



Tree value and root investigations for trees adjacent to the A3

RHS Wisley, Surrey

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RHS REP10-xxx - Appendix 5 - Barrell Tree Consultancy - Report - Tree value and root investigations for trees adjacent to the A3 2 June 2020_

2nd June 2020



Summary

I visited RHS Wisley on 26th May 2020 to assess the importance and value of specific trees located on the A3 boundary of the Gardens. I investigated the root spread of one of the largest redwood trees, numbered T184, to establish if graphics produced by Highways England were a true and reliable representation of where the significant roots were located for the purposes of assessing the impact of proposed highway works on the tree.

In terms of tree importance, I focused on two redwood trees because they were the most visually prominent. I concluded that they were special in a heritage context for visual and scientific reasons, and could be reasonably classified as Grade II* Listed Heritage trees. I carried out a valuation of both trees using a widely accepted and peer reviewed approach, and established that their combined value came to just over £1 million.

In terms of root investigations, I hand-excavated a single trench about 8.5m to the west of T184 and about 2m in length, down to a depth of about 1m. This investigation found three substantial roots 7–10cm in diameter in the top 40cm of the soil profile, and further smaller roots down to 1m depth, that were visually identified as coming from the subject tree.

It is claimed that the Arboradix technology used to map the root location can identify roots greater than 2.5cm diameter. These investigations confirmed that the data presented in the HE graphic did not reliably represent the full spread of significant roots three to four times the minimum size that this technology is claimed to identify.

The implications of these findings are that the advice to HE on the impact of the proposals is flawed because it is based on the unreliable Arboradix data. In turn, this casts serious doubts on the reliability and credibility of the HE assessments. These findings confirm the Atkins conclusions that the risk of de-stablising five of the trees from the proposed works, is ‘*Very High*’ and that the preliminary advice to “*Relocate retaining structure further from tree*” is sound. To date, I have not seen any attempt by HE to positively respond to this advice.

In summary, these investigations confirm that if the works are implemented as described, the potential impact on at least five of the important identified trees will be so adverse that there can be no reasonable prospect of them being retained. If there is any genuine will to minimise any adverse impacts on these trees, the proposals must be re-evaluated as set out in the standard BS 5837 guidance that is routinely applied to assessing UK planning submissions.

Jeremy Barrell – 2nd June 2020



1 Introduction

1.1 Overview

1. The RHS position in relation to the Redwood Trees was set out in para 3 of its Relevant Representation <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/TR010030/TR010030-000300-Royal%20Horticultural%20Society%20Relevant%20Representation.pdf>
2. Following its objections made during the Consultation period of the DCO, HE assured the RHS that the Redwood Trees would not be adversely affected.
3. Whilst my report focuses on the Redwood Trees, there are many other trees with the potential to be adversely affected by the DCO Scheme. All the trees within the footprint of the overbridge land and all adjacent trees to this and along the A3 boundary where works are proposed adjacent to the fence, whose root protection areas (RPAs) extend into this land, could be adversely affected to some extent. The RHS has asked me to review the likely impacts on these trees as well.
4. Based on the Veteran Trees and other DCO information, the RHS has now been able to carry out (since Covid restrictions) a site survey [APP-089]: https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/TR010030/TR010030-000185-TR010030_6.5_environmental_statement_appendix7.3_veteran_trees.pdf
5. It is clear from this work that the DCO Scheme would be highly likely to harm the Redwood trees.
6. This conclusion has arisen following the Representations made by the RHS at D7 [REP7-042]: <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/TR010030/TR010030-000840-Royal%20Horticulture%20Society%20-%20Appendix%203%20-%20Letter%20from%20Barrell%20Tree%20Consultancy%20to%20RHS.pdf>
7. The RHS submitted a copy of the Alignment Options Assessment [REP7-043] prepared by HE at D7: <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/TR010030/TR010030-000835-Royal%20Horticulture%20Society%20-%20Appendix%204%20-%20Alignment%20Options%20Assessment.pdf>
8. HE has given no indication as to whether or not this Assessment will be acted upon. However, the RHS believes that if it is to be acted upon:



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- HE will need consent from the ExA to the variations to the DCO Scheme it proposes; but that
 - These changes will still not adequately protect the Redwood Trees
9. HE responded to the RHS D7 Submissions at D8 in its Response to RHS's Deadline 7 Submission (pages 17-18):https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010030/TR010030-000940-TR010030_Volume_9.100%20-%20Applicants%20Response%20to%20RHSs%20Deadline%207%20Submission.pdf

The Submission also contained a technical note from Atkins at Appendix A. This discloses at page 1 of 48 that two great Redwood Trees and three other important trees are at "Very High" risk of being destabilised.

HE confirms that the structural Root Zones will be affected and that *"Design modifications should be undertaken in consultation with the Arboriculturalist"*.

10. The RHS asked for copies of sections of Trees to be supplied in its Overview submitted at D9:

"The RHS is unable to assess the impact of the proposed works on the redwood trees with the information available and requires cross sections of the existing A3 construction (widened it understands in the 1970's) , and comparative cross-sections of the proposed DCO works, at the locations of significant trees from HE."

This information has not yet been supplied.

11. The RHS has now undertaken its own, non-invasive tree root survey. This discloses that it is likely that the roots from the Redwoods do extend into HE's land further than HE believes.
12. If these roots are tampered with in any way the Redwood trees will be so adversely affected that their health will irreversibly decline ultimately resulting in premature death, and in any event, they will have to be removed for safety reasons because the cut roots will destabilise them within falling distance of the A3 and Wisley Gardens. HE's works will interfere with these roots. A burden will be placed on the RHS to remove its own trees, which the RHS are not prepared to do to a treasure of its Collection.
13. HE has suggested a Requirement 18 in the dDCO that states:



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Protection of certain tree roots at RHS Garden Wisley

18. No intrusive works in connection with the authorised development may be carried out, and no plant, materials or vehicles will be used or stored in the areas shown cross-hatched red on the RHS Tree Protection Plan, except with the consent of the owner of RHS Garden Wisley, such consent not to be unreasonably withheld or delayed.

14. This is not fit for purpose and should be replaced by a Requirement drafted as follows:

Protection of Tree Roots at RHS Garden Wisley

18. No soil level changes (excavation or filling), or access of any sort (pedestrian or vehicular) within the BS5837 root protection areas of these trees will be permitted unless agreed in advance with the RHS. If any works within the root protection areas are agreed, they will be described in an arboricultural method statement and their locations shown on a tree protection plan.

Copies of the Tree Protection Plan referred to in the emerging draft Requirement have not yet been provided and they should be required by the ExA.

1.2 Instruction and report purpose

I am instructed by RHS Wisley to review the importance of the trees along the eastern site boundary with the A3 shown on plan HE551522-ATK-ELS-A3_ML-DR-LL-000002RevPO1.3, and to carry out preliminary exploratory excavations to assess the location of roots for selected trees in relation to proposed highway alterations outside the fence forming the western boundary of the RHS Wisley Garden. I was specifically asked to focus on the two redwood trees, numbered 183 and 184 in the Highways England (HE) *Veteran trees and Arboricultural Impact Assessment* (6.5 Environmental Statement, Appendix 7.3), and to consider whether the process relating to the assessment of these trees was compliant with British Standard guidance. This was required as a specific response to the Highways England (HE) document titled *M25 junction10/A3 Wisley Interchange TR010030 9.100 Applicant's Response to RHS's Deadline 7 Submission* dated May 2020, HE Reference TR010030?APP/9.100 (Vol 9) Rev 0.

The purpose of this report is to report on the importance of the redwood trees, assess the reliability of the information on their root locations provided by HE, to formally record the findings, and to advise on the implications for tree retention in the context of the British Standard guidance, to inform the RHS response to the above referenced HE document.

1.3 My credentials

I am a tree expert specialising in managing trees in a legal and planning context, and more information on my business operation can be found at <https://www.barrelltreecare.co.uk/>. A summary of my credentials and legal experience can be reviewed at the following links:

1. <https://www.barrelltreecare.co.uk/assets/Uploads/J-Barrell-CV.pdf>



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2. <https://www.barrelltreecare.co.uk/assets/Uploads/JB-CareerSummary-Updated-010118.pdf>
3. <https://www.barrelltreecare.co.uk/assets/Uploads/LegalCases-Updated-310819.pdf>

In the context of this project, I have been practically involved in a wide range of practical tree management for more than 40 years, as both a contractor and consultant. I have published more than 140 articles and papers on tree management, and am widely recognised as an international authority in this field, regularly speaking at international conferences, and as a keynote speaker in Canada, USA, Australia, New Zealand, and Italy, in the last six years. I am a specialist in heritage tree assessment and developed the first international tree assessment method called TreeAH (<http://www.treeaz.com/downloads/TreeAH-Version-12-With-Updated-Nomination-Form-LR.pdf>).

I take training seriously and regularly attend continuing professional development (CPD) events to ensure that my level of knowledge is as up to date as possible. It is compulsory for me to attend and formally record a minimum of 25–30 hours of CPD a year to maintain my professional memberships. I always significantly exceed those minimums, e.g. my formally recorded Royal Institution of Chartered Surveyors CPD hours exceeded 121 hours in 2013, 245 hours in 2014, 328 hours in 2015, 470 hours in 2016, 397 hours in 2017, 397 hours in 2018, and 493 hours in 2019. Although my primary discipline is trees, I aim to regularly attend legally oriented events, in addition to my specialist area.

2 Site visit, observations, and investigations

2.1 Site visit

I attended the site on Tuesday 26th May 2020 from 1000 to 1600, and met Mr D Alexander, Mr T Layton, and Mr W Oliffe, all from RHS Wisley, who were present during the investigations. The weather at the time of the visit was clear, still, and dry, with good visibility. All my observations were from ground level by visual means and all dimensions were estimated unless otherwise noted. During my visit, I took a series of photographs, some of which are included in this report. I walked the A3 boundary to familiarise myself with the relationship between the trees within the RHS boundary and the proposed works on the HE land on the other side of the fence. There was no safe access to the HE land and so all my observations were based on what could be seen from within the RHS boundary.

2.2 Observations of the importance of trees 183 and 184

These trees are both redwoods (*Sequoiadendron gigantea*) estimated to be about 80–90 years old. They are visually prominent and seen daily by thousands of motorists travelling along the adjacent A3 from both directions because they are so tall (24 and 27m), standing much taller than all the surrounding tree cover. They are also prominent within the RHS Gardens, which is a Grade II* Listed Park and Garden laid out in 1878 to 1902 and acquired by the RHS in 1903. They dominate the skyline in the views from within the Gardens out towards the south and east (Figure 1).



Figure 1: View of the Garden boundary looking towards the east visually dominated by the redwood trees 183 and 184.



2 Site visit, observations, and investigations

In addition to their obvious visual importance because they are seen by so many people every day, they also have significant heritage value. Both trees are early plantings in an important scientific collection and part of a Grade II* heritage landscape and as such have heritage value for scientific reasons. They are landmark trees seen daily by many people and so have heritage value for visual reasons. These two heritage characteristics affords them the status of Grade II* Listed Heritage trees.

In monetary terms, it is possible to place a value on these trees using a credible and widely accepted peer reviewed method called the Capital Asset Valuation Assessment of Trees (CAVAT) (<https://www.tandfonline.com/doi/full/10.1080/03071375.2018.1454077>). I am a trained CAVAT assessor and have carried out a preliminary valuation of these two trees, which delivered a value of £479,790 for T183 and £531,937 for T184, or a combined value of £1,011,727.

2.3 Investigations of the rooting characteristics of T184

Although I walked the boundary and saw all the trees with the potential to be adversely affected by the proposed works on HE land, I focused my root investigations on one tree, a redwood numbered T184 in the HE documentation. This was because it was one of the biggest trees with the greatest potential to be harmed by any excavation activity near it. More specifically, the purpose of the investigation was to establish the reliability of the root morphology data provided by HE in its Deadline 7 Submission noted in 1.1 above. At page 17/48 of that document, there was a graphic representation of the root mapping carried out by Writtle Forest Consultancy using the Arboradix equipment, and this was used to inform the location of my excavation investigation.

At T184, I located an area roughly to the west of the trunk, and at 8.5m from its centre, that was free from other nearby large trees (Figure 2), and excavated a trench that is approximately shown on an extract of the root morphology graphic (Figure 3). At this point, the trench was excavated perpendicular to the radius from the tree about 2m in length, 0.5m in width, and 1m depth (Figure 4). Within that trench at about 30–40cm below ground level, I uncovered three substantial roots that were measured at about 7–10cm diameter (Figure 5). I confirmed that these were alive by noting the bark was firmly attached and that they were likely to be from T184 because of the red colour of the bark and wood beneath, a known root characteristic of this species. I also noted smaller fibrous roots at the bottom of the pit at about 1m depth, that I also identified as likely to be from the subject tree (Figure 6). I did not take samples for laboratory confirmation of the species, but this could be easily done if the findings are disputed. The trench was filled in following the excavation, but it would be possible to easily open it up again if any of my observations needed to be verified.

2 Site visit, observations, and investigations



Figure 2: Location of the trench (yellow box) before excavation, 8.5m west of the centre of T184.

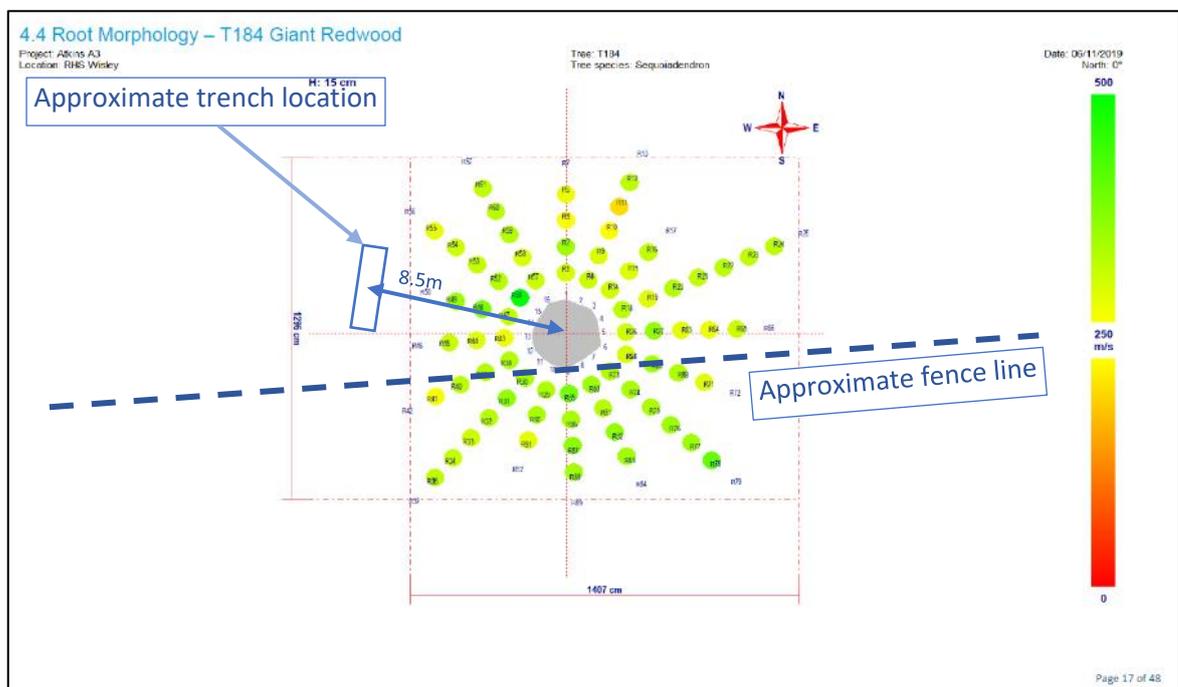


Figure 3: Copy of the root morphology graphic for T184 with additional annotation in blue, showing the approximate fence line, the distance of the centre of the trench to the centre of the tree being 8.5m, and the approximate trench location.

2 Site visit, observations, and investigations



Figure 4: Excavated trench down to about 50cm depth showing three roots about 7–10cm in diameter.



Figure 5: Close up of one of roots being measured at about 10cm diameter.

2 Site visit, observations, and investigations



Figure 6: Trench excavated down to about 1m depth showing obvious smaller roots at the bottom with species characteristics associated with T184.

3 Discussion

3.1 The Arboradix technology

Writtle Forest Consultancy used a technology called Arboradix to map the spread of roots over 2.5cm diameter as the primary means of assessing the impact of the proposed works on adjacent trees. The Arboradix technology is new and although a very basic explanation was set out in Section 2 of the Writtle Forest Consultancy Report (Appendix A 9.100 Applicant's Response to RHS's Deadline 7 Submission [REP8-045]), there were no technical explanations of any substance or any published references to provide further clarification and reassurances on how well it performs. Without research material to verify how this technology performs, it cannot be treated as reliable or given any significant weight. As far as I am aware, there was no ground truthing carried out by digging holes to check and verify the results and the reliability of the graphics produced.

3.2 Reliability of the Arboradix investigation data

In the absence of supporting explanations or a published record of any verification process, I decided to check the results shown on the graphic in Figure 3 by excavating in an area where the graphic indicated there would be no significant roots of greater than 2.5cm diameter. This location is shown on Figures 3 and 4, and is 8.5m from the centre of the tree, about 2.5m from the last indicated location on the graphic of any significant roots in excess of 2.5cm. The reason for choosing this location was to check the results shown in the graphic.

As can be clearly seen from Figures 4, 5, and 6, three roots of 7–10cm were uncovered, which is a size three to four times larger than the minimum size claimed to be identified by this technology. The Arboradix investigation did not identify these roots. Although I have only checked one tree, the unreliability of the data was so startling that it must throw into significant doubt the data for the rest of the trees. This simple investigation has confirmed that the results shown in this graphic, and possibly all the other graphics, are not reliable and cannot be credibly used as the basis for advising on any adverse impact on any of the trees without further investigations.

3.3 Implications of the unreliable Arboradix investigation data

On page 2 of the Atkins Technical Note within Appendix A 9.100 Applicant's Response to RHS's Deadline 7 Submission document [REP9-045] in paragraph 4 of Section 3, it states:

"The mapped root zones have then been used to inform cross section drawings covering the trees and to inform on the current impacts of the proposals."

If this statement is correct, then the advice to HE on the impact of the proposals must be flawed because it is based on the unreliable Arboradix data. In turn, this casts serious doubts on the reliability and credibility of the HE assessments.



3 Discussion

3.4 Alternative approach to using the Arboradix investigation data

In this context of the unreliable Arboradix investigation data, there can be no justifiable reason for opting for this approach over that set out BS 5837. Indeed, the BS 5837 approach is what would be normally applied in any planning submission. It clearly sets out that for a tree of the size of T184, the radius of the root protection zone (RPA) should be 15m, and although there is provision to adjust this in some circumstances, I can see no justifiable reasons to alter it in this situation.

If the BS 5837 approach is applied to all the seven trees identified in the Atkins Technical Note (176, 181, 183, 184, 185, 192, and 197), the proposed highway works fall within sensitive RPAs and are going have the potential to adversely affect the health and retention potential of all these trees. Indeed, this is the conclusion that Atkins came to in their Technical Note relating to five of these trees, part of which is reproduced in Figure 7. At row 7 highlighted in yellow, the risk of de-stablising five of the trees, is rated at 'Very High', based on the flawed data and my assessment is that if the BS 5837 approach is applied, the prospects for the trees are even worse.

Technical Note		ATKINS						
		T176 Norway Maple	T181 Red Oak	T183 Giant Redwood	T184 Giant Redwood	T185 Turkey Oak	T192 Populus x generosa 'Beupre'	T197 Hybrid Black Poplar
1.	Estimated percentage encroachment by closest proposed excavation for crib wall within RPA.	42%	43%	44%	48%	49%	18%	18%
2.	Estimated percentage encroachment by closest proposed excavation for crib wall within Measured Root System.	28%	43%	18%	35%	49%	2%	11%
3.	Distance of Measured Root System extending toward carriageway.	3.0 metres	4.0 metres	5.0 metres	6.0 metres	4.0 metres	6.0 metres	5.0 metres
4.	Distance of main stem to closest proposed excavation for crib wall.	0.6 metres	0.5 metres	1.5 metres	0 metres	0.2 metres	5.4 metres	4.1 metres
5.	Linear encroachment in metres of closest proposed excavation for crib wall within Measured Root System.	2.4 metres	3.43 metres	3.5 metres	6.0 metres	4.0 metres	0.6 metre	0.9 metre
6.	Estimated Structural Root Zone	2.8 metres	2.45 metres	4.95 metres	5.15 metres	2.45 metres	3.25 metres	2.75 metres
7.	Risk of de-stabilising tree. This is assessed by calculating the % linear encroachment of the excavation for the crib wall within Estimated Structural Root Zone.	Very High 78%	Very High 79%	Very High 71%	Very High 100%	Very High 92%	Low 0%	Low 0%
8.	Is it viable to reduce crown of the tree to allow the retention of the tree.	No.	No.	No.	No.	No	Yes, but this is a vigorous species, ongoing, regular pruning will be required to retain safely.	Yes, but this is a vigorous species, ongoing, regular pruning will be required to retain safely.

Figure 7: The yellow highlighting shows the Atkins assessment of the risk of the proposed works de-stabilising five of the trees is "Very High".

3.5 Conclusion and recommendation

My investigations have thrown considerable doubt on the reliability of the Arboradix investigation data and confirmed that it cannot be reliably used to assess the impact on the trees, as applied by HE.

3 Discussion

I agree with the Atkins assessment that the risk of the proposed works de-stabilising five of the important trees is “*Very High*” and that there is no alternative to their preliminary evaluation of “*Relocate retaining structure further from tree*” (Figure 8), if these trees are to be retained. Indeed, by the admission of HE’s own consultants, the obvious implication is that at least five of these trees are going to be lost because of the proposed works.

Technical Note		ATKINS						
		T176 Norway Maple	T181 Red Oak	T183 Giant Redwood	T184 Giant Redwood	T185 Turkey Oak	T192 Populus x generosa 'Beupre'	T197 Hybrid Black Poplar
9.	Is the reduced soil volume available viable in relation to the tree health in the foreseeable future?	No.	No	No.	No	No	Yes	Yes
10.	Preliminary evaluation of options to retain tree whilst reducing risk of failure of root system consequent to proposed works.	Relocate retaining structure further from tree.	Treatment of roots during excavations. Soil amelioration.	Treatment of roots during excavations. Soil amelioration.				
							Possible crown reduction. Arboricultural monitoring of works.	Possible crown reduction. Arboricultural monitoring of works.

Figure 8: The yellow highlighting shows the Atkins preliminary evaluation of options to retain the trees.

More specifically, the BS 5837 benchmark is the normal one that would be used, and it is quite reasonable to apply it in this situation. On that basis, the only way that these trees can be reliably retained without any adverse impacts is to make sure that there is no significant disturbance within their RPAs. If there is any genuine will to minimise any adverse impacts on these trees, the proposals must be re-evaluated as set out in the standard BS 5837 guidance that is routinely applied to assessing UK planning submissions.



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