

# **Arboricultural Impact Assessment**

**- Written in accordance with BS5837: 2012**

**Springhouse  
Stottercliffe Road  
Thurlstone  
South Yorkshire**

**20<sup>th</sup> December 2017**

Reference: **JC/125/171220**

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## Summary of report

This report considers the impact on trees of a proposed dwelling and associated landscaping on Stottercliffe Road in Thurlstone. The survey took place on Tuesday 12<sup>th</sup> December 2017.

The survey includes 30 individually documented trees, and many more trees in listed group locations. Species and above ground dimensions and constraints were recorded. Observations were made on tree condition. Below ground constraints were assessed, including the assignment of Root Protection Areas. Trees were categorised according to the criteria in BS5837: 2012 – from category 'A' (highest quality), through categories 'B' and 'C', to category 'U' (lowest quality).

Under this proposal 21 low quality trees are to be removed, many of which were planted by our client. The only category B tree on site - a large ash tree – should not suffer adverse effects from the installation of a wall and drain within the Root Protection Area (RPA), due to the careful design of both. Small trees on neighbouring land are not expected to be affected, despite minor RPA incursion of an access ramp. Lowering of levels within the RPAs of two severely pruned sycamores may have a minor effect, but the trees are very likely to recover and are of insufficient quality to justify alteration of plans. Planned boundary fencing is to be of a design that minimises impact to be negligible.

Details of the above construction and design matters are clearly defined within an Arboricultural Method Statement, and a Tree Protection Plan describes where necessary measures to prevent harm to retained trees during construction.

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## **1. Introduction**

### **1.1 Terms of instruction**

Jon Coe Tree Services Ltd were instructed by Mr Rob Hill to undertake a tree survey at his property Springhouse on Stottercliffe Road in Thurlstone.

### **1.2 Scope of survey**

The key requirements identified were to establish the condition of the trees on site, and the impact of the proposed development upon them, in accordance with BS5837: 2012<sup>1</sup> '*Trees in relation to design, demolition and construction: Recommendations*' (referred to herein as BS5837: 2012<sup>1</sup>). This was not a detailed risk assessment survey.

The survey considered all trees within the area relevant to the proposed works. Consideration was also given as to whether any trees outside the application boundary would be affected.

### **1.3 Documents supplied by client**

Existing and proposed plans were supplied by email by Design Space Architecture at the time of instruction. The proposed layout to which this report refers is shown at Appendix G.

### **1.4 Items included within this report**

The main report describes, in this order: the collection of data; summary of data; arboricultural impact; tree protection; arboricultural method statement and other relevant issues. It is followed by references and the appendices.

Central to the purpose of this report are Appendices H, I and J - drawings of Arboricultural Impact, Tree Protection, and Method Statement.

## **1.5    Qualifications and experience**

The survey and report were carried out by Jon Coe, who holds a BSc (Honours) degree in Arboriculture from Myerscough College, Professional-grade membership of the Arboricultural Association, and Associate membership of the Institute of Chartered Foresters.

Jon undertakes many shorter courses as part of his commitment to professional development. These have included the following Arboricultural Association courses:

- BS5837: Tree surveying and categorisation
- BS5837: Tree assessment for planning applications
- BS5837: Managing trees on construction sites

Jon has thirteen years of continuous experience working in the arboricultural industry.

## **1.6    Caveats and limitations**

This report is for the use of the client only. Its use or reproduction by any other party is forbidden without the author's prior written consent.

No reliance should be given to any non-arboricultural observations, which are made from the standpoint of a layperson.

The survey was solely concerned with the requirements of BS5837: 2012<sup>1</sup>. It was not a risk assessment survey, and it considered tree health only so far as necessary to fulfil the requirements of BS5837: 2012<sup>1</sup>.

The survey and all observations were made from ground level only.

No soil samples were taken.

Observations were valid at the time they were made. However, trees are dynamic and growing structures that experience changes affected by time, weather and other factors.

## **2. Data collection**

### **2.1 Site visit**

The survey was conducted on Tuesday 12<sup>th</sup> December 2017. It was a cold dry day with a light covering of snow; visibility for surveying was not hampered.

### **2.2 The site and tree layout**

The survey plot lies in the village of Thurlstone, with site layout as shown in the Tree Constraints Plan (Appendix F). It is a sloping plot, from west (higher) to east (lower). Along the sloping northern boundary are various small low quality trees and a larger flowering cherry. The western (upper) boundary is dominated by a row of low quality mature sycamores that have been severely pruned. Along the southern boundary is a broad strip of 20+ semi- and early-mature broadleaves. Part of the eastern boundary holds a pleached hornbeam hedge and various more semi- and early-mature broadleaves and conifers. A group of small semi- and early-mature trees is located centrally within the plot.

Individual tree's details are recorded in the Tree Schedule (Appendix A) and the Tree Constraints data (Appendix B). Findings are summarised in section 3.1.

### **2.3 Survey method**

The initial survey was conducted without influence of the development proposal.

Each tree was given a tree identification number, as shown on the Tree Constraints Plan (Appendix F).

Trees details were recorded against locations plotted on the supplied plans. These appeared to be accurate. Where relevant trees were missed, the stem location has been identified to the best ability of the arboricultural surveyor. Often this involved triangulation of stem location using a laser rangefinder, but in some cases it was necessary to visually estimate the stem's location on the site plan.

The species of each tree was recorded. Common names are used in the Tree Schedule (Appendix A), with a list of botanical names supplied in Appendix C.

Tree height was estimated in metres (m), to the nearest 0.5 m (rounded up) - or the nearest metre for trees above 10 m. At regular intervals or for trees where precise height is likely to be important, it was recorded using the 'Measure Height' Android app; this has been checked for accuracy using a Suunto clinometer, to which it bears close comparison.

Stem diameter was measured in millimetres (mm) using a diameter tape, in accordance with the conventions detailed in Annex C of BS5837: 2012<sup>1</sup>, which in most cases is at 1.5m above ground level.

Crown spread was recorded at the four cardinal points, to the nearest 0.5m (rounded up) - using a laser range-finder (Leica Disto D810).

Where it was likely to be relevant, height of canopy clearance was recorded to the nearest 0.5 m. This was necessarily an estimate, as canopy clearance is not usually consistent around the whole tree; a figure for the typical low point around the canopy was therefore estimated.

Age class was assessed according to the five possible categories listed in BS5837: 2012<sup>1</sup>. These are young, semi-mature, early-mature, mature and over-mature.

Structural and physiological condition of trees were separately assessed and summarised using five possible categories: poor, moderate, fair, good, very good. More specific observations on condition were noted under 'Observations'.

'Observations' included details of specific structural and physiological issues, notes on past and suggested future management, and problems currently presented by the trees.

An estimate was made (in years) of the potential remaining contribution that each tree could offer, in its current situation, without a need for significant tree surgery operations.

Each tree was categorised according to the guidance given in BS5837: 2012<sup>1</sup> (Appendix D). Retention categories of A, B, C or U were allocated (in

descending order of tree quality), with an additional sub-category of 1, 2 or 3 that defines whether the principal category was allocated for arboricultural, landscape or cultural reasons respectively.

### **3. Summary of data**

#### **3.1 Trees**

The survey includes 30 individually documented trees and seven group locations. Group locations are assigned for hedges or for arboriculturally cohesive groups containing many individual stems.

The trees here are a diverse range of species, due in part to planting undertaken by our client. With the exception of a row of severely pruned mature sycamores, the great majority of trees are either early- or semi-mature. Broadleaves dominate, but there are a number of conifers, especially in the central clump.

Details and comments for all surveyed trees are recorded in the Tree Schedule (Appendix A) and the Tree Constraints data (Appendix B). Individual tree locations are shown on the Tree Constraints Plan (Appendix F).

#### **3.2 Retention categories**

Retention categories have been assigned in accordance with the criteria in BS5837: 2012<sup>1</sup> (Appendix D).

One tree on site is significantly better quality than all others here. This is a large mature ash tree (tree 01) – it is assigned retention category B1.

The remainder of the trees on site lack the qualities required to raise them above the level of category C.

#### **3.3 Below ground constraints**

The Root Protection Areas (RPAs) are the areas in which construction and activities related to the construction process should not take place, in order to protect the trees' root systems. Where such activities cannot be avoided,

it may be possible to incorporate design measures that prevent the damage that may occur to the tree's health and stability through soil compaction, level changes, root severance and contamination. Sections 6 and 7 of BS5837: 2012<sup>1</sup> outline methods for protecting RPAs during the construction process, and for building within them where this is unavoidable.

RPAs are generically calculated as an area equivalent to a circle with a radius 12 times the stem diameter, in accordance with section 4.6.1 of BS5837: 2012<sup>1</sup>; this also provides methods for calculating the combined stem diameter of multi-stem trees.

In accordance with BS5837: 2012<sup>1</sup>, the RPAs listed in the Tree Constraints data (Appendix B) have been determined from the stem diameter by using Table 4 (Appendix E), whose values are themselves extracted from Table D.1 in Annex D of the standard (BS5837: 2012<sup>1</sup>). Stem diameters are rounded up to align with those in Table 4; potentially to the trees' benefit.

Where group locations occur, a continuous RPA boundary has been shown on the Tree Constraints Plan (Appendix F). The extent of this boundary has been determined by the tree assessor, using a balanced judgement of the various contributing factors – particularly the species composition and density of the group.

### **3.4    Above ground constraints**

Data for crown spread is listed in the Tree Constraints Data (Appendix B). Additionally, the Tree Schedule (Appendix A) contains data on canopy clearance, and the height of the first major branch (where applicable).

## **4.    Arboricultural Impact Assessment**

### **4.1    Overview of the impact of proposed development on trees on this site**

Under this proposal 21 low quality trees are to be removed, many of which were planted by our client. The only category B tree on site - a large ash tree – should not suffer adverse effects from the installation of a wall and drain within the Root Protection Area (RPA), due to the careful design of both. Small trees on neighbouring land are not expected to be affected,

despite minor RPA incursion of an access ramp. Lowering of levels within the RPAs of two severely pruned sycamores may have a minor effect, but the trees are very likely to recover and are of insufficient quality to justify alteration of plans. Planned boundary fencing is to be of a design that minimises impact to be negligible.

## **4.2    Trees losses**

Up to 21 trees are to be removed under this proposal. With the exception of a mature Japanese cherry, and a mature sycamore that has been severely pruned, all the trees for removal are either semi- or early-mature. All are category C, none have any special merit. Many were in fact planted by our client. Details of all these tree removals are shown on the Arboricultural Impact Assessment drawing at Appendix H.

Included in the above total number, trees 19, 20, 21, 22, 23 and 37 are likely to be removed for aesthetic reasons, but their removal is not necessary to implement the proposed works.

## **4.3    Impact on Tree 01**

A new boundary wall that is to be built within tree 01's RPA is to be a drystone construction, with necessary footings not exceeding 150 mm depth, and hand-dug such that any encountered roots exceeding 25 mm diameter can be retained if possible. Both gateposts at the north end of this drystone wall are to be hand excavated prior to the wall construction - this allows for minor post and wall re-alignment to east or west if any root exceeding 25 mm diameter is encountered during excavation for gatepost. Given this described design and construction, no significant impact on tree 01 is expected as a result of this wall and gateposts. This view was further reinforced by the information that an existing water mains and culvert are located between the stem of tree 01 and the line of the proposed wall (information from client and supplied plans).

A new shallow linear drain is required to deal with surface water. This shallow drain is to be hand excavated to a depth not exceeding 100 mm below current surface level. It is expected to remain within the existing

drive's sub-base material (which was itself installed within the last 20 years). No significant impact on tree 01 is expected.

Removal of deadwood branches throughout the tree canopy is recommended. This is standard safety work that will not adversely affect tree 01.

#### **4.4    Impact on Group 5**

This laurel hedge is to be reduced in length at its western end.

#### **4.5    Impact on Trees 8, 9 and 10**

The garden access ramp will make a minor incursion into the RPAs of trees 8, 9 and 10 that grow on neighbouring land. This is unlikely to have any noticeable effect on those trees' health - particularly because they grow on the north side of a wall whose footings are likely to have inhibited southwards root growth.

#### **4.6    Impact on Trees 14 and 15**

In creating a more level garden area for the proposed dwelling, the ground level will be lowered and a retaining wall added within the RPAs of trees 14 and 15. These are low quality trees - that due to severe pruning are now supporting far less extensive canopies than their stem size would suggest (see photo 4). Any minor branch dieback resulting from root loss in this area could be satisfactorily pruned out, with the trees' visual amenity unlikely to be significantly reduced.

#### **4.7    Impact of fenceline on groups 18 and 29, and trees 30 to 37**

A fenceline is proposed along much of the new dwelling's boundary, and through the RPAs of various trees (especially those in group 18). This fenceline will not significantly affect tree roots, as the construction is to be primarily above ground, supported only on spaced wooden posts - with the

design to allow scope for adjustment in spacing intervals if roots exceeding 25 mm diameter are encountered at any point. Additionally, trees whose RPAs are traversed by this fenceline are almost all early- and semi-mature (hence tolerant of minor disturbance).

#### **4.8    Impact of services**

Any new connections or trenching for services will be outside of the RPAs of retained trees.

### **5.    Tree Protection Plan**

#### **5.1    Timing, and awareness of tree protection**

The requirements of the Tree Protection Plan should be implemented in full prior to the commencement of any construction work. All parties operating on site, and all those involved in planning construction operations, should be made aware of all of the requirements of the Tree Protection Plan. See also the drawing at Appendix I.

#### **5.2    Temporary fencing**

Tree protection fencing is required to prevent access to the part of Tree 01's RPA that is adjacent to the drive and to the build area, and that is not already hard-surfaced. See the drawing at Appendix I for the exact location of this fencing.

This is to prevent the harm that is easily done to trees through compaction of their rooting soil – as would occur if this area was used for materials deliveries or for vehicle parking and manoeuvring.

This fencing should consist of 2 metre high welded mesh panels on concrete or rubber feet. The panels should be joined together using at least two anti-tamper couplers, installed so their removal is only possible from inside the fence. Fence couplers should be spaced apart by at least 1 metre, and the panels should be supported on their inner sides by stabiliser struts, with these attached to base plates that are secured with ground

pins. An all-weather notice should be affixed to the fencing with the following (or similar) wording: “Construction exclusion zone for protection of tree roots – no access” (BS5837: 2012<sup>1</sup>, 6.2.2.3).

### **5.3    Moving fencing prior to drystone wall construction**

One part of the Tree Protection Fencing may be removed during the period of drystone wall construction only - as shown on the drawing at Appendix I. This removal of fencing is not to occur until the day drystone wall construction commences, and all operatives on site during the unfenced period must be made aware of the importance of avoiding any excavation or compaction in the newly unfenced area. It must be replaced once wall construction is complete. Other than that all tree protection fencing is to remain in place throughout the period of construction and materials deliveries.

### **5.4    Existing hard surfacing**

Existing hard surfacing provides protection during construction to the unfenced parts of Tree 01's RPA.

## **6.    Arboricultural Method Statement**

### **6.1    Scheduling**

The various components of this method statement are arranged sequentially, in the order in which they should be carried out.

### **6.2    Tree pruning – deadwood branch removals for Tree 01.**

Deadwood branches are to be removed throughout the canopy of tree 01. This should include any deadwood branch exceeding either 25 mm diameter or 1.0 metre in length.

Pruning should be carried out in accordance with *BS 3998: 2010 Tree work – recommendations* <sup>2</sup>.

### **6.3    Tree removals**

Details of all tree removals required are shown on the Arboricultural Impact Assessment drawing at Appendix H.

All tree removals should be carried out in accordance with the various guidance in BS 3998: 2010 Tree work – Recommendations <sup>2</sup>.

### **6.4    Implementation of Tree Protection plan**

The requirements of the Tree Protection Plan should be implemented in full prior to the commencement of any construction work or materials deliveries (Section 5).

### **6.5    Installing surface drain in Tree 01's Root Protection Area**

The linear drain - along the length shown within tree 01's RPA - is to be hand excavated to a depth not exceeding 100 mm below current surface level. See the drawing at Appendix J.

### **6.6    Constructing wall in Tree 01's Root Protection Area**

The new boundary wall within tree 01's RPA is to be a drystone construction, with excavation for footings not exceeding 150 mm depth, and hand-dug such that any encountered roots exceeding 25 mm diameter can be retained if possible. Both gateposts at north end of this drystone wall are to be hand excavated prior to the wall construction - this allows for minor post and wall re-alignment to east or west if any root exceeding 25 mm diameter is encountered during excavation for gatepost. See also the drawing at Appendix J.

### **6.7    Garden access ramp adjacent to Trees 8 to 10**

Excavation and other works involved in constructing the garden access ramp are not to extend north of the labelled line shown on the drawing at Appendix J.

## **6.8    Excavations and retaining wall near to Trees 14 and 15**

Within the RPAs of trees 14 and 15 is a proposed levels change and retaining wall construction. It is essential that the excavation and other works involved in this do not extend west of the labelled line shown on the drawing at Appendix J.

## **6.9    Fence construction**

The new fenceline shown on the drawing at Appendix J is to be primarily an above ground wooden construction, supported only on spaced wooden posts - with this design to allow scope for adjustment in spacing intervals if roots exceeding 25 mm diameter are encountered at any point.

## **6.10    Severing or exposing tree roots**

As tree roots can extend well beyond the generic Root Protection Area defined in BS5837: 2012<sup>1</sup>, it is likely that some minor roots will be encountered during excavations. This is most likely to apply to Tree 1. If it is necessary to sever any of these individual minor roots (less than 25 mm diameter), this can be done using secateurs or a sharp handsaw. If small-diameter roots occur in clumps, or if roots exceed 25 mm diameter, they should only be severed after consultation with an appropriately qualified arboriculturist (BS5837: 2012<sup>1</sup>, 7.2.3).

Any roots that are exposed should be immediately covered to prevent drying out, and to protect them from sudden temperature changes. This is especially important during the colder months, when frost damage of roots is a significant risk.

## **7.    Other observations**

### **7.1    Legal status of trees on site**

Please note that the status of trees on site - with regard to Tree Preservation Orders and Conservation Areas - has not been checked. It is advised that this is done before any further investment in the planning

process. The relevant legislation to these matters is contained within the Town and Country Planning Act 1990 <sup>3</sup> and The Town and Country Planning (Tree Preservation) (England) Regulations 2012 <sup>4</sup>.

## **7.2 Wildlife considerations and law**

The requirements the following legislation should also be considered in the planning of any arboricultural operations.

- Wildlife and Countryside Act 1981 <sup>5</sup>
- Countryside and Rights of Way Act 2000 <sup>6</sup>
- The Conservation of Habitats and Species Regulations 2010 <sup>7</sup>
- The Conservation of Habitats and Species (Amendment) Regulations 2011 <sup>8</sup>

One combined effect of the above legislation is that tree work operations must be planned to avoid disturbance to nesting, breeding or roosting birds, or to bats and their roosts. The nests of wild birds are protected whilst in use, and all 18 bat species found in the UK are afforded European Protected Species status.

## **7.3 Standards of tree work**

Unless otherwise specified, any tree work recommended in this report should be carried out in accordance with the British Standard *BS 3998: 2010 Tree work – Recommendations* <sup>2</sup>.

## Reference List

1. British Standards Institution (2012) *BS 5837: 2012 Trees in relation to design, demolition and construction – Recommendations*. London, BSI Standards Ltd.
2. British Standards Institution (2010) *BS 3998: 2010 Tree work – Recommendations*. London, BSI Standards Ltd.
3. *Town and Country Planning Act 1990*. London, HMSO.
4. *The Town and Country Planning (Tree Preservation) (England) Regulations 2012*. London, HMSO.
5. *Wildlife and Countryside Act 1981*. London, HMSO.
6. *Countryside and Rights of Way Act 2000*. London, HMSO.
7. *The Conservation of Habitats and Species Regulations 2010*. London, HMSO.
8. *The Conservation of Habitats and Species (Amendment) Regulations 2011*. London, HMSO.

## Photographs



**Photo 1.** The circled area includes trees 19 to 28, most or all of which will be removed under the proposed works.



**Photo 2.** Showing the route of the proposed drystone wall. Tree 01 is in the background. The drawing at Appendix G shows that an existing water main is located in the ground between Tree 01 and the proposed wall.



**Photo 3.** Showing the route of the proposed drystone wall. Tree 01 is on the right. The proposed dwelling will occupy land beyond the existing building at centre.



**Photo 4.** The prominent trees just right of centre are sycamores 12 to 17. The severe recent pruning is clearly visible.

## Appendices

### Appendix A:    **Tree Schedule (excluding Root Protection Areas and crown spread)**

**Table 1** (overleaf) contains data for all trees, excluding Root Protection Areas and crown spread details – which are found in Appendix B.

**Condition categories, in ascending order of quality:**

*poor – moderate – fair – good - very good*

| Tree Number | Species (common name) | Height (m) | Canopy clearance (m) | Life stage   | Observations, and suggestions for management                                                                                                   | Remaining contribution (years) | BS retention category | Condition (physiological : structural) |
|-------------|-----------------------|------------|----------------------|--------------|------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-----------------------|----------------------------------------|
| 01          | Ash, Common           | 16         | 4                    | Mature       | A large and attractive tree.<br>Various large deadwood branches throughout canopy - remove.<br>Hidden culvert and water mains well within RPA. | 20+ Years                      | B1                    | Good : Fair                            |
| 02          | Yew                   | 2          | 0                    | Semi Mature  | Young vigorous yew hedge.                                                                                                                      | 40+ Years                      | C1                    | Very good : Fair                       |
| 03          | Yew                   | 2          | 0                    | Semi Mature  | Young vigorous yew hedge.                                                                                                                      | 40+ Years                      | C1                    | Very good : Fair                       |
| 04          | Cherry                | 9          | 2.5                  | Mature       | No significant issues observed                                                                                                                 | 20+ Years                      | C1                    | Fair : Fair                            |
| 05          | Laurel                | 2.5        | 0                    | Early Mature | Laurel hedge.                                                                                                                                  | 20+ Years                      | C1                    | Very good : Fair                       |
| 06          | Ash, Common           | 8          | 2                    | Semi Mature  | Low quality self-set.                                                                                                                          | 10+ Years                      | C1                    | Fair : Fair                            |
| 07          | Ash, Common           | 9          | 2                    | Early Mature | Low quality self-set.                                                                                                                          | 10+ Years                      | C1                    | Fair : Fair                            |
| 08          | Cypress species       | 7          | 1                    | Early Mature | On neighbouring land.                                                                                                                          | 20+ Years                      | C1                    | Fair : Fair                            |
| 09          | Cypress species       | 6.5        | 1                    | Early Mature | On neighbouring land.                                                                                                                          | 20+ Years                      | C1                    | Fair : Fair                            |
| 10          | Ceanothus             | 4          | 0.5                  | Mature       | Ceanothus.<br>On neighbouring land.                                                                                                            | 20+ Years                      | C1                    | Good : Fair                            |
| 11          | Holly                 | 8          | 0                    | Early Mature | No significant issues observed                                                                                                                 | 40+ Years                      | C1                    | Good : Fair                            |

| Tree Number | Species (common name) | Height (m) | Canopy clearance (m) | Life stage  | Observations, and suggestions for management                                                                                                                                                                                    | Remaining contribution (years) | BS retention category | Condition (physiological : structural) |
|-------------|-----------------------|------------|----------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-----------------------|----------------------------------------|
| 12          | Sycamore              | 13         | 6                    | Mature      | Low quality multi-stemmed sycamore, recently 'topped'.                                                                                                                                                                          | 40+ Years                      | C1                    | Good : Fair                            |
| 13          | Group, mixed species  | 4          | 0                    | Semi Mature | Clump of laurel and holly.                                                                                                                                                                                                      | 20+ Years                      | C1                    | Good : Fair                            |
| 14          | Sycamore              | 13         | 5                    | Mature      | Sycamore has been recently 'topped' to leave a low quality tree. Due to greatly reduced canopy size, rooting requirements are also likely to be less than is suggested by stem size.                                            | 40+ Years                      | C1                    | Fair : Fair                            |
| 15          | Sycamore              | 13         | 5                    | Mature      | Twin-stemmed sycamore, recently 'topped' to leave a low quality tree. Due to greatly reduced canopy size, rooting requirements are also likely to be less than is suggested by stem size.                                       | 40+ Years                      | C1                    | Fair : Fair                            |
| 16          | Sycamore              | 13         | 6                    | Mature      | Multi-stemmed sycamore has been recently 'topped' to leave a low quality tree. Due to greatly reduced canopy size, rooting requirements are also likely to be less than is suggested by stem size.                              | 40+ Years                      | C1                    | Fair : Fair                            |
| 17          | Sycamore              | 14         | 5                    | Mature      | Sycamore with co-dominant stems above 1.5 m height. Has recently been 'topped' to leave a low quality tree. Due to greatly reduced canopy size, rooting requirements are also likely to be less than is suggested by stem size. | 40+ Years                      | C1                    | Fair : Fair                            |

| Tree Number | Species (common name) | Height (m) | Canopy clearance (m) | Life stage   | Observations, and suggestions for management                                                                                                                                                                                                  | Remaining contribution (years) | BS retention category | Condition (physiological : structural) |
|-------------|-----------------------|------------|----------------------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-----------------------|----------------------------------------|
| 18          | Group, mixed species  | 1          | 0                    | Early Mature | Group of 20+ stems of early- and semi-mature trees, with stem diameters spread evenly in the range of 100 to 300 mm.<br>Height of group is 15+ m.<br>Species include eucalyptus, birch, beech, alder, aspen, sycamore, hornbeam, spruce, ash. | 40+ Years                      | C1                    | Fair : Fair                            |
| 19          | Cedar, Deodar         | 10         | 0.5                  | Early Mature | No significant issues observed                                                                                                                                                                                                                | 40+ Years                      | C1                    | Good : Good                            |
| 20          | Beech, Common         | 4          | 1                    | Semi Mature  | Very small tree. No significant issues observed                                                                                                                                                                                               | 40+ Years                      | C1                    | Good : Fair                            |
| 21          | Beech, Common         | 6          | 0.5                  | Semi Mature  | Very small tree.                                                                                                                                                                                                                              | 40+ Years                      | C1                    | Good : Good                            |
| 22          | Beech, Common         | 6          | 1                    | Semi Mature  | Very small tree.                                                                                                                                                                                                                              | 40+ Years                      | C1                    | Good : Good                            |
| 23          | Fir                   | 6          | 0.5                  | Semi Mature  | Small tree.                                                                                                                                                                                                                                   | 40+ Years                      | C1                    | Good : Good                            |
| 24          | Cypress, Lawson       | 5          | 0.5                  | Early Mature | No significant issues observed                                                                                                                                                                                                                | 40+ Years                      | C1                    | Good : Fair                            |
| 25          | Eucalyptus            | 17         | 5                    | Early Mature | Young but tall. A very fast growing species.                                                                                                                                                                                                  | 40+ Years                      | C1                    | Good : Fair                            |
| 26          | Fir                   | 8          | 0.5                  | Semi Mature  | No significant issues observed.                                                                                                                                                                                                               | 40+ Years                      | C1                    | Good : Good                            |
| 27          | Cedar, Deodar         | 8          | 0.5                  | Early Mature | No significant issues observed                                                                                                                                                                                                                | 40+ Years                      | C1                    | Good : Fair                            |
| 28          | Cypress species       | 7          | 0                    | Semi Mature  | No significant issues observed.                                                                                                                                                                                                               | 40+ Years                      | C1                    | Good : Fair                            |

| Tree Number | Species (common name) | Height (m) | Canopy clearance (m) | Life stage   | Observations, and suggestions for management                                 | Remaining contribution (years) | BS retention category | Condition (physiological : structural) |
|-------------|-----------------------|------------|----------------------|--------------|------------------------------------------------------------------------------|--------------------------------|-----------------------|----------------------------------------|
| 29          | Hornbeam              | 4          | 0                    | Early Mature | Row of pleached hornbeams. 13 stems with typical stem diameter being 100 mm. | 40+ Years                      | C1                    | Good : Good                            |
| 30          | Beech, Common         | 15         | 3                    | Early Mature | No significant issues observed                                               | 40+ Years                      | C1                    | Good : Good                            |
| 31          | Whitebeam             | 9          | 2.5                  | Early Mature | No significant issues observed                                               | 40+ Years                      | C1                    | Fair : Fair                            |
| 32          | Spruce                | 9          | 0.5                  | Semi Mature  | Low quality sparse tree                                                      | 20+ Years                      | C1                    | Moderate : Fair                        |
| 33          | Whitebeam             | 8          | 0                    | Early Mature | Structurally poor: co-dominant stems with tight union and included bark.     | 10+ Years                      | C1                    | Good : Poor                            |
| 34          | Cypress species       | 6          | 0                    | Early Mature | Has grown with a severe lean to south-east.                                  | 20+ Years                      | C1                    | Good : Moderate                        |
| 35          | Hawthorn              | 6          | 0.5                  | Early Mature | No significant issues observed.                                              | 40+ Years                      | C1                    | Good : Fair                            |
| 36          | Berberis              | 2.5        | 0                    | Early Mature | Hedge                                                                        | 20+ Years                      | C1                    | Good : Fair                            |
| 37          | Cypress, Lawson       | 14         | 0                    | Early Mature | No significant issues observed                                               | 40+ Years                      | C1                    | Good : Good                            |

**Appendix B:    Tree Constraints Data:    Root Protection Areas (RPAs) and crown spread**

**Table 2** (overleaf) contains data for Root Protection Areas and crown spread for all trees – all other tree data is found in in Appendix A.

| Tree Number | No. of stems | Diameter (mm) single stem | Diameter (mm) - 2 to 5 stems                                         |        |        |        |        | Mean stem diameter (mm) | Calculated stem diameter (mm) | Radius of nominal circle (m)(from BS5837: 2012' Annex D) | RPA Area (m²) (from BS5837: 2012' Annex D) | Crown spread (m) |      |      |     |
|-------------|--------------|---------------------------|----------------------------------------------------------------------|--------|--------|--------|--------|-------------------------|-------------------------------|----------------------------------------------------------|--------------------------------------------|------------------|------|------|-----|
|             |              |                           | stem 1                                                               | stem 2 | stem 3 | stem 4 | stem 5 |                         |                               |                                                          |                                            | north            | east | west |     |
| 01          | 1            | 1070                      |                                                                      |        |        |        |        |                         | 1070                          | 12.9                                                     | 519                                        | 7                | 5    | 5.5  | 9.5 |
| 02          |              |                           | Group location - for RPA and canopy extent see Tree Constraints Plan |        |        |        |        |                         |                               |                                                          |                                            |                  |      |      |     |
| 03          |              |                           | Group location - for RPA and canopy extent see Tree Constraints Plan |        |        |        |        |                         |                               |                                                          |                                            |                  |      |      |     |
| 04          | 1            | 520                       |                                                                      |        |        |        |        |                         | 520                           | 6.3                                                      | 124                                        | 6                | 6    | 4    | 5.5 |
| 05          |              |                           | Group location - for RPA and canopy extent see Tree Constraints Plan |        |        |        |        |                         |                               |                                                          |                                            |                  |      |      |     |
| 06          | 1            | 150                       |                                                                      |        |        |        |        |                         | 150                           | 1.8                                                      | 10                                         | 2.5              | 2.5  | 2.5  | 1.5 |
| 07          | 1            | 190                       |                                                                      |        |        |        |        |                         | 190                           | 2.4                                                      | 18                                         | 1.5              | 4    | 2.5  | 3   |
| 08          | 2            |                           | 150                                                                  | 150    |        |        |        |                         | 212                           | 2.7                                                      | 23                                         | 1                | 1    | 1    | 1   |
| 09          | 2            |                           | 150                                                                  | 150    |        |        |        |                         | 212                           | 2.7                                                      | 23                                         | 1                | 1    | 1    | 1   |
| 10          | 1            | 180                       |                                                                      |        |        |        |        |                         | 180                           | 2.4                                                      | 18                                         | 1                | 3    | 2.5  | 3   |
| 11          | 5            |                           | 100                                                                  | 70     | 60     | 60     | 50     |                         | 157                           | 2.1                                                      | 14                                         | 2.5              | 2.5  | 2.5  | 2.5 |
| 12          | 4            |                           | 490                                                                  | 460    | 340    | 250    |        |                         | 794                           | 9.6                                                      | 290                                        | 5.5              | 5.5  | 6.5  | 5.5 |
| 13          |              |                           | Group location - for RPA and canopy extent see Tree Constraints Plan |        |        |        |        |                         |                               |                                                          |                                            |                  |      |      |     |
| 14          | 1            | 970                       |                                                                      |        |        |        |        |                         | 970                           | 11.7                                                     | 430                                        | 4.5              | 3.5  | 7.5  | 4.5 |
| 15          | 2            |                           | 770                                                                  | 530    |        |        |        |                         | 935                           | 11.4                                                     | 408                                        | 2.5              | 3.5  | 7    | 6   |
| 16          | 3            |                           | 430                                                                  | 440    | 450    |        |        |                         | 762                           | 9.3                                                      | 272                                        | 3.5              | 3    | 6.5  | 5   |
| 17          | 1            | 940                       |                                                                      |        |        |        |        |                         | 940                           | 11.4                                                     | 408                                        | 4                | 8.5  | 9    | 6   |
| 18          |              |                           | Group location - for RPA and canopy extent see Tree Constraints Plan |        |        |        |        |                         |                               |                                                          |                                            |                  |      |      |     |
| 19          | 1            | 180                       |                                                                      |        |        |        |        |                         | 180                           | 2.4                                                      | 18                                         | 2.5              | 2.5  | 3.5  | 1.5 |

| Tree Number | No. of stems                                                         | Diameter (mm) single stem | Diameter (mm) - 2 to 5 stems |        |        |        |        | Mean stem diameter (mm) | Calculated stem diameter (mm) | Radius of nominal circle (m)(from BS5837: 2012' Annex D) | RPA Area (m²) (from BS5837: 2012' Annex D) | Crown spread (m) |       |      |      |
|-------------|----------------------------------------------------------------------|---------------------------|------------------------------|--------|--------|--------|--------|-------------------------|-------------------------------|----------------------------------------------------------|--------------------------------------------|------------------|-------|------|------|
|             |                                                                      |                           | stem 1                       | stem 2 | stem 3 | stem 4 | stem 5 |                         |                               |                                                          |                                            | north            | south | east | west |
| 20          | 1                                                                    | 80                        |                              |        |        |        |        |                         | 80                            | 1.2                                                      | 5                                          | 3                | 1.5   | 3.5  | 0.5  |
| 21          | 1                                                                    | 80                        |                              |        |        |        |        |                         | 80                            | 1.2                                                      | 5                                          | 1                | 2.5   | 4    | 1    |
| 22          | 1                                                                    | 80                        |                              |        |        |        |        |                         | 80                            | 1.2                                                      | 5                                          | 2.5              | 1     | 2.5  | 0    |
| 23          | 1                                                                    | 120                       |                              |        |        |        |        |                         | 120                           | 1.5                                                      | 7                                          | 2                | 2     | 2    | 2    |
| 24          | 1                                                                    | 160                       |                              |        |        |        |        |                         | 160                           | 2.1                                                      | 14                                         | 1.5              | 1.5   | 1.5  | 1.5  |
| 25          | 1                                                                    | 230                       |                              |        |        |        |        |                         | 230                           | 3                                                        | 28                                         | 2                | 1.5   | 3.5  | 0    |
| 26          | 1                                                                    | 180                       |                              |        |        |        |        |                         | 180                           | 2.4                                                      | 18                                         | 2                | 2.5   | 2.5  | 2.5  |
| 27          | 1                                                                    | 200                       |                              |        |        |        |        |                         | 200                           | 2.4                                                      | 18                                         | 2.5              | 2.5   | 3    | 1.5  |
| 28          | 2                                                                    |                           | 120                          | 100    |        |        |        |                         | 156                           | 2.1                                                      | 14                                         | 1                | 1     | 1    | 1    |
| 29          | Group location - for RPA and canopy extent see Tree Constraints Plan |                           |                              |        |        |        |        |                         |                               |                                                          |                                            |                  |       |      |      |
| 30          | 1                                                                    | 360                       |                              |        |        |        |        |                         | 360                           | 4.5                                                      | 64                                         | 4                | 5.5   | 5.5  | 4    |
| 31          | 1                                                                    | 160                       |                              |        |        |        |        |                         | 160                           | 2.1                                                      | 14                                         | 3                | 3     | 3    | 3    |
| 32          | 1                                                                    | 10                        |                              |        |        |        |        |                         | 10                            | 0                                                        | 0                                          | 2                | 1     | 1    | 1.5  |
| 33          | 2                                                                    |                           | 160                          | 150    |        |        |        |                         | 219                           | 2.7                                                      | 23                                         | 2.5              | 0.5   | 1    | 2.5  |
| 34          | 1                                                                    | 160                       |                              |        |        |        |        |                         | 160                           | 2.1                                                      | 14                                         | 0.5              | 3     | 3    | 1    |
| 35          | 1                                                                    | 100                       |                              |        |        |        |        |                         | 100                           | 1.2                                                      | 5                                          | 2                | 1     | 2.5  | 1.5  |
| 36          | Group location - for RPA and canopy extent see Tree Constraints Plan |                           |                              |        |        |        |        |                         |                               |                                                          |                                            |                  |       |      |      |
| 37          | 1                                                                    | 350                       |                              |        |        |        |        |                         | 350                           | 4.2                                                      | 55                                         | 3                | 3     | 3    | 3    |

**Appendix C:    Key to botanical names**

|                 |                                   |
|-----------------|-----------------------------------|
| Berberis        | - <i>Berberis</i> spp.            |
| Ceanothus       | - <i>Ceanothus</i> spp.           |
| Cherry          | - <i>Prunus</i> spp.              |
| Common ash      | - <i>Fraxinus excelsior</i>       |
| Common beech    | - <i>Fagus sylvatica</i>          |
| Common hawthorn | - <i>Crataegus monogyna</i>       |
| Cypress         | - <i>Cupressus</i> spp.           |
| Deodar cedar    | - <i>Cedrus deodara</i>           |
| Eucalyptus      | - <i>Eucalyptus</i> spp.          |
| Fir             | - <i>Abies</i> spp.               |
| Holly           | - <i>Ilex aquifolium</i>          |
| Hornbeam        | - <i>Carpinus betulus</i>         |
| Laurel          | - <i>Prunus laurocerasus</i>      |
| Lawson cypress  | - <i>Chamaecyparis lawsoniana</i> |
| Spruce          | - <i>Picea</i> spp.               |
| Sycamore        | - <i>Acer pseudoplatanus</i>      |
| Whitebeam       | - <i>Sorbus aria</i>              |
| Yew             | - <i>Taxus baccata</i>            |

## Appendix D:    Tree retention categories

Trees are assessed for retention categories in the order in which those categories appear in the table below – with all trees initially assessed against the criteria for category 'U', followed sequentially by categories 'A', 'B' and 'C'.

**Table 3** (overleaf) is based on Table 1 of BS5837: 2012 <sup>1</sup>; some but not all of the text is necessarily reproduced verbatim.

Table 3.

| Trees that are not suitable for retention                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                 |                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Category U</b><br>Trees whose condition means that their retention as living trees beyond 10 years is unrealistic in the context of the current land use | 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 (where, for example, 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.<br><br>In some circumstances, category U trees may have conservation value which it might be desirable to preserve, despite tree condition. |                                                                                                                 |                                                                                                                                                   |
| Trees whose retention should be prioritised                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                 |                                                                                                                                                   |
|                                                                                                                                                             | 1.<br>Predominantly arboricultural merit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 2.<br>Predominantly landscape merit                                                                             | 3.<br>Predominantly cultural merit<br>(includes conservation value)                                                                               |
| <b>Category A</b><br>High quality trees, currently with life expectancy of at least 40 years                                                                | Trees that are particularly good examples of their species, especially rare or unusual species. Also trees that are essential components of groups or formal or semi - formal arboricultural features (such as an avenue's dominant or principal trees).                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Trees, groups or woodlands that have particular visual importance as arboricultural and/or landscape features . | Trees, groups or woodlands that have significant conservation, historical, commemorative or other value (such as veteran trees or wood - pasture) |

| Trees whose retention should be considered (with Category B assuming the greater priority in retention decisions)                      |                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                       |                                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
|                                                                                                                                        | 1.<br>Predominantly arboricultural merit                                                                                                                                                                                                                                                                                                                              | 2.<br>Predominantly landscape merit                                                                                                                                                                                                                                                   | 3.<br>Predominantly cultural merit<br>(includes conservation value) |
| <b>Category B</b><br>Moderate quality trees, currently with life expectancy of at least 20 years                                       | Trees that are excluded from category A due to impaired condition (such as the presence of significant though remediable defects, including unsympathetic past management and storm damage), such that they are unlikely to be suitable for retention beyond 40 years. Also trees that simply lack the special quality necessary to merit the category A designation. | Trees present in numbers, often those growing as groups or woodlands, such that their collective rating is higher than that which they might attract as individuals. Also trees occurring as collectives but situated so as to make little visual contribution to the wider locality. | Trees that have material conservation or other cultural value.      |
| <b>Category C</b><br>Low quality trees, currently with life expectancy of at least 10 years. Also young trees of stem diameter <150mm. | Trees that are unremarkable or of very limited merit, or that have such impaired condition that they do not qualify in higher categories.                                                                                                                                                                                                                             | Trees growing as groups or woodlands, but without this conferring on them significantly greater collective landscape value. Also trees offering low or only temporary/transient landscape benefits                                                                                    | Trees lacking any material conservation or other cultural value.    |

## Appendix E:    Calculating Root Protection Areas

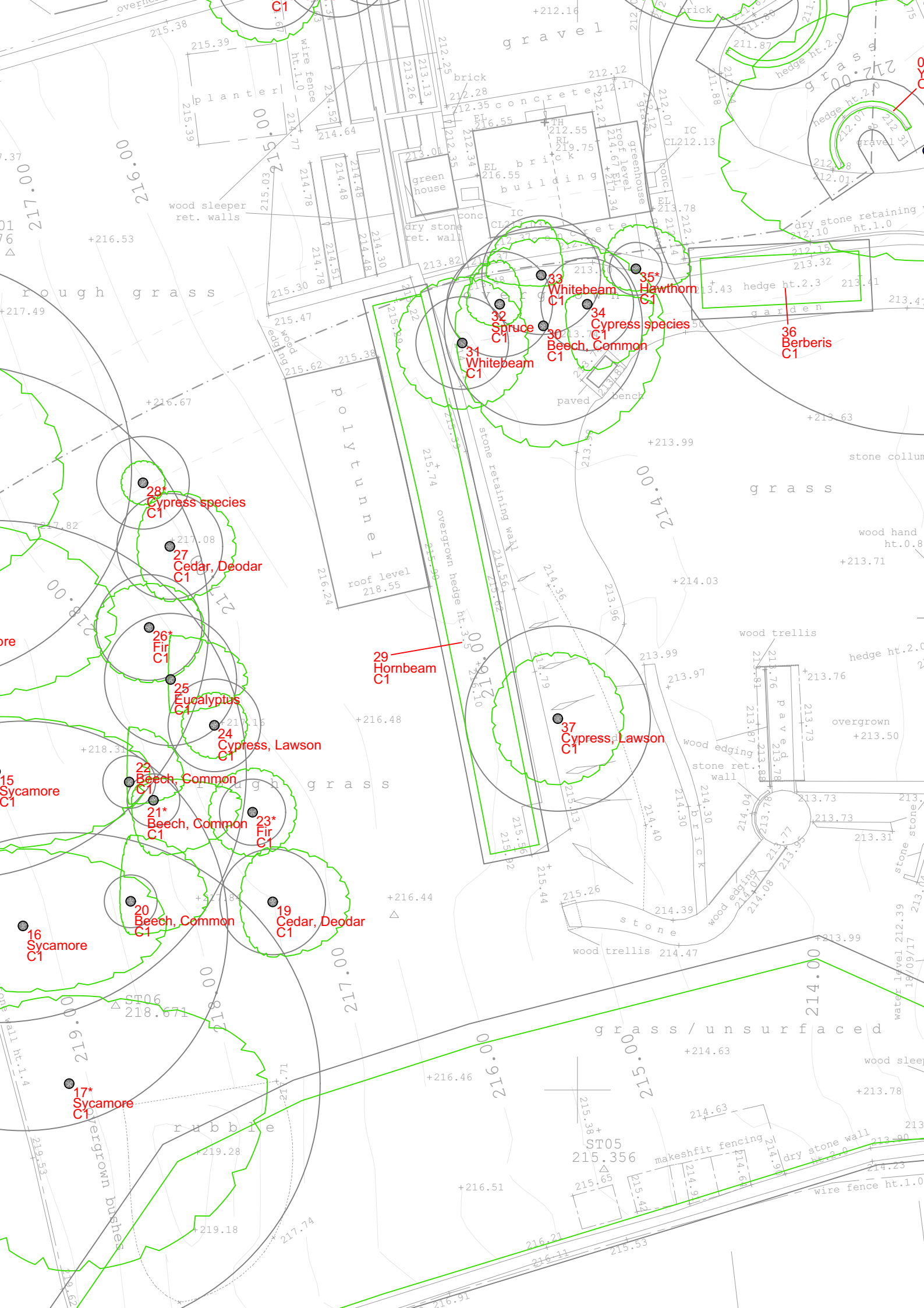
**Table 4.** This table was used to establish Root Protection Areas (RPAs) in accordance with section 4.6.1 of BS5837: 2012<sup>1</sup>, and Annex D of the same standard (from which this table's values are drawn). 'Stem diameter' refers to either the measured diameter of single stem trees, or the calculated combined stem diameter of multi-stem trees (BS5837: 2012<sup>1</sup>, 4.6.1).

| Stem diameter (mm) | Radius of a uniformly circular RPA (m) | RPA – area (m <sup>2</sup> ) | Stem diameter (mm) | Radius of a uniformly circular RPA (m) | RPA – area (m <sup>2</sup> ) |
|--------------------|----------------------------------------|------------------------------|--------------------|----------------------------------------|------------------------------|
| 75                 | 0.9                                    | 3                            | 675                | 8.1                                    | 206                          |
| 100                | 1.2                                    | 5                            | 700                | 8.4                                    | 222                          |
| 125                | 1.5                                    | 7                            | 725                | 8.7                                    | 238                          |
| 150                | 1.8                                    | 10                           | 750                | 9.0                                    | 255                          |
| 175                | 2.1                                    | 14                           | 775                | 9.3                                    | 272                          |
| 200                | 2.4                                    | 18                           | 800                | 9.6                                    | 290                          |
| 225                | 2.7                                    | 23                           | 825                | 9.9                                    | 308                          |
| 250                | 3.0                                    | 28                           | 850                | 10.2                                   | 327                          |
| 275                | 3.3                                    | 34                           | 875                | 10.5                                   | 346                          |
| 300                | 3.6                                    | 41                           | 900                | 10.8                                   | 366                          |
| 325                | 3.9                                    | 48                           | 925                | 11.1                                   | 387                          |
| 350                | 4.2                                    | 55                           | 950                | 11.4                                   | 408                          |
| 375                | 4.5                                    | 64                           | 975                | 11.7                                   | 430                          |
| 400                | 4.8                                    | 72                           | 1000               | 12.0                                   | 452                          |
| 425                | 5.1                                    | 81                           | 1025               | 12.3                                   | 475                          |
| 450                | 5.4                                    | 92                           | 1050               | 12.6                                   | 499                          |
| 475                | 5.7                                    | 102                          | 1075               | 12.9                                   | 519                          |
| 500                | 6.0                                    | 113                          | 1100               | 13.2                                   | 547                          |
| 525                | 6.3                                    | 124                          | 1125               | 13.5                                   | 573                          |
| 550                | 6.6                                    | 137                          | 1150               | 13.8                                   | 598                          |
| 575                | 6.9                                    | 150                          | 1175               | 14.1                                   | 625                          |
| 600                | 7.2                                    | 163                          | 1200               | 14.4                                   | 652                          |
| 625                | 7.5                                    | 177                          | 1225               | 14.7                                   | 679                          |
| 650                | 7.8                                    | 191                          | 1250+              | 15.0                                   | 707                          |

## **Appendix F:    Tree Constraints Plan**

The Tree Constraints Plan (overleaf) indicates the locations, retention categories, Root Protection Areas and crown spreads of all relevant trees. Tree locations are as defined on the site plan that was supplied by Design Space Architecture.

In cases where the location of a tree was not included on the supplied plan, the tree number is suffixed with an \*. In such cases, the stem location has been identified to the best ability of the arboricultural surveyor. Where reference points are to be found on site, this is likely to have involved triangulation of stem location using a laser rangefinder. In other cases, it may have been necessary to visually estimate the stem's location on the site plan.



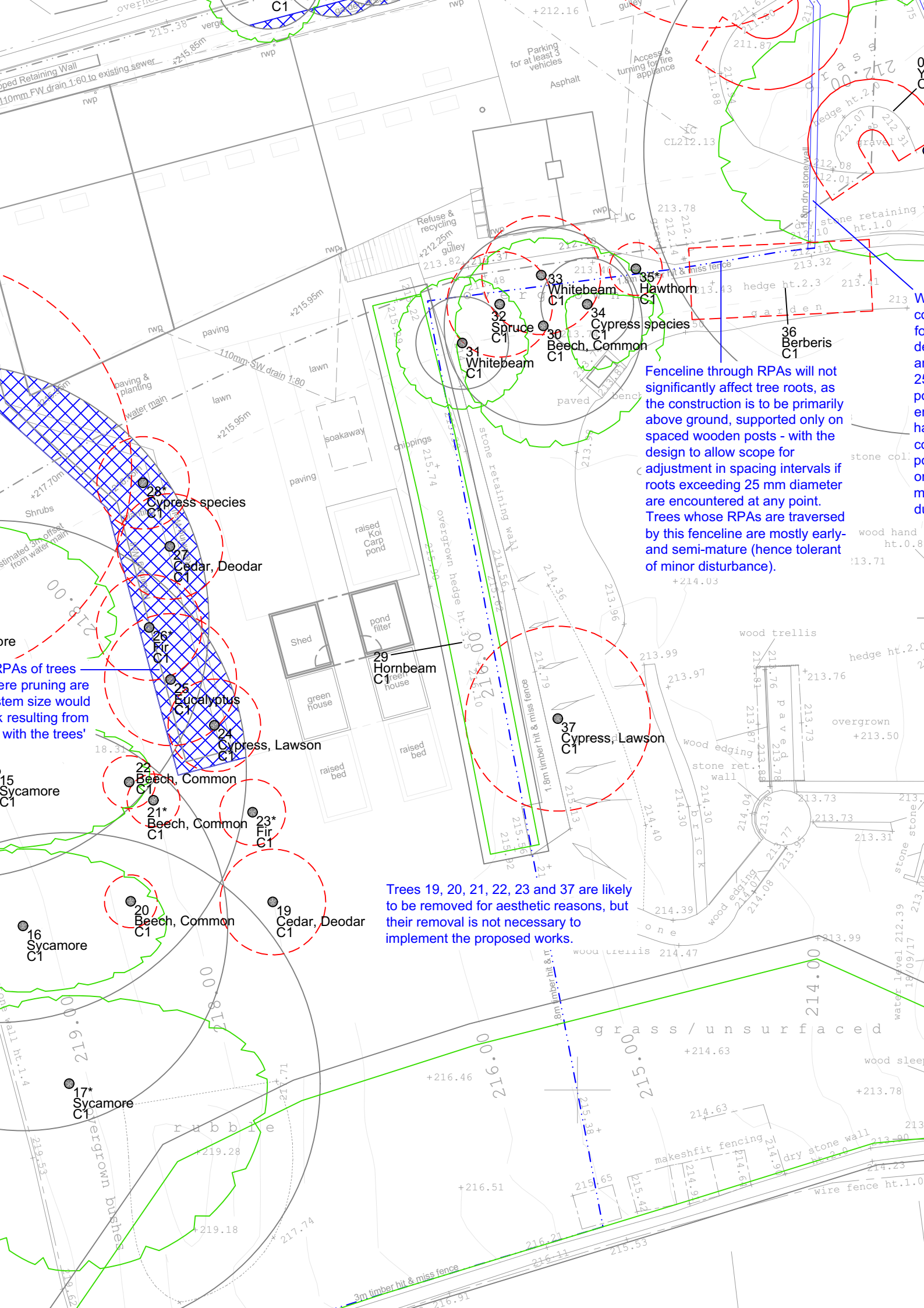
## **Appendix G:    Proposed development plan**

The proposed layout overleaf (the right-hand drawing) was supplied by Design Space Architecture. It is this layout on which this report's findings are based.



## **Appendix H:    Arboricultural impact assessment – drawing**

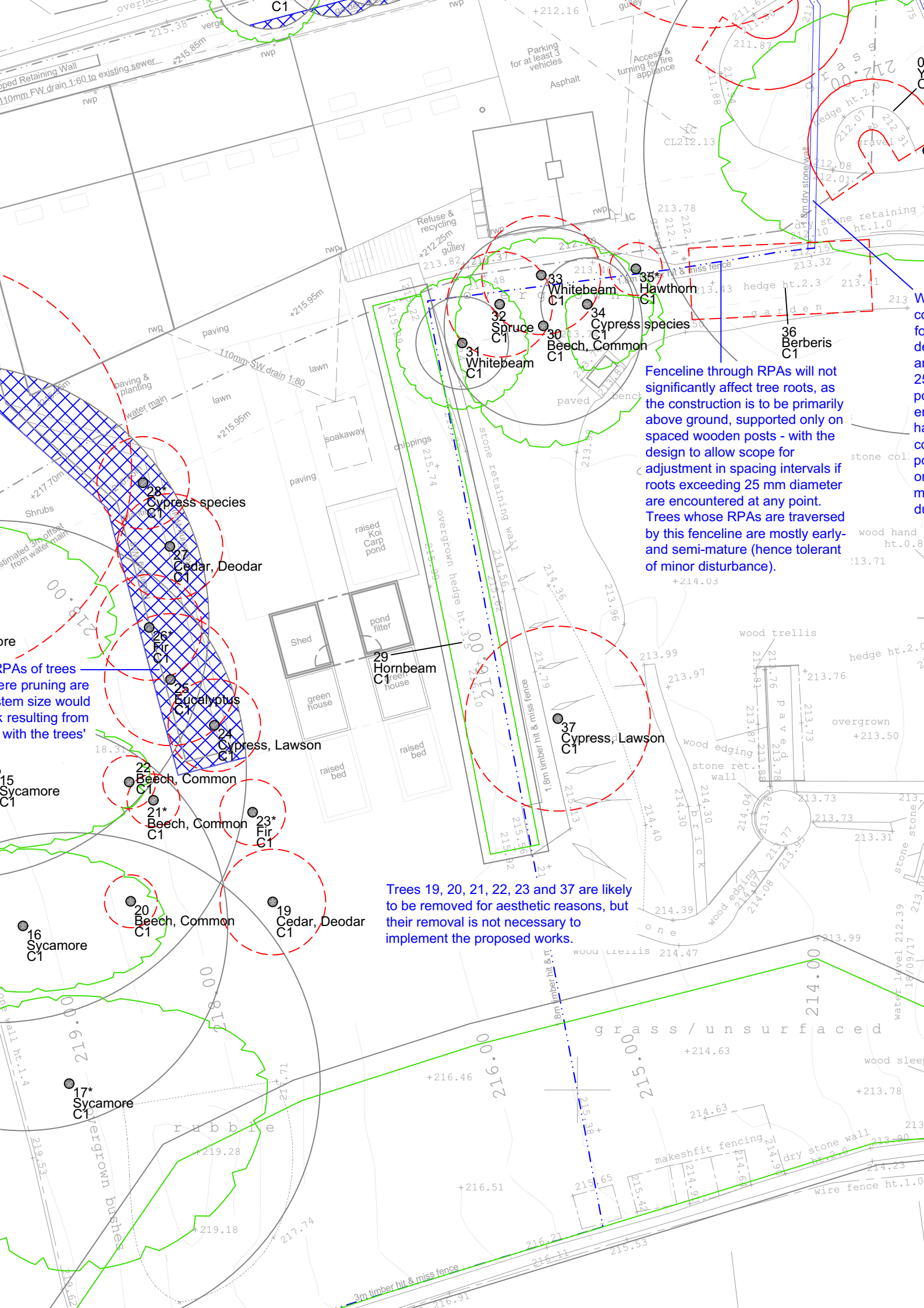
The drawing overleaf illustrates the proposed layout in relation to trees, as referred to in the Arboricultural Impact Assessment (section 4).



Fenceline through RPAs will not significantly affect tree roots, as the construction is to be primarily above ground, supported only on spaced wooden posts - with the design to allow scope for adjustment in spacing intervals if roots exceeding 25 mm diameter are encountered at any point. Trees whose RPAs are traversed by this fenceline are mostly early- and semi-mature (hence tolerant of minor disturbance).

RPAs of trees  
are pruning are  
stem size would  
resulting from  
with the trees'

Trees 19, 20, 21, 22, 23 and 37 are likely to be removed for aesthetic reasons, but their removal is not necessary to implement the proposed works.



## **Appendix I:    Tree protection plan - drawing**

The drawing overleaf illustrates the layout referred to in the Tree Protection Plan (section 5). Neither this drawing nor section 5 stands alone; it is essential that both are referred to together.



## **Appendix J:    Arboricultural Method Statement - drawing**

The drawing overleaf illustrates a number of the measures described in the Arboricultural Method Statement (section 6). Neither this drawing nor section 6 stands alone; it is essential that both are referred to together.

