots.

Construction site layout (offices, parking) Information

With the current availability of open ground and parking, no structures or vehicle parking associated with site management should be required within areas where trees are present.

Construction site materials storage Information

Materials should be stored in a designated area. The space for storing (whether temporary or long-term) materials, spoil and fuel and the mixing of cement and concrete; should be accommodated within this designated area.

The effects of slope on the movement of potentially harmful liquid spillages towards or into protected areas have been considered. Arrangements should be made in the storage area to ensure no spillages are capable of running into or blown onto tree rooting areas.

Any facilities for the storage of oils, fuels or chemicals shall be sited on impervious bases and surrounded by impervious bund walls. The volume of the bund compound shall be at least equivalent to the capacity of the tank plus 10%. If there is a multiple tankage, the compound shall be at least equivalent to the capacity of the largest tank, or the combined capacity of interconnected tanks, plus 10%. All filling points, vents, gauges and sight glasses shall be located within the bund. The drainage system of the bund shall be sealed with no discharge to any watercourse, land or underground strata. Associated pipework shall be located above ground and protected from accidental damage. All filling points and tank overflow pipe outlets shall be detailed to discharge downwards into the bund.

Planting: Information

As stated in BS 5837:2012, regular maintenance of newly planted trees is of particular importance for at least three years during the critical post-planting period and might, where required by site conditions, planning requirements or legal agreement, may be necessary for five years or more.

Wildlife: Information

Wildlife is protected in law and it is a legal requirement that Bats, and nesting birds or other protected species are not disturbed.

Tree removal works should be undertaken out with the bird nesting season or alternatively, following a thorough inspection of the trees to be removed including conducting an aerial inspection if necessary. The presence of dense ivy on trees will require the specific requirement to check the presence of bird nests between March and the end of September.

Tree Surgery: Information

All tree work should it become necessary will be agreed and carried out in line with BS 3998:2010 (Recommendations for Tree Works).

Recommendations

Tree Contractors - Management Recommendations & Control measures:

- 1. All tree surgery operations are governed by the British Standard 3998, "Recommendations for Tree Works". Contractors employed must be required to comply with this standard, and any future pruning works should be conducted by a fully qualified and fully insured, reputable arboricultural contractor. Such a contractor should provide evidence of insurance and qualifications for all classes of tree surgery operations.*
- 2. A method statement and risk assessment should be requested for inspection prior to the commencement of works.*
- 3. The general tree protection measures shall apply to the tree surgery teams.*
- 4. All contractor vehicles to be parked and stored outside the (Construction Exclusion Zone – CEZ).*
- 5. No re-fuelling of machinery to take place within the CEZ and not within 10m of the CEZ or uphill of it.*
- 6. Re-inspections should be conducted annually and it is advised that the timing of tree inspection timing should be varied for the most comprehensive results.*

Monitoring

In accordance with item 6.3 of BS5837:2012, the site and associated development should be monitored regularly by a competent Arboriculturist to ensure that the tree protection measures are complied with.

Post Development Implications

The design of the development should aim to ensure no future pressures for tree removal arise.

Appendix 1: BS5837 Tree Categorisation

Category (A) - (Light Green): trees whose retention is most desirable and are of high quality and value. These trees are considered to be in such a condition as to be able to make a lasting contribution (a minimum of 40 years) and may comprise:

- (i) Trees which are particularly good examples of their species especially rare or unusual, or essential components of groups or of formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue);
- (ii) Trees, groups or woodlands which provide a definite screening or softening effect to the locality in relation to views into or out of the site, or those of particular visual importance (e.g. avenues or other arboricultural features assessed as groups);
- (iii) Trees or groups or woodlands of significant conservation, historical, or commemorative value

Category (B) - (Mid Blue): are trees whose retention is considered desirable and are of moderate quality and value. These trees are considered to be in such a condition as to make a significant contribution (a minimum of 20 years) and may comprise:

- (i) Trees that might be included in the high category but because of their numbers or slightly impaired condition (e.g. presence of remediable defects including unsympathetic past management and minor storm damage), are downgraded in favour of the best individuals;
- (ii) Trees present in numbers such that they form distinct landscape features and attract a higher collective rating than they would as individuals. Individually these trees are not essential components of formal or semi-formal arboricultural features, or trees situated mainly internally to the site and have little visual impact beyond the site;
- (iii) Trees with clearly identifiable conservation or other cultural benefits.

Category (C) - (Grey): are trees that could be retained and are considered to be of low quality and value. These trees are in an adequate condition to remain until new planting could be established (a minimum of ten years) or are young trees with a stem diameter below 150mm and may comprise:

- (i) Trees not qualifying in higher categories;
- (ii) Trees present in groups or woodlands, but without this conferring on them significantly greater landscape value and or trees offering low or only temporary screening benefit;
- (iii) Trees with very limited conservation or other cultural benefits.

Category (U) - (Dark Red): Trees for removal are those trees in such a condition that any existing value would be lost within 10 years and which should in the current context be removed for reasons of sound arboricultural management. Trees within this category are:

- (i) 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;
- (ii) Trees that are dead or showing signs of significant, immediate or irreversible overall decline;
- (iii) Trees infected with pathogens of significance to the health and or/safety of other trees nearby trees or very low quality trees suppressing adjacent trees of better quality.

Table 1 Cascade chart for tree quality assessment

Category and definition	Criteria (including subcategories where appropriate)			Identification on plan
Trees unsuitable for retention (see Note)				
Category U Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years	<ul style="list-style-type: none"> Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees (e.g. where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning) Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline Trees infected with pathogens of significance to the health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality <p><i>NOTE</i> Category U trees can have existing or potential conservation value which it might be desirable to preserve; see 4.5.7.</p>			See Table 2
	1 Mainly arboricultural qualities	2 Mainly landscape qualities	3 Mainly cultural values, including conservation	
Trees to be considered for retention				
Category A Trees of high quality with an estimated remaining life expectancy of at least 40 years	Trees that are particularly good examples of their species, especially if rare or unusual; or those that are essential components of groups or formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue)	Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture)	See Table 2
Category B Trees of moderate quality with an estimated remaining life expectancy of at least 20 years	Trees that might be included in category A, but are downgraded because of impaired condition (e.g. presence of significant though remediable defects, including unsympathetic past management and storm damage), such that they are unlikely to be suitable for retention for beyond 40 years; or trees lacking the special quality necessary to merit the category A designation	Trees present in numbers, usually growing as groups or woodlands, such that they attract a higher collective rating than they might as individuals; or trees occurring as collectives but situated so as to make little visual contribution to the wider locality	Trees with material conservation or other cultural value	See Table 2
Category C Trees of low quality with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150 mm	Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories	Trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value; and/or trees offering low or only temporary/transient landscape benefits	Trees with no material conservation or other cultural value	See Table 2

Appendix2: BS 5837:2012 Terms and Definitions

Arboricultural Method Statement: Methodology for the implementation of any aspect of development that is within the root protection area, or has the potential to result in loss of or damage to a tree to be retained.

Arboriculturist: Person who has, through relevant education, training and experience, gained expertise in the field of trees in relation to construction.

Access Facilitation Pruning: One-off tree pruning operation, the nature and effects of which are without significant adverse impact on tree physiology or amenity value, which is directly necessary to provide access for operations on site.

Competent Person: Person who has training and experience relevant to the matter being addressed and an understanding of the requirements of the particular task being approached. NOTE - a competent person is expected to be able to advise on the best means by which the recommendations of this British Standard may be implemented.

Construction Exclusion Zone (CEZ): Area based on the root protection area from which access is prohibited for the duration of a project.

Root Protection Area (RPA) Layout design tool indicating the minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the tree's viability, and where the protection of the roots and soil structure is treated as a priority. RPA: This is the Root Protection Area, measured in square metres and defined in BS5837:2012 as "a layout design tool indicating the minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the tree's viability, and where the protection of the roots and soil structure is treated as a priority". The RPA is shown on the drawing. Ideally this is an area around the tree that must be kept clear of construction, level changes of construction operations. Some methods of construction can be carried out within the RPA of a retained tree but only if approved by the Local Planning Authority's tree officer.

Service Any above or below ground structure or apparatus required for utility provision. NOTE. - Examples include drainage, gas supplies, ground source heat pumps, CCTV and satellite communications.

Bole: Principal above ground structural component(s) of a tree that supports its branches.

Structure: Manufactured object, such as a building, carriageway, path, wall, service run, and built or excavated earthwork.

Minimum distance: This is a distance equal to 12 times the diameter of the tree measured at 1.5m above ground level for single stemmed trees and 10 times the average diameter of the tree measured at 1.5 m above ground level tree for multi stemmed specimens. (BS 5837:2012, section 4.6).

Appendix 3: References

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