ANDERSON
TREE CARE
Arboricultural Contractors and Consultants

Anderson Tree Care Limited,
Garden Cottage, Park Street,
Barlborough,
Chesterfield, S43 4TJ.
Phone; 01246 570 044
Fax; 01246 570 045
e-mail; info@andersontreecare.co.uk
company registration no. 5872995

Tree Report:	**Thornbridge Hall, Ashford in the Water. DE45 1NZ**
Client:	**Mr J & Mrs E Harrison.**
Date of Survey:	**Various dates, May 2021.** **(And previously in February 2017.)**
Weather at time of Survey:	**Mixed.**
File reference:	Thornbridge Hall 02

Appendices:
1. Sketch plan showing positions from which photographs were taken.
2. Report from 2017.

Report author: W L Anderson. Dip Arb.(RFS) M.Arbor.A.
Checked by: R H Anderson. Dip Arb.(RFS)

Situation.

Lately, a car park has been constructed within the grounds of Thornbridge Hall. This required a new driveway to be constructed within the root protection areas (RPAs) of several mature trees. Also a previously unsurfaced track has been surfaced, and other areas formerly used as hard-standing, have also been surfaced.

This report is required to assess the likely damage to the trees and what the long-term effects might be.

How trees might be damaged by construction work.

Through the 1960s & 70s, the post war development boom led to construction work being undertaken around mature trees. It was eventually realised that the maxim of "everything will be all right as long as you don't heap up soil against the tree's trunk" was not preventing trees from declining, so the Landscape Institute asked the British Standards Institute to publish guidance on avoiding damage to trees during development works.

In 1980 the first iteration of *British Standard 5837 2012 Trees in relation to design demolition and construction – Recommendations*, was produced. This was BS5837 1980, which was revised in 1991. BS5837 1991 was replaced by BS5837 2005, which gave way to the current version in 2012.

The 2005 publication came up with the idea of the "root protection area" now widely known as the RPA. It is a circular area, tree at the centre of radius 12 times the trunk diameter. Despite the presentation of this as a scientifically sound physical law, it is no such thing, it is merely a rule-of-thumb that is widely accepted. In actual fact the "rule" merely represents the likely crown spread and reflects the widely held belief that the roots reach as far as the branches spread. The implication within this is that any damage to the soils or roots within the RPA is likely to be detrimental, which is not entirely confirmed by any research.

As a general rule a mature tree will have branches that reach approximately the same distance as the RPA-radius calculation. As trees reach late maturity it is often found that this "rule" is less likely to be true; the branches might reach less than this distance. Of course many things can affect a tree's growth but the 12-times-diameter-rule gives us a pleasingly simple method of envisaging a tree's requirements.

Experiments have been undertaken in an effort to ascertain the effects of root damage to trees, many of these are discussed in the government's publication Tree Roots in the Built Environment[1]. Unfortunately most of the research undertaken into how excavation damages trees is undertaken on relatively young trees but it should be noted that trenching on one side of a tree caused very little long-term damage, and this was when the trenches were dug less than a metre from the trunk.

[1] Research for Amenity Trees no 8; "Tree Roots in the Built Environment." (2006) TSO (formerly HMSO)

Unfortunately research into how root damage might affect a mature tree's health is almost non-existent, so we are left to rely on anecdotal evidence. I am sufficiently elderly to have witnessed the installation of the cable TV infrastructure (in the early 1990s) around Sheffield (where I live), which led to the excavation of trenches in fairly close proximity to a large number of street trees. Many of us within the industry at that time anticipated this as likely to lead to the death of many trees, but this hasn't proved to be the case (so far). It would be hard to say they all thrived afterwards but equally I can think of only one tree in my neighbourhood that declined afterwards, and even that took over a decade.

Development sites are of course very different to street works situations, and I recall that in the 1980s, when I entered the industry, the very few case studies of trees declining invariably seemed to be on larger development sites, where works were ongoing for many months or even years. It wasn't RPAs having trenches dug through them that led to decline, it was the repeated trampling of the soils around trees that led to compaction and the subsequent decline of trees.

It is now well-understood that as soil bulk density increases (as it's compacted) root growth is inhibited. And to make matters worse water and air cannot percolate into the soils, which also affects tree growth. Fortunately roots, given time will help with the breaking up of compacted soils although this depends on how heavily-compacted the soils may be. Also, it is highly likely that younger trees are more resilient than elderly ones, so this is another consideration. The 1991 version of BS5837 did allow the reduction of RPAs depending on a tree's age and vigour, although this aspect is not specifically mentioned in the 2005/12 version.

It should be remembered that the often-seen illustration, where a tree's go down almost mirroring the branch and trunk growth is wrong. Most tree root action is the upper 600 mm of the soil profile. And surfacing works are unlikely to reach even half that depth.

I think it is fair to make the following summary:

- An intrusion into the RPA that only affects a small portion of the circular RPA is unlikely to cause lasting damage.
- Cutting a trench through an RPA on only one side, that never gets closer than say half the RPA radius is unlikely to be significantly detrimental.
- Installing a tarmac surface is unlikely to involve excavations that sever deep roots.
- Spending many months working within an RPA, repeatedly using machinery that compacts an RPA's soils, is likely to be more damaging than an operation completed over (say) a couple of weeks.

The trees.

I have considered this situation in four parts: These are the (1) trees by the new drive, (2) the trees in the new car park, (3) the trees alongside the newly surfaced track (disabled access route) at the east side of the garden, and (4) the trees at the north side, adjacent to the Monsal Trail.

1. Trees by the new drive.

Photograph 1.

Photograph 2.

Photograph 1 is a view looking roughly south-west from roughly half-way along the drive. The driveway encroaches the RPAs of at least 3 trees, although I do not think that this intrusion is sufficient to cause any lasting damage. The bund of soil to the north of the drive is a concern but it is not likely to have caused any damage in the RPA of the tree to the right. The soil currently heaped up within the RPA could be removed and leave the roots beneath undisturbed.

Photograph 2 shows another tree at the side of the new drive, which has clearly been effectively dead for several years. This is nothing to do with the recent driveway installation. The tree is a Sycamore.

Photograph 3.

Photograph 4.

Photographs 3 & 4 show two more trees in extremely poor condition. Photo 3 is a Purple leafed Norway Maple: I understand there is an ongoing drainage problem near this tree. it's poor condition may very well relate to water-logged soils. Photo 4 is a Horse Chestnut, almost certainly one of the pink-flowered cultivars. I say this because it has a graft union at the top of the trunk. Pink Horse Chestnuts are almost always sickly trees; they suffer from a sort of canker (usually called bud proliferation) that almost certainly is due to poor plant breeding. It's condition is also not related to recent activity.

Photograph 5.

Photograph 5 is another Horse Chestnut showing the early signs of decline. This is almost certainly due to Horse Chestnut Bleeding Canker.

Unfortunately Horse Chestnut as a species is having a pretty hard time of things at the moment, with two sorts of Bleeding Canker (one bacterial, one fungus-like) affecting it, and a leaf mining moth as well. I also couldn't help but notice that livestock damage to some trees around the parkland is quite significant. (There's a Lime tree just to the east of the car park bund that is being undermined by Badgers excavating a sett. We have recently seen a tree topple due to Badger excavations!)

(The splodges on the photo are rain on the lens.)

Photograph 6 shows the Lime tree with quite extensive excavations at its base. The car park bund is in the background. This tree is well away from any surfacing work; I've included the photo to illustrate the other issues that may be affecting trees.

Photograph 6.

Overall, whoever decided the driveway should follow the route it has taken did a reasonable job of keeping it away from trees.

2. Trees within and adjacent to the new car park.

Superficially there are only a couple of trees in the car park, both Horse Chestnuts. Both have been given space in accordance with the "branch spread" principle.

Photograph 7.

Photograph 7 shows the tree furthest down the car park. This is approximately 18 metres tall and I measured the trunk diameter to be almost a metre. This means its RPA should be a circle of radius 12 metres. the patch of grass that surrounds the tree is not that big it's approximately 16 metres across and the right hand boundary is 6 metres away from the tree.

There are some signs of minor dieback, albeit nothing as obvious as the tree in photo 5.

Photograph 8 shows the base of the tree, the rather patchy grass suggests that livestock previously gathered and grazed beneath the tree. It's not immediately obvious but the tree's roots have suffered some damage, compacted soils and damaged roots, from the livestock. This sort of damage is fairly typical for parkland trees.

Photograph 8.

Photograph 9.

Photograph 9 shows the other Horse Chestnut, higher up the car park. Its trunk diameter is slightly less at 950 mm, and its height is 18 metres.

The patch of grass in which it stands is 20 metres by 15 metres, so about 25% smaller than BS5837 suggests; 300 m^2 rather than 408. (See BS5837 annex D.) Noticeably the tree's branch spread is roughly the same as the undisturbed ground.

Photograph 10 is another view of the higher tree. This is taken looking roughly west.

Photograph 10.

Photograph 11.

Photograph 11 is a view of the trunk of the western tree. I think this has suffered an attack of Horse Chestnut Bleeding Canker in the past that has led to the strips of exposed heartwood.

This tree is also showing signs of some dieback, much the same as the eastern tree.

Horse Chestnut Bleeding Canker seems to affect trees differently. I have seen some trees succumb fairly rapidly while others appear to recover only to decline later. The disease can lead to the timber becoming very brittle but I don't think that is a concern with either of the car park trees at the moment.

While the two Horse Chestnuts are the most notable trees on the car park, there is also an area of woodland to the north; adjacent to the Monsal Trail, and to the west. The western area of woodland is actually in the garden although the tarmacked area does get quite close to some of the trees.

Photograph 12 is a view of the woodland edge looking west along the northern edge of the car park.

Photograph 12.

Photograph 13.

Photograph 13 is a view looking east along the northern edge of the car park.

Woodland is not paid much heed in the planning legislation, the NPPF only mentions semi-natural ancient woodland (SNAW). This area of woodland, adjacent to the car park at least, appears to be fairly recently planted in that all the trees are a similar size and seem to have been planted fairly uniformly.

Photograph 14 taken looking roughly northeast, from the public footpath shows the western end of the woodland.

Photograph 14.

The woodland stretches alongside the Monsal Trail, along the parkland's northern boundary. I think it's fair to regard this as secondary woodland, and equally fair to note that it does not appear to have received any proactive management in recent years: While considering woodlands it should be noted that the Forestry Commission are quite concerned about unmanaged woodlands. The ecosystem services that are increasingly being recognised in planning guidance, are best provided by proactively managed woodlands. Planting trees and forgetting about them is not good practice in any situation. All trees that are likely to have a long life will require some nurturing.

None of the trees at this part of the woodland are particularly large and I do not think the individual trees have had their RPAs significantly intruded upon by the car park surfacing.

The trees in the garden, alongside the car park (to the west) are generally larger than the ones in the woodland but I shall address those as part of the next section.

3. Trees alongside the disabled access to the garden.

New surfacing has been laid over an existing track that gave access to the parkland from the garden. I understand this was used mainly by quad bikes, and small tractors might also have traversed this area. I understand that this has been installed to ensure wheelchair users can access the garden.

A public footpath from the Monsal Trail's footbridge crosses the parkland. The footpath runs roughly north to south and is adjacent to the garden boundary, at the upper edge of the car park.

Photograph 15.

Photograph 15 is a view looking north along the drive. Obviously the tarmac is covering almost 50% of the RPAs of some of the trees. The trees here are labelled; Norway Maple, Horse Chestnut, and Sycamore.

(The Bluebells in this photo are the non-native Spanish ones.)

I've highlighted these three trees because they are all in poor condition. The Norway Maple has an extensive pocket of decay at the base, the Horse Chestnut is completely dead, almost certainly due to Horse Chestnut Bleeding Canker, and the Sycamore seems to have two separate cavities higher in the crown. The Maple threatens the public footpath and should have been removed before now. (I will shortly be putting in notice to the local planning authority in order to get these trees removed.)

Photograph 16 shows the base of another tree at the side of the disabled access. This is not good, although it would be reasonable to note that probably less than 50% of its RPA has been affected.

Photograph 16.

It's difficult to know what the future may hold for trees like these. Quite clearly more consideration could have been given to the situation but had the problem been examined before the tarmac was installed, I think it likely that a similar route would have been chosen, although the three trees in photo 15 would have been removed before the surface was laid. The tree in photo 16 would probably also have been removed. It is my experience that damage of this sort, might take many years to develop and become stability threatening.

4. Trees alongside the Monsal Trail.

In February 2017 I appraised a number of trees here, in anticipation of a planning application, although I was not commissioned to look at all of the trees. I noted then that trees had been ignored for quite a long time and my conclusion pointed out that the whole site would benefit from some new trees being planted. Although I did not inspect all the trees along this boundary I gained the impression that this area of the site had been used as a dumping ground or storage area for "stuff that would probably come in useful." My report of 2017 pointed out two Beech trees with a fungal infection that were subsequently removed, and noted several other trees that appeared to be in decline.

Photograph 17. (Taken February 2017).

Photograph 17 shows what can reasonably be called a stockyard. This is looking east along the boundary. Various bits and pieces of stone and building materials have been stored here without much concern for trees. I understand that some of the stone stored here probably dates from the time when the site was owned by Sheffield Council and used as an educational establishment. The Council undertook modifications in order to make it usable for teaching, without much consideration for the history of the place. (This is fortunate as in the 1980s, Sheffield Council notoriously demolished some of its buildings before they could be listed by Historic England.)

Photograph 18. (Taken 2017.)

Photograph 18 shows a Sycamore tree that is now surrounded by tarmac. It's not obvious in this photo but the tree is surrounded by hard-packed, compacted gravel. This tree is at the limit of my 2017 inspection.

Photograph 19 is the same tree now. I presume the tarmac has simply been laid on the existing surface

Photograph 19.

It is possible that this new tarmac is preventing rainfall from percolating through to the soil beneath, and thus becoming available to the tree, but it is also possible that the compacted gravel is similarly impermeable.

Photograph 20.

Photograph 20 shows a Norway Maple in front of the gate to the Monsal Trail. The tarmac here is less close to the tree but still covers a large portion of the RPA.

Photograph 21.

Photograph 21 is a view looking west along the Monsal Trail boundary; the trail is over the wall. I don't know what was here before the area was tarmacked. The tree in photos 18 & 19 is at the far end of the hedge at the left.

Photograph 22 is a view of the same trees in photo 21 but taken looking eastwards.

Photograph 22.

Photograph 23.

Photograph 23 shows the area at the end of the tarmacked area. The Sycamore in photo 18 is at the left hand side in the background.

This concludes my observations on the trees possibly affected by the tarmac laying.

Discussion.

From the point-of-view of trees, and at first sight, this whole project is somewhat disconcerting. However after a closer inspection I have not found any trees damaged so extensively that I felt it necessary to immediately condemn them. (The trees I have recommended for removal are trees that would be condemned if they were found in any public space.)

Also, I believe that the project has, in the case of the car park Chestnuts at least, sought to avoid damaging trees by leaving the ground beneath the crowns undisturbed. Although the space given to the trees does not entirely comply with BS5837's recommendations, it is almost certainly adequate. Also, if there had been any dispute as to how much space they should be given then it would have been reasonable to make a case for their replacement as their future prospects are not at all certain.

It is undeniably a waste of time attempting to preserve trees through a development project when their future lives are likely to be relatively short. The previous version of BS5837 accepted that a tree with less than 20 years life expectancy should not be a constraint on a development proposal, although the 2012 version is less forthright even if that implication remains.

It seems sensible to consider whether or not any of the affected trees would by themselves stand in the way of planning permission for any project. The ultimate question is would any of those trees justify protection with a Tree Preservation Order? The trees already have rudimentary protection by virtue of being in a Conservation Area, but none of the ones affected by these works have sufficient amenity value to justify them standing in the way of a development proposal. The crucial aspect in considering whether a tree is TPO worthy is whether a tree's removal would have a significant negative impact on the environment and its enjoyment by the public[2], which in this case is debatable. I am aware that Thornbridge Hall's owners have no intention of causing any significant negative impact, precisely the opposite in fact.

The most important thing with any collection of trees is to ensure that there is a broad age and species range. Rodney Helliwell (the very well-known and highly respected Arboriculturist, sadly recently deceased) suggested that a management objective with any tree population should be replacement of 10% of the tree stock every ten years. Also, it seems barely a month goes by without news of another impending tree disease, and as it seems that many diseases, like the current Chalara Ash Dieback, are species-specific, ensuring that there is a range of species from different plant families is the best defence against denudation. Another defence against disease is youth: Younger trees growing vigorously are frequently more resistant to diseases than elderly, less-vigorous trees, so ensuring there is always a range of ages is also wise.

My site inspection in 2017 drew the conclusion that renewing the tree stock should be an ongoing objective for Thornbridge Hall, and I draw the same conclusion from this visit. If this current scheme is the impetus for addressing the lack of any recent tree planting then I would consider that a positive outcome.

All this said it is impossible to deny that damage must have been caused to established trees and that had more consideration been given to trees then a different scheme might not

[2] See paragraph 7 of https://www.gov.uk/guidance/tree-preservation-orders-and-trees-in-conservation-areas

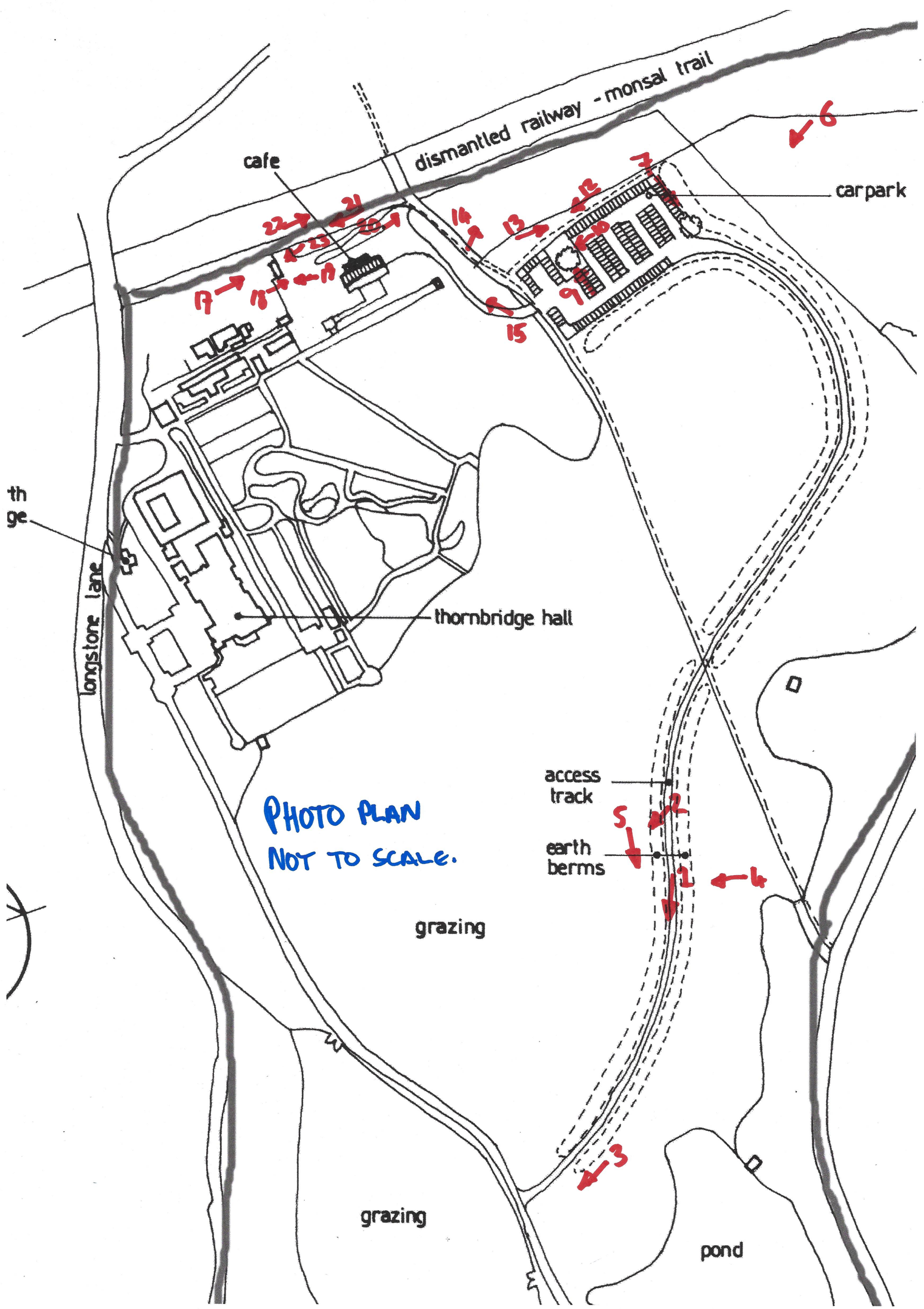
have been proposed. However proving that the works undertaken have led to significant life-shortening damage to any individual tree in the short-term is extremely difficult.

I think it worth noting that this project seems to have been undertaken very rapidly. The construction work was confined to the areas that are now tarmacked and damage to the soils beneath trees elsewhere was avoided. I have been involved with numerous building sites over the last 40 years, and seen many trees that suffered maltreatment over a considerable period. This is clearly not the case in this situation. I further note that attempting to dig up the recently installed surface and then replacing it with some sort of tree-friendly surfacing system, is likely to cause further root damage.

Conclusions.

1. Had the new drive to the new car park been planned to avoid damaging trees the route chosen would have been very similar to the one taken.
2. The new car park has been constructed in a manner that sought to avoid established trees and has largely achieved that objective.
3. Had a route for the disabled access through the trees been planned around the lowest quality trees, it would have been in roughly the same position.
4. Many of the trees along the Monsal Trail-boundary have been suffering from unintentional neglect for many years.
5. Although several trees have undoubtedly suffered some damage as a result of the tarmac surface installation, none have been rendered immediately unstable.
6. Although several trees may suffer long-term decline from the tarmac installation, it is not possible to make any firm predictions as to how long it might take for any decline to manifest itself.
7. The installation of the surfaces seems to have been undertaken largely without affecting the soils and vegetation outside of the surfaced areas.
8. None of the trees affected could be described as being veteran or ancient and none have characteristics that make them stand out from many other trees growing on the estate.
9. The vast majority of the trees on the Thornbridge Hall estate are unaffected by this development.

W L Anderson. Dip.Arb(RFS). M Arbor A.
Anderson Tree Care Limited. May 2021.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Garden Cottage, Park Street,
Barlborough,
Chesterfield, S43 4TJ.
Phone; 01246 570 044
Fax; 01246 570 045
e-mail; info@andersontreecare.co.uk
company registration no. 5872995

Tree Survey:	**Thornbridge Hall, Ashford in the Water. DE45 1NZ**
Client:	**Mr & Mrs Harrison, via Jason Bannister, Bannister Architectural Limited.**
Date of Survey:	**February 7th and 9th 2017.**
Weather at time of Survey:	**Fine but dull.**
File reference:	Thornbridge Hall 01

Appendices:
1. Tree location plan.
2.

Report author: W L Anderson. Dip Arb.(RFS) M.Arbor.A.
Assisted by: S L M Farrimond BSC (Hons) MSc
Checked by: R H Anderson. Dip Arb.(RFS)

Introduction.
Mr & Mrs Harrison are seeking to erect some outbuildings to the rear of Thornbridge Hall. These to be used for activities associated with the day-to-day operations of the Thornbridge Hall estate. The area proposed for these buildings is currently used as informal storage for machinery, materials and compostable waste.

There are some large trees around the area hence this report. Some are in very poor condition. All my comments are made with reference to drawing 15/017 02.

Tree Preservation Orders.
Thornbridge Hall is listed and is a Conservation Area. I shall presume all the trees have basic protection.

British Standard 5837 2012 Trees in relation to design demolition and construction – Recommendations.

I have taken the above document as the basis for this report. The Standard has been recently revised and the 2005 version withdrawn. The Local Planning Authority should consider this Standard in its deliberations about this site. The Standard states its objectives of achieving "a harmonious and sustainable relationship between trees and structures."

The preoccupation of this standard is the categorisation method and the Root Protection Area (RPA). The logic for this is that resources should not be wasted attempting to retain trees that do not justify retention, nor should a project set out to retain a tree only to ensure its rapid demise by failing to take account of its growing conditions.

While the Standard covers much more than these matters, at this stage in this project these are the major concerns. This survey is intended to supply the information necessary to ascertain which trees are suitable for inclusion in the project and how their retention will affect the manner in which the site is developed. BS5837 anticipates that an Arboricultural Impact Assessment (AIA) will be undertaken once the layout is finalised and that the planning application will be accompanied by a Tree Protection Plan (TPP).

The TPP is a drawing that shows which trees are to be retained and where the protection measures are to be installed. This should be accompanied by a "Method Statement" detailing the measures to protect the trees and when they can be removed. The AIA will contain details of tree work to be undertaken to facilitate the development and a summary of any tree planting.

BS5837; Tree Categorisation Method.
The categorisation method is summarised in BS5837 at section 4.5 where it emphasises the need for it to be undertaken by an Arboriculturist. Elsewhere the Standard tells us that an Arboriculturist should be a "person who has, through relevant education, training and experience, gained expertise in the field of trees in relation to construction."

There are 4 retention categories; U, A, B & C. The criteria for inclusion in each category and subcategory are summarised in Table 1 "Cascade chart for tree quality assessment," an interpretation of which follows:

Trees unsuitable for retention.			
Category and definition			
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.	Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees. Trees that are dead or 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. *NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve.*		
Trees to be considered for retention.			
Category and definition	Subcategories		
	1. Mainly arboricultural qualities	**2. Mainly landscape qualities**	**3. Mainly cultural qualities**
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 or principal trees within an avenue).	Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features.	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture).
Category B 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.
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.

NB. This is an interpretation of table 1, not a copy, although much of the text is verbatim.

BS5837 contains details about what colours should be used to indicate their categories on any drawings; these are U = dark red, A = light green, B = mid blue, and C = grey.

BS5837 goes into greater detail (at 4.5.10) about the appraisal of small trees; those of less than 150mm diameter, as these are easily replaced with similar sized new trees. It notes that they might even be transplanted.

It includes further detail (at 4.5.11) about the importance of veteran trees and the measures that are likely to be needed to avoid damaging them and to ensure they are not an imposition upon a development.

BS 5837; Root Protection Area.

The Root Protection Area (RPA) is defined as a circular area of radius 12 times the trunk (stem) diameter (TD). BS5837 contains details as to where and how it should be measured, and also as to how to treat trees with more than one stem; an equivalent diameter is calculated. I use a diameter tape to measure this and use common sense to adjust this measurement where Ivy or other factors affect the measurement. Despite the Standard's attempts to standardise the measurement conventions there will be times when there is little choice but to estimate the measurement.

While the RPA is defined as a circle the Standard accepts the impracticality of erecting circular fences and it implies that other shapes are acceptable as long as the impact of the alteration is properly appraised. As a general rule, the 12 times the TD sum can be interpreted as a "tree to building distance" that is easy to calculate. It would usually be acceptable to plot the RPA on any drawing as a square with sides of twice the tree to building distance, notwithstanding the fact that this would have a greater area than the circular area.

The two previous versions of BS 5837 have contained advice about offsetting the RPA. The 2012 version does not but allows (at 4.6.2) deviation based upon "a soundly based Arboricultural assessment of likely root distribution."

The 12 times the TD rule is often seen as a mathematical method of calculating where a tree might have grown roots, plainly it is not. It might be helpful to consider it as a system of calculating the size of pot that might be needed were it possible to transplant a mature tree into a pot. The calculation is actually for a volume of soil, although as the pot is predetermined to be 600mm deep (most tree root action is in the upper 600mm of a soil profile), it is only necessary to calculate an area.

Clearly if a tree has grown on very shallow soils it might be necessary to have a larger RPA. I anticipate that a tree grown in such conditions would be of relatively poor quality, although making firm predictions about such things should be avoided.

At Annex D, BS5837 contains a table of RPA areas for single stem diameters, and at Annex C the measuring conventions are illustrated. Annex D rounds the TD to multiples of 25mm and the RPA to the nearest whole square metre.

While damage to tree roots is paramount, other factors need to be taken into consideration; factors such as shade from nearby trees, future growth and even access for machinery in order to undertake future tree management. These factors may affect the categorisation.

The Survey Schedule.

While BS5837 suggests numerous factors that should be recorded on the schedule the information presented in this survey is as follows:

1. **Tree no & species.** I hope this is self-explanatory. I routinely use common names but will use scientific names to clarify the identification where necessary. Some trees are dealt with as groups. Hedges are dealt with similarly.
2. **Height.** (Ht) measured in metres. This is estimated from ground level. I use a clinometer and laser range finder to assist. While these are reasonably accurate, actually seeing the top of a tree from ground level can be difficult so the height should always be regarded as an estimate.
3. **Trunk Diameter.** (TD) measured in millimetres using a tape. This is rounded up to the nearest 10, greater accuracy is unnecessary. Where I have been forced to estimate the measurement due to basal growths or some-such, the figure is appended with an "E."
4. **Age class.** BS 5837 uses the term "life stage." I consider this to mean the same as age class. The categories are Young (Y), Middle-aged (EM for early-mature), Mature (M), Over-mature (OM) and Veteran (V). BS5837 uses the class "semi-mature" but this appears too similar to early-mature for me to make a meaningful distinction. A veteran tree is one that has probably exceeded its 'normal' life span and has developed attributes such as wildlife habitat, biodiversity benefits, historic association or such-like. To quote from the Standard: It is a tree that *by recognised criteria, shows features of biological, cultural or aesthetic value that are characteristic of, but not exclusive to, individuals surviving beyond the typical age range for the species concerned.*
5. **Category.** The retention category as detailed above.
6. **Comments**. This column is simply to impart additional information and may cover reasons for the trees' categorisation or anything else that I feel is worthy of mention. Peculiar crown formation might be mentioned, or an unusual branch configuration. BS5837 recommends we measure the *"radius of branch spread at the four cardinal points*." This section will contain that information if I feel it necessary to measure unusual crown formation. Otherwise the presumption is that the trees are fairly typical for the species. The Standard also suggests that we record the height of crown-clearance; that is how far from the ground the branches grow. I shall not mention this unless it is unusual or particularly relevant. I shall broadly confine my assessment of the trees physiological condition to poor, fair, good, or dead and mention it here. All trees are assumed to be in good condition unless mentioned otherwise. The Standard asks us to include the *"estimated remaining contribution in years."* This is rather a "how long is a piece of string" question. I shall include a rough assessment of remaining life where I deem it necessary. By and large this will have been included as part of the 'category' assessment. If necessary I shall comment here.
7. **Root Protection Area.** As detailed above. Taken from Annex D. (NB. The RPA is 'capped' at 707m^2, i.e. a circle with 15m radius or a square with 26m sides.)

BS5837 contains a suggestion of information that might be gathered for a tree survey. This includes information such as the height of a tree's first branch, and the

crown spread to the four cardinal points. I note that the Blue Book (that is “Tree Preservation Orders; a guide to the law and good practice” DETR 2000 (since 2014 replaced by internet guidance that says much the same thing)) contains the very useful advice that local planning authorities should not ask for any more information than is necessary to decide an application (to work on a protected tree). This is a sensible approach and one that I apply to all matters related to planning and trees. I note that the recent NPPF document (at paragraph 193) contains similar advice.

If something is particularly notable about a tree, say the crown spread is particularly broad or lop-sided, I shall mention it and expand upon the characteristic and its relevance in the discussion section of the report.

The previous version of BS5837 contained the instructions for preparing a “Tree Constraints Plan.” While this was a sensible idea it was probably over complicated. It was intended to be a tool to inform the designer of a site layout more than an essential component of a planning application. It was meant to show the various retention categories of each tree or group, the tree positions and the heights and accurate spreads of each tree. It was also supposed to show the areas likely to be affected by shade. Shade would clearly differ from June to December and on slopes of different orientations, so this would be a complicated drawing. In fact I think it would be likely to be so convoluted as to be unusable.

Experienced designers are fully capable of working with different levels, neighbouring buildings, slopes of differing orientation, and interpreting where shade might be a problem, so the tree constraints plan could be seen as unnecessary. It is our intention that the tree schedule should provide sufficient information for a suitably experienced and skilled graphic designer to prepare some sort of Tree Constraints Plan should he or she consider it was necessary.

“An iterative process.”

BS5837’s Figure 1 is a flow chart illustrating the processes in developing a site. It emphasises that a development project should be an “iterative” process, meaning that advice from the Arboriculturist should be ongoing. This might mean that a sketch of a proposal should be discussed with the Arboriculturist, and the impact on trees appraised before preparing more detailed plans.

On large spacious sites it might be feasible to simply position structures and services outside of the RPAs, but on more typical sites it might be necessary to sacrifice a poor quality tree in order to give a better quality tree more space.

If these matters are addressed before a planning application is submitted it ought to speed up the decision-making process for the local planning authority. Figure 1 anticipates that the planning application will be accompanied by a Tree Protection Plan, which shows the positions of RPA protection fencing, and an Impact Assessment. This should be a summary of tree work that the project will require. This will include trees that are to be removed as well as those that might need pruning. It will also include an appraisal of the benefits of any tree planting and the likelihood of improved tree management upon the project’s completion. By definition the impact assessment will take into account the surrounding area’s tree population and the condition and management (or lack of) currently in operation.

The Trees.

A tree location plan is appended to the rear of this report; the tree numbers have been superimposed on the proposed site layout drawing. It appears that this was prepared from a previous topographical survey and thus shows some trees of which there is now no sign at all.

Tree No.	Species.	Ht	TD	Age class	Cate-gory	Comments.	RPA
1.	Beech	22	1100	M	U	Old *Meripilus giganteus* bracket on base. Principle tree in a group of 3 Beech. Obvious die-back. No option other than removal.	0
2.	Beech	23	1000	M	C1	Middle tree of group of three with 1 & 3. Will be a rather peculiar shape when tree 1 is removed.	452
3.	Beech	22	900	M	C1	Some decay and damage – one-sided crown due to tree 2.	366
4.	Sycamore	16	520	M	C1	2m from wall, one-sided crown entirely over highway.	124
5.	Sycamore	16	570	M	C1	Trunk hard against the wall, one-sided crown entirely over Monsal Trail.	150
6.	Sycamore	15	490	M	C1	Trunk against wall, one-sided crown entirely over Monsal Trail	113
7.	Sycamore	15	450	M	C1	Poor form, one-sided crown – Holly, Yew and Portuguese Laurel beneath	92
8.	Norway Maple	14	590	M	C1	Poor form and significant bark damage, probably due to Squirrels.	163
9.	Beech	20	910	M	U	Basal impact damage, significant cavity at 8m. The cavity is over 600mm deep and the diameter of the trunk at this point is less than 900mm. There is little option other than to remove this tree.	0
10.	Beech	20	1110	M	U	Clusters of old *Meripilus giganteus* brackets around base, obvious die-back, no option other than removal.	0
11.	Sycamore	17	740	M	C1	One-sided due to tree 12, old stump at base.	255
12.	Sycamore	18	710	M	C1	Ivy clad. Poor form, some Squirrel damage.	238

Tree No.	Species.	Ht	TD	Age class	Cate-gory	Comments.	RPA
13.	Sycamore	18	640	M	C1	Ivy clad. Severe basal damage and some decay. Very close to pump(?) building.	191
14.	Sycamore	16	800E	M	C1	Ivy clad. Poor form, some damage.	290
15.	Sycamore	16	650	M	C1	Ivy clad. Poor form, some damage.	191
16.	Sycamore	16	620	M		Ivy clad. Minor basal wound, nothing special	177
17.	Sycamore	21	780	M		OK. Compaction around roots.	290

Discussion.

I am aware that Thornbridge Hall has something of a convoluted history. Not so many years ago from 1945 to 1997, the site belonged to Sheffield Council who used it as a teacher training college. During this period the trees and grounds were managed by Sheffield's Parks Department and I can imagine that the area where the proposed buildings are to be located was used pretty much as it appears to be used now; as a storage area for the site's accoutrements and compost. I mention this matter because I find it easy to envisage the current owners being blamed for not having paid much attention to the trees in the area, and I doubt this is the case; it is highly likely that the neglect of the trees in the area commenced a long time ago.

I'm not trying to be critical here, it's just that as an Arboriculturist with almost 40 years experience I have seen how out-of-the-way areas within parks and gardens are sometimes commandeered for exactly this sort of use. All too often the result is trees are damaged; not maliciously but simply by having their physiological requirements ignored. Such habits are widespread. We have to accept that modern working practices do not necessarily fit in with landscapes designed by the Victorians. These days we are obliged to use machinery to avoid injuring employees and we have to accept that these gardens were designed for manual workers with wheelbarrows, not machinery lime modern tractors.

The Monsal trail is just over the site boundary and I am extremely conscious that this is an intensely used tourist-facility. This has some significance to risk management in that we need to appraise the trees accordingly.

Photograph 1.

Photograph 1 shows trees 1, 2 and 3. At this time of year it is fairly easy to see how the crowns of the individual tree fit together. I think it is obvious that when tree 1 (at

the left) is removed the remaining trees will be rather strangely shaped. While it might seem presumptuous of me to state that this tree is coming down, there is really little choice in the matter. The Giant polypore fungus (*Meripilus giganteus*) is a notorious cause of decay in Beech trees and while it is difficult to appraise the extent of decay, in this case, the crown is sufficiently degraded (died back) to reason that it must be removed. This appraisal is based upon the fact that at the time of my visit there was what appeared to be an expensive tractor parked beneath it and a quantity of dressed stone, which is likely to be valuable. It goes without saying that if this tree collapsed or toppled towards the Monsal Trail the consequences could be tragic.

Photograph 2.

Photograph 2 is a view of the base of tree 1. The gunky-fawn mass between the cut saplings is the degraded fungal fruiting body. There is a similarly degraded mass at the base of tree 10.

Photograph 3 is a view of the base of tree 10. It is clear that this tree has been suffering root damage from passing vehicles for a considerable period. The *Meripilus* fungus probably developed as a result of roots being repeatedly wounded although the tree growing in such a confined position will probably not have helped its resistance to infection. We should not blame the infection entirely on these factors; this is not a tree in the first flush-of-youth and generally resistance to disease decreases with age.

This tree cannot be retained as it is very close to a workshop and the former chapel building where it appears people work.

Photograph 3.

I should note here that it's a basic principle of risk assessment in respect of trees that a tree in the middle of a field where there is little to damage should a tree fall over, does not need to be removed. There are numerous biodiversity benefits in declining trees so if they can be retained with little risk of injury or damage they should be left alone. In this situation where there are large trees with a known defect in close proximity to people and structures, there is little choice other than to remove them.

Photograph 4.

Photograph 5.

Photograph 4 is a view of my colleague sticking a steel tape measure into the hole in tree 9. Photo 5 is a view of the hole which is approximately 100mm from top to bottom. The cavity is at least 600mm deep and the stem's diameter is 900mm. While we were on site we watched a Jackdaw climb into the hole, which appeared to be to the distress of a Grey Squirrel. I presume the gnawing around the hole's perimeter is Squirrel damage. This tree should also be removed.

Photograph 6.

Photograph 6 is view from the base of tree 9 looking roughly west. Trees 1, 2 & 3 are in the background and the Norway Maple 8 is at the right. The evergreen shrub mass in the centre is largely Portuguese Laurel which is now recognised as an invasive pest. The proposed site layout requires the Laurel and the Maple to be removed.

Unfortunately Victorian gardens are often pretty well full of invasive plants. While Rhododendron, and Laurels (both Cherry and Portuguese) were planted for the dark glossy foliage (which seemed to suit the Victorians' dour state-of-mind), these plants are now proving to be nuisances. Rhododendron is the number one forest weed in this country and it is an offence to release it into the wild. Laurel is not yet on the Country's list of invasive species[1] but they are (Cherry and Portuguese) likely to be included at the next revision.

Photograph 7 is a view of the site from the base of tree 9 looking east. Trees 11 to 16 are all Ivy clad. While the plans call for trees 14 & 15 to be retained I think it would probably be more sensible to remove them and plant something new.

Photograph 7.

From photos 6 & 7 it is apparent that the area has been treated somewhat disdainfully for a long time. I don't mean that people deliberately set out to compact soils and create poor tree-growing conditions deliberately, simply that little thought was given to the trees. This is not unusual; people often seem to regard trees as fixtures and fittings, completely forgetting that they need to be able to extract moisture and nutrient from the soils around them.

This concludes my observations on the trees at this site that are in proximity to the proposal for the ancillary buildings.

Proposal.

I am aware that the proposed layout has been prepared with the intention of keeping as many of the trees as a possible. For example tree 1 was slated for retention with the new garage positioned in front of an existing retaining wall, which ought to have acted as a barrier to root growth. Mr Bannister had clearly considered this matter when compiling the plan. Unfortunately tree 1 cannot be retained under any circumstances and it's removal would leave trees 2 & 3 exposed and with poor form. As removing tree 1 is going to require some heavy machinery (a mobile crane) which will be expensive to hire in, then it would make sense to remove the neighbouring

[1] See schedule 9 of the Wildlife and Countryside Act. It is an offence to release any of the species named on the schedule into the wild.

trees at the same time. Retaining them would mean the chances of establishing new trees in their shade were reduced and they're unlike to last long anyway as both are in relatively poor condition.

The proposal does not require all the condemned trees to be removed but it does require others that are in less-parlous condition to be removed. This report has shown that none of those trees are particularly noteworthy specimens so their removal should not be contentious. I further note that the Monsal Trail, which is just outside the site is pretty well tree-lined with trees which will largely screen the project from view.

I therefore propose that the most sensible way forward is to remove trees as per the following schedule:

Tree No.	Species.	Ht	TD	Action
1.	Beech	22	1100	Remove due to fungal infection.
2.	Beech	23	1000	Suggest remove as removing tree 1 will leave it a poor shape and exposed.
3.	Beech	22	900	Suggest remove as removing tree 1 will leave it a poor shape and exposed.
4.	Sycamore	16	520	No work required.
5.	Sycamore	16	570	No work required.
6.	Sycamore	15	490	No work required.
7.	Sycamore	15	450	No work required.
8.	Norway Maple	14	590	Remove as it is a poor specimen and would be very close to the new building.
9.	Beech	20	910	Remove due to the large cavity.
10.	Beech	20	1110	Remove due to fungal infection.
11.	Sycamore	17	740	Will have to be removed to permit the building to be erected.
12.	Sycamore	18	710	Will have to be removed as roots would be extensively damaged.
13.	Sycamore	18	640	Remove as it is has suffered basal damage and is very close to the pump room.
14.	Sycamore	16	800E	No work required.
15.	Sycamore	16	650	No work required.
16.	Sycamore	16	620	Remove to permit the garage to be relocated.
17.	Sycamore	21	780	No work required.

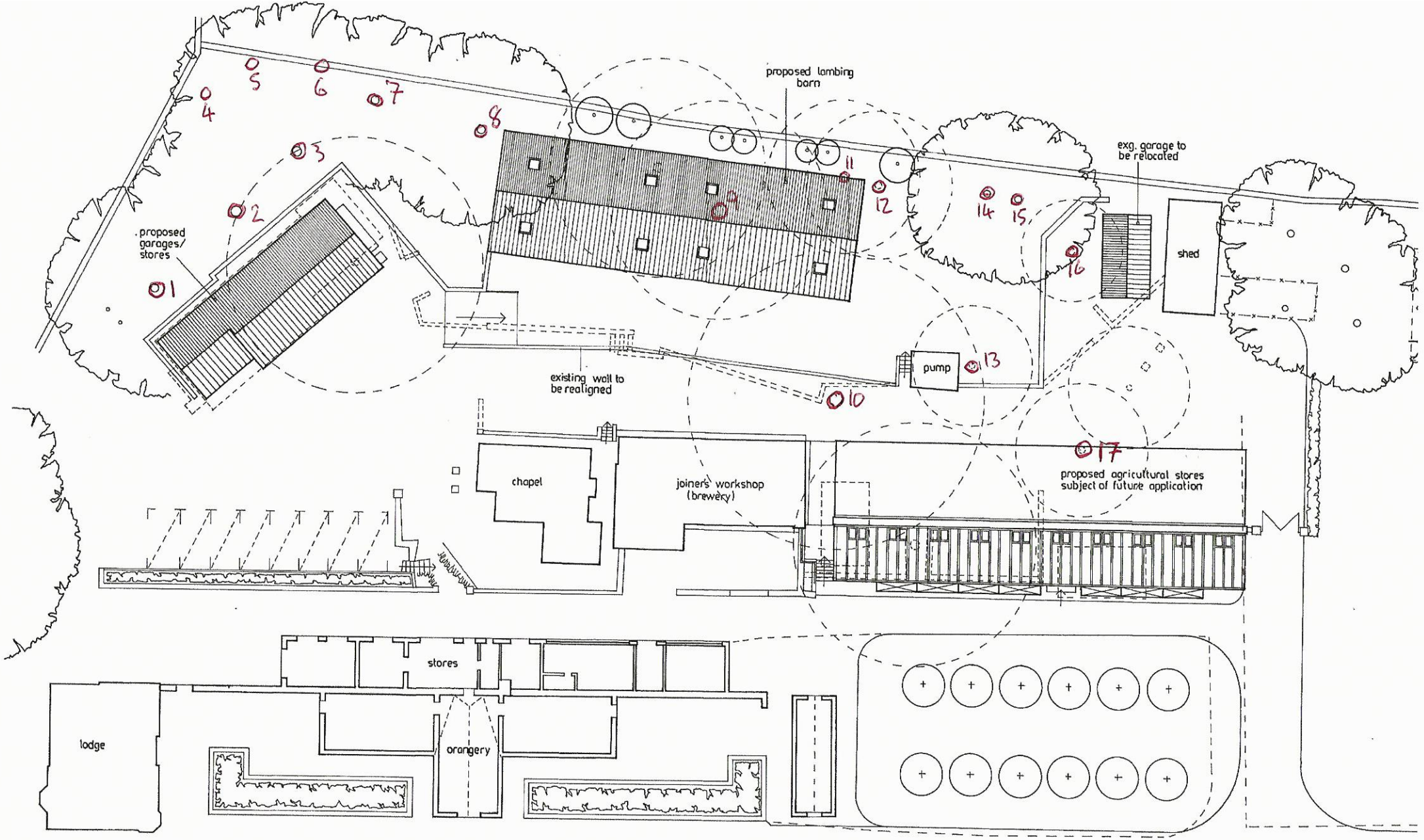
I realise that this is quite a lot of work but I regard very few of the trees as having a long future life. Even if the current usage of the area was changed considerably (to prevent further soil compaction and accidental damage to trees) the trees would not improve their condition. Unfortunately the seeds of these trees' decline were sown a long time ago and the most sensible option now is to look to new planting.

Conclusion.

I see no reason why trees should stand in the way of this proposal. While it means that some trees will have to be removed, apparently prematurely, this is not incompatible with the principle of renewing the site's tree stock.

Renewing the country's tree is an ongoing task and should be an objective of the property's long and short-term management plans.

W. L. Anderson. Dip.Arb. (RFS) M.Arbor.A.
ANDERSON TREE CARE LIMITED. February 2017.



TREE LOCATION PLAN FEB 2017

THORNBRIDGE HALL

NOT TO SCALE.