Comments on the planning proposal for the UK Holocaust Memorial and Learning Centre

Victoria Tower Gardens, Westminster

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18408-SubmissionComments-JB

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Summary

The mature plane trees around Victoria Tower Gardens ("the Park") are a unique, historic, valuable, and irreplaceable living environmental asset of national importance, and unmatched in the adjacent London area.

I have reviewed the tree aspects of the UK Holocaust Memorial and Learning Centre planning proposal and have come to the following conclusions:

1. The trees are Grade II* environmental assets, i.e. trees of "*more than special interest*", comparable on a scale of importance to Grade II* Listed Buildings.
2. They have a monetary value that is in the range of millions of pounds.
3. No evidence has been provided to show that this heritage importance and monetary value has been considered in the planning assessment, which sets it at odds with emerging national government aspirations and policy.
4. There are significant shortcomings in the submitted supporting tree investigations and analysis, which reduces the reliance and weight that can be placed on them.

The inadequate nature of the planning submission is significant and does not reliably demonstrate that the proposal can be implemented without adverse impacts on the health, life expectancy, and visual amenity, of trees of national importance. This is contrary to national government guidance and policy, and Westminster City Council (WCC) planning policies at the local level.

Summary

For these reasons, there is a robust case for requesting that the following further information and clarifications are required before the impact on trees can be properly and reliably assessed:

1. An analysis to show that the heritage importance and monetary value of the trees has been considered, in line with emerging national government aspirations and policy relating to the principles of natural capital accounting and net environmental gain.
2. Recognition that the whole of the Park provides rooting volume for the trees, or if that is disputed, the provision of proper and credible explanations to justify why that is not the case and where the root protection areas (RPAs) are.
3. A full investigation of the extent and integrity of the culverted stream/sewer beneath the southern end of the Park to establish if it provides a mechanism for delivering air and water to support rooting at depth.
4. Identification of the precise extent, i.e. the width, length, and depth, of the three-dimensional excavation envelope.
5. Reliable and credible investigations to establish the extent of roots that will be cut to create this excavation envelope, i.e. explorations along the boundary of that envelope down to its full depth.
6. A review of the air and water inputs into the soil profile at depth and whether creating the contiguous piling seal around the excavation envelope will adversely affect established air and water pathways through the soil that the existing trees may currently rely on.
7. A reliable and credible analysis of what the impacts on important trees will be, taking full account of any new site investigation data, relevant references, and relevant evidence from other projects in London.
8. Despite it not being a strict BS requirement, it is entirely feasible to produce a full arboricultural method statement in advance of planning consent. Due to the complexity of the project and the importance of the trees, such a document is essential to properly assess the impact on important trees and is justified under these circumstances.

Jeremy Barrell
4th February 2019

1 Introduction

1.1 Report purpose

I have prepared this report to provide an independent expert opinion on the reliability of the supporting tree documentation and any possible adverse impact on trees from the construction of the proposed UK Holocaust Memorial and Learning Centre at Victoria Tower Gardens, Westminster, as submitted by the UK Holocaust Memorial Foundation and published online by WCC. I stress that this report is only concerned with the impact on trees and does not consider any other aspects of the planning proposal.

1.2 My credentials

I am a tree expert specialising in managing trees in a development context and the assessment of heritage trees (www.barrelltreecare.co.uk). A summary of my credentials can be viewed at https://www.barrelltreecare.co.uk/assets/Uploads/J-Barrell-CV.pdf.

1.3 Statement of independence

On this project, I am acting in the capacity of an independent expert and not as a paid advisor to any party. My interest is of a professional nature because the trees that may be affected are of national importance and I am prepared to volunteer my expertise in the national best interest. I confirm that I have not taken any fee for my time and I have no connections or personal relationships that I am aware of with any of the parties involved in this project, although I may know some individuals through my business and professional activities.

I declare that I have signed the Save Victoria Tower Gardens petition to register my concerns that the importance of the trees is properly factored into the decision-making process, and as a means of keeping up to date with the progress of the proposal. I met a representative of the Save Victoria Tower Gardens Campaign on 4th December 2018 for about 30 minutes at the site, where I was shown the approximate extent of the proposal. Other than that, I have not attended any meetings or met any of the other campaigners objecting to or supporting the proposal.

2 Site visits and relevant background information

2.1 Site visits

I first visited the site in the context of this proposal on 4th December 2018 where I began to check the extent of the construction activity in relation to the adjacent trees. I have subsequently visited several times to look in more detail at the trees and the location of the excavation pits, as described in the submission documentation.

2.2 Overview of the submitted tree documentation

I accessed the planning documents as published on the WCC website, reference 19/00114/FULL. I have only reviewed in detail those documents that seem to directly refer to the trees, namely the Arboricultural Impact Assessment, Parts 1 and 2, and the Environmental Statement (Volume 5) Appendix C Construction Management Plan (CMP), and I make the following preliminary observations:

- **Bartlett Consulting (BC) Arboricultural Impact Assessment Report (December 2018):** The tree data collection and recording seem broadly compliant with BS 5837, and I would not seek to dispute that information.
- **Sharon Hosegood Associates (SHA) Root investigation by Tree Radar Technical Note (01/11/18):** This is advised as being "*a companion report to the detailed TreeRadar report SHA 621 Victoria Tower Gardens, Millbank, London TreeRadar report March 2018*". This companion report has not been provided, and seems to be necessary to see as it is referenced in the submitted documents. I was not sure about several points relating to the provided information and so phoned and emailed SHA to ask for clarifications on 21st January 2019. I asked for clarification on the depth of the investigations, if positive root identifications were verified by excavating, how long had the latest software update been issued, and had that software been checked in any way to assess its reliability. I also subsequently asked to see the companion report and for more details of the credentials of the technician who carried out the work. SHA advised it was reverting to its client before responding, but no clarification on any of these points has been received in the two weeks since those requests.
- **Canopy Consultancy (CC) Root Survey Report (September 2018):** This is a detailed record of the investigations carried out and I have no criticism of how the work was done. However, at 1.2 it states that the aim of the study "*is to determine the extent of root activity*", but there are only investigations down to about 1m in depth, so it does not seem to have met the brief. I note that the plan included as the last page of the CC Report and of the full BC Report had no key or title to explain the annotation, so its purpose and relevance is unclear.
- **Environmental Statement (Volume 5) Appendix C Construction Management Plan:** This does not currently deal with tree protection in any other way than referencing the Arboricultural Method Statement, when it is prepared.

2.3 Relevant planning policy

It is not my role to provide the detail of planning policy, but I note that there are clear emerging national government policy statements at the highest level requiring that

"*natural capital*" (25 Year Environment Plan) is accounted for in new developments, and that the principle of "*net environmental gain*" (NPPF) is applied to assessing the suitability of development proposals. These principles obviously apply to trees as a significant component of natural capital and the natural environment.

I am not a planning specialist, and I leave the detail of that issue to other experts, but I record that at the local level, within the WCC development control framework, the WCC Unitary Development Plan (January 2007) and the WCC City Plan (November 2013) are relevant. As correctly referenced in the BC Report, I understand that the following policies, *inter alia*, are relevant to the tree issues in this planning submission:

- Policy S.35 Green Infrastructure states that harm to trees through proposed development must be " ... *firstly prevented, mitigated second, finally compensated …* " and that the wider landscape must be " ... *protected and enhanced with opportunity to extend and create ...* "
- Policy ENV16 Trees and Shrubs states that the Council will refuse " *… development resulting in loss or damage to trees which make a significant contribution …* "

3 The status and value of the trees

3.1 Heritage importance

The relative importance of heritage trees can be assessed using a method called TreeAH (http://www.treeaz.com/tree_ah/), which adopts similar terminology to that used by Historic England to classify historic architectural assets. In summary, heritage trees can be classified as Grade II (trees of special interest), Grade II* (trees of more than special interest), and Grade I (trees of exceptional interest). Individual trees and groups can have heritage importance for three main reasons, i.e. visual, cultural, and scientific, and the more heritage attributes they possess, the higher they sit within the overall hierarchy (Figure 1).

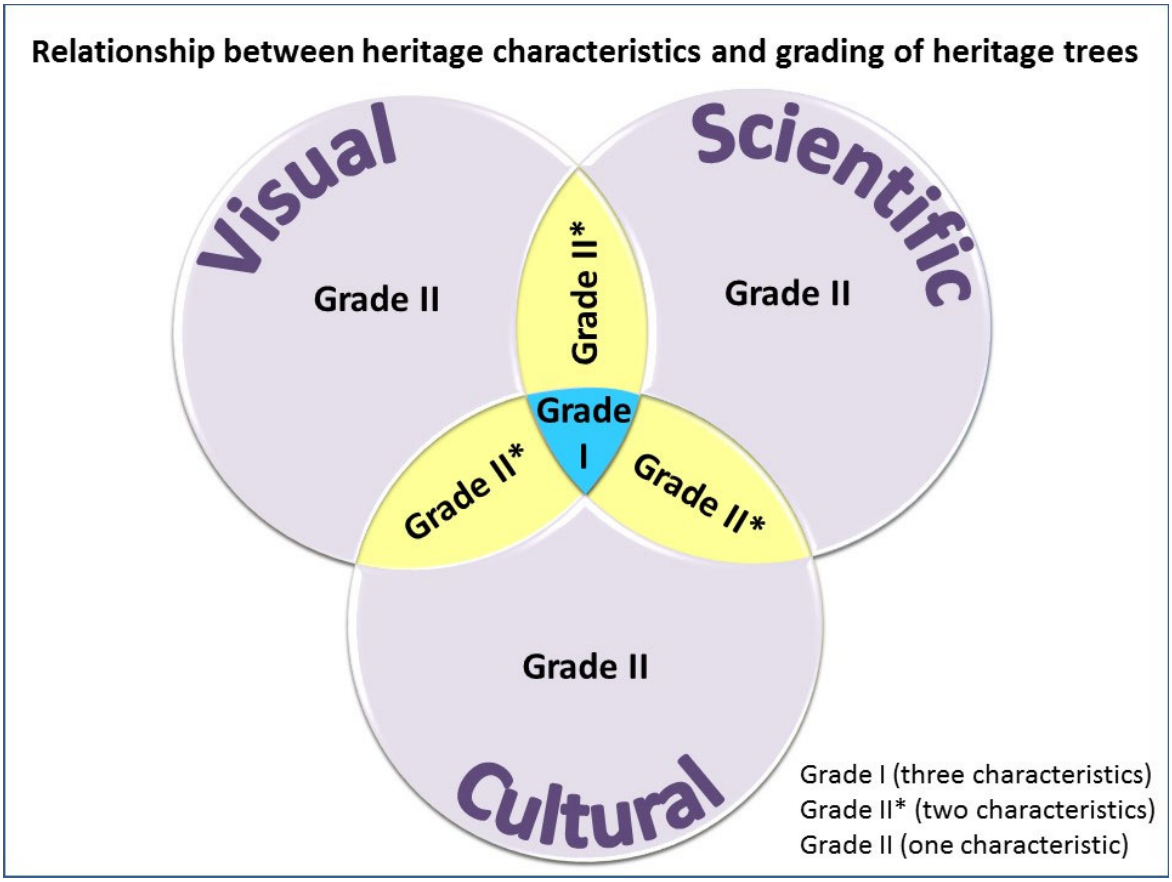

Figure 1: Conceptualisation of how the number of heritage characteristics influences where heritage trees sit within an overarching hierarchy of spectrum of importance.

In this instance, the trees are part of a large and visually prominent group in central London in an area where there are no other similar features, and I assess that they have heritage value for visual reasons. Additionally, they abut the UNESCO Westminster World Heritage Site in their location directly adjacent to the Palace of Westminster, and as such, I assess that they have heritage value for cultural reasons. I doubt if they have heritage value for scientific reasons, primarily because they are not quite old enough.

In summary, although I accept heritage assessment is subjective and my view may differ from others, I believe that these trees have two out of three heritage characteristics, which

makes them Grade II* environmental assets, i.e. trees of "*more than special interest*", comparable on a scale of importance to Grade II* Listed Buildings.

I emphasise that the cultural attributes of the trees are unique to these individuals, and cannot be replicated through any mitigation measures. Once such trees have been lost, those living links with the past have been irreplaceably broken, and their value cannot be replaced. Similarly, the visual impact of the trees is primarily as a continuous linear group of large mature individuals about the same height. The loss of any individual trees from within the group would disrupt the visual integrity of the feature, an alteration that could not be mitigated in the short and medium terms by replacement planting. Furthermore, the loss of any individual tree from within the group would leave adjacent trees exposed to wind and make them more vulnerable to failure in storm conditions, thus threatening the potential for retention of the whole feature.

3.2 Structural replacement value

There are several methods of assessing the financial value of trees as they stand at a point in time. An appropriate approach in this instance would be the CAVAT method endorsed by the London Tree Officers Association and now widely used in the UK. I have carried out a preliminary CAVAT valuation and include the data sheet in Appendix 1, which indicates that the cumulative value of all the trees identified in the BC Report is in excess of £13.6 million. Of course, I accept that not all the trees could be adversely affected by the proposal, and the calculation is not included to identify any precise impact on value. However, the figure does place a monetary figure on the scale of the value of the potential impact on trees, which is clearly into the millions of pounds, which I believe is significant.

3.3 Annual value of the delivery of benefits

i-Tree is an international peer-reviewed approach to quantifying the annual benefits that trees deliver, in addition to their structural replacement value. I have not carried out an analysis using i-Tree, but point out that the trees will be providing annual benefits that can be valued. These are in addition to the CAVAT values and should also be factored into the decision-making process.

3.4 Summary

Despite emerging government and planning guidance setting out the importance of factoring in the value of natural assets into decision making and ensuring that new proposals embrace the principle of net environmental gain, no attempt has been made to assess tree value to inform what risks and enhancement this proposal offers. These trees rank highly on a national spectrum of heritage importance, and are irreplaceable from that perspective. Additionally, they have a monetary value that is in the millions of pounds range.

This proposal has provided no evidence to show that the heritage importance and monetary value of the trees has been considered, which puts it at odds with emerging national government aspirations and policy.

4 Concerns arising from the planning submission on trees

4.1 Limited baseline data and inappropriate technical references

At over 100 pages, the BC Report may seem comprehensive at a casual glance, but a detailed and expert review reveals several fundamental flaws. The key purpose of such a report is to identify what the impact on trees will be, which in this case directly relates to how much pruning will be required, how many roots will be cut, and any peripheral impacts on the growing environment. Of most concern is the seemingly blind and rather convenient acceptance that there are no significant roots from these trees below a depth of 1m and a failure to investigate this critical aspect with any rigour. The reliability of the analysis within the BC Report is further compromised by a reliance on dated references and a reluctance to seek out and apply emerging experience of the unique conditions in London that affect the growth of tree roots.

In overview, the BC Report has failed to identify the importance of the three-dimensional excavation envelope, what its full extent will be, how many roots will be cut during its creation, and what impact those losses will have on the trees. Instead, we have incomplete and inadequate investigations, forcing analysis based on leaps of faith to cover the gaps in the data, leading to unreliable and unsubstantiated conclusions.

4.2 The importance of reliable investigations at the outer extent of the excavation envelope

I have taken the Turner & Townsend CMP as providing an overview of the proposed work phases, and specifically note Figure 3 and subsequent figures, which illustrate the footprint and depth of the excavation, i.e. the three-dimensional excavation envelope. From a quick review of the more detailed drawings, it is not clear how deep the piles will be driven, but it will be significantly deeper than 1m, and the piles will be contiguous. This means that all roots extending into the full three-dimensional internal extent of the piling wall will be cut. This three-dimensional footprint of the excavation represents the full direct impact in terms of cut roots, and it is the extent of root loss from this activity that must be known to reliably assess the impact on the trees.

The present level of investigations only seems to have looked at the roots down to a depth of 1m, and the potential for any significant roots deeper than this has been dismissed. In the absence of any credible information on where the roots are beyond 1m in depth, any analysis within the BC Report cannot be considered reliable for the purposes of identifying the realistic impact on adjacent trees.

4.3 The potential for deep rooting in plane trees generally, and in the Park specifically

My experience working in the subsidence and planning sectors in London, backed up by photographic and documentary evidence, is that plane can and often do root down to depths of 4–6m, and sometimes deeper, especially in places where there are soil voids created from backfilling. For example, in 2011, I oversaw excavations in the public realm outside the Connaught Hotel in Carlos Place, Mayfair, related to the installation of a new

water feature that required deep excavations to install a storage water tank. During that project, very few roots were discovered in the top 1m or so of the soil profile because it was mainly concrete and other hard infrastructure. However, once the excavations progressed deeper, and some went down to 5m, extensive rooting was discovered in the deeper soil horizons. Indeed, Figure 2 shows an operative in one of the pits working around roots greater than 30cm in diameter at about 4m depth. These were plane trees significantly smaller than many of the trees in Victoria Tower Gardens.

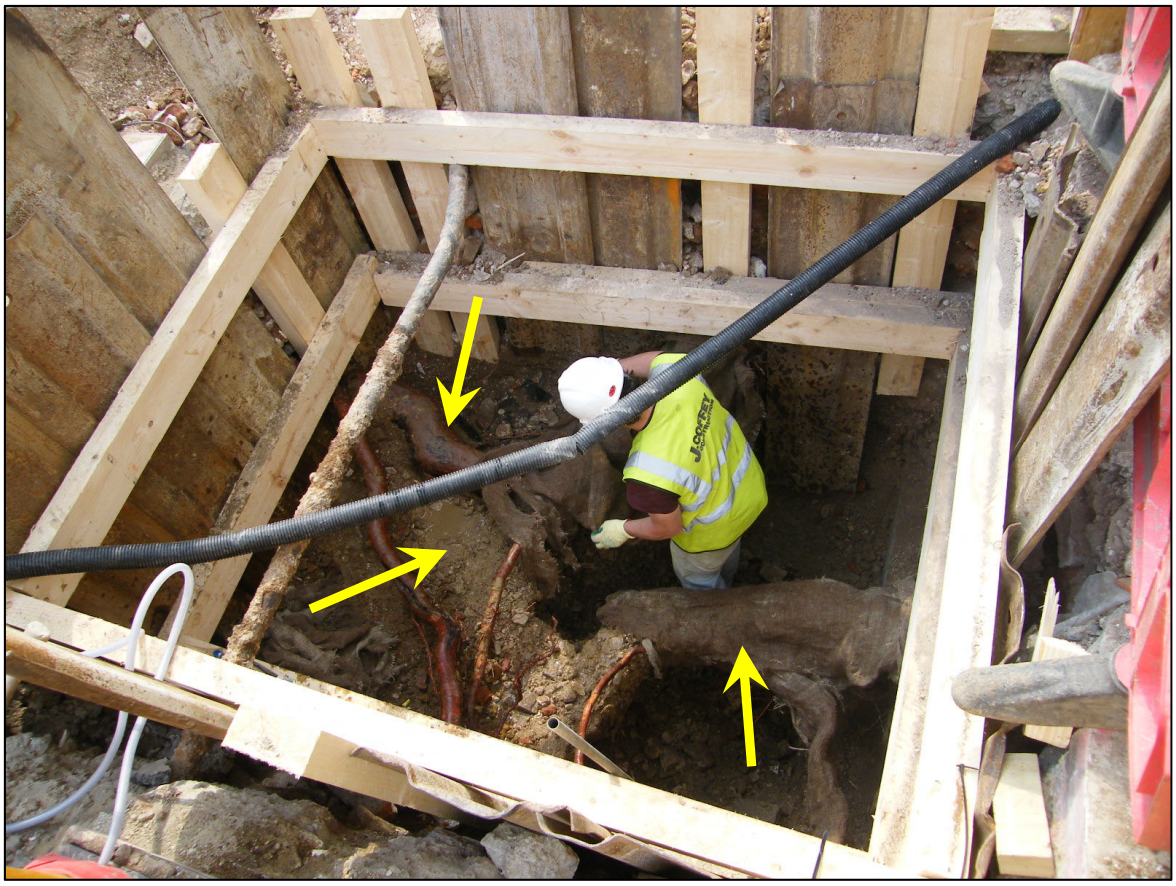

Figure 2: Plane roots uncovered during excavations outside the Connaught Hotel, Mayfair, in 2011, showing roots (yellow arrows) of 20–30cm and greater diameters, at depths of up to 4–5m below ground level.

Additionally, I have been advised that there is an historic culverted stream/sewer that runs beneath the southern end of the Park, the outlet of which can be seen by looking over the river wall at the Park's narrowest end. This is mentioned at 17.2 of the site investigation report, but its integrity is unknown, and it is not mentioned in any of the analysis in the BC Report. As the tide rises and falls, although there may be a mechanism to prevent rapid ingress into the structure, because there has been no detailed assessment of its integrity, there may still be the potential for air and water to be pushed up into the voids under pressure and then flow out again. If there are any flaws in the culvert/sewer, the tidal fluctuations could easily be driving regular daily fresh air and water inputs upwards into the soil profile below 1m from the upper surface. If that is the case, then this could account for the lack of any roots close to the surface. This possible mechanism for supporting significant roots at depth has not even been investigated, let alone, discussed in the BC Report analysis.

4 Concerns arising from the planning submission on trees

In summary, my experience of multiple observations from subsidence investigations and development projects around London demonstrate that plane trees can and do regularly root to depths of 4–6m, and deeper. Furthermore, simple visual observations at the southern end of the Park confirm that a potential mechanism to supply fresh air and water to support deep rooting beneath the surface below 1m may exist, but has not been investigated in any detail or mentioned in the BC Report analysis.

4.4 The limitations of the SHA site investigations

I have read the SHA Report and raise the following concerns:

1. **General – proofing the readings:** Tree Radar is a new technology and it is still unclear how reliable it is. It relies heavily on interpretation because of its complexity and the extreme variation of conditions below ground, which in turn relies on the experience of the technician using it. Indeed, concerns over its reliability in practice have resulted in some local planning authorities not normally accepting such investigations as evidence of the extent of below-ground rooting in a development context, e.g. the London Borough of Kensington & Chelsea. Such anxieties may be unfounded, but where there is reasonable doubt, an obvious solution is to excavate a sample of the trenches following radar investigations and verify whether what is shown on the readings is reflected by the roots in the ground. This may have been done on this project but, if it has, it is not clearly explained in the SHA Report. I asked SHA the question and had not received an answer by the time of issuing this report. If it has not been done, then the results for this site cannot be safely treated as reliable.
2. **Page 1 – Credentials of Mr Lee:** Mr Lee is listed as the lead consultant, but no details of his credentials are attached. My understanding is that there is a high element of data interpretation in the use of Tree Radar and the outcomes can be highly dependent on the experience of the technician interpreting the results. It is therefore relevant to ask for a summary of the credentials and experience of Mr Lee before accepting that the results are a reliable interpretation of the data.
3. **Page 2 – Companion report:** This is referenced, but not provided, and should be available to allow a proper assessment.
4. **Page 2 – Newly released software:** Paragraph 2 notes that the data analysis was undertaken using "*newly released analysis software*". I am concerned that this assessment has been undertaken using software that has had limited practical testing and have asked for clarification on this point. If that is the case, then this creates another question mark over the reliability of the analysis.
5. **Page 3 – Conclusion:** I note that the statement "*the trees are rooting throughout the grass area and likely beneath the highway to the west of the site*" seems to be at odds with the CC Report statement (see 4.5, bullet 3 below) that this area "*does not provide an adequate rooting environment*". I also note the statement "*Along the proposed building lines the trees are still rooting, but at very low rooting densities and at depths not below 1m.*" I do not know how deep the Tree Radar can reach and that is not stated in the SHA Report. I have asked for clarification on this point, but have not received it

by the time of publishing this report. The point being that this statement cannot be strictly correct because it only applies to how deep the equipment can penetrate. There is no evidence at all showing whether there are roots below this depth. At first glance, this statement is potentially misleading because it implies that there are no roots beneath a specific depth, and yet no investigations have been carried out to verify this.

4.5 The limitations of the CC Report

I have read the CC Report and do not criticise the practical approach and recording of the findings. However, it has obvious shortcomings in the context of this project that are clearly articulated in the text, but not properly accounted for in the BC Report analysis. My main concerns are:

1. **1.2:** The report states that the Aims of Study are "*to determine the extent of root activity from the mature London plane trees that line the park to the east and west.*" It doesn't do this because it only investigates down to 1m, when there is clearly the potential for rooting well below this depth. The report has not done this because it has been limited to the depth of the excavations, i.e. 1m, and the rest is just speculation. For that reason, the report is potentially misleading and unreliable, in that it sets out a clear aim, misleading the reader into thinking that it covers all rooting activity, but then only investigates down to 1m.
2. **4.2:** The statement in the second sentence "*This is shown in the results by a lack of roots within the top 60cm were* [Sic] *the majority of roots would be expected to be located.*" is a simplistic interpretation of general root growth model that cannot be applied with any certainty in London specifically, and urban areas in general. It is now widely accepted beyond the dated references that roots will grow wherever growing conditions allow and to try to promote that root growth is mostly in the top 60cm of the profile is misleading for urban situations. The third sentence "*It appears as though the trees have taken advantage of the looser material beyond 100cm depth.*" accepts that deeper rooting may account for the lack of roots near the surface, which is a worrying inconsistency with other statements. Finally, the statement in the penultimate paragraph applies one rule to the trees on the west of the site, but fails to apply the same reasoning to extending the RPAs into the Park from the eastern boundary, despite there being no chance whatsoever of roots growing beyond the river wall "*The root protection area (RPA) to the west of the western trees comprises a main road which does not provide an adequate rooting environment. The size of the roots uncovered in trenches 3 to 6 show that the trees in this area are reliant on the rooting environment within the park and as such, their RPAs should be offset to take this into consideration.*"

4.6 Concerns over the analysis in the BC Report

I have read the BC Report and do not dispute the basic tree data. However, I have concerns about the way that data and the findings of the two supporting reports has been interpreted and presented, as follows:

4 Concerns arising from the planning submission on trees

1. **Failure to explain inconsistencies within the supporting reports:** As I briefly mention in 4.4(5) above, there are inconsistencies between he conclusions of the two supporting reports about where roots are. These have not been intelligently analysed in the BC Report to assess which is correct, if any, and instead the convenient position that there are no roots beneath 1m depth in the three-dimensional excavation envelope has been assumed. This assumption is unreliable because it is not supported by the evidence, and it is not supported by common practical experiences from many planning and subsidence investigations in London.

2. **Failure to identify and describe the importance of the three-dimensional excavation envelope:** Nowhere in this report is there any mention of the depth that the excavations for the proposal will go to. The three-dimensional excavation envelope is the most important aspect of the whole project to assess because it has the potential to have the greatest impact on the trees. Loss of significant roots is the greatest threat of the proposal and this can only be reliably assessed by first, accepting that there could be roots below 1m, and second taking practical measures to estimate how many of those roots will be cut. Everything else, so pruning, surfacing alterations, and remedial works, is much less important than this critical assessment. Its importance has not been identified, and no serious or reliable investigations have been carried out to clarify the extent of root loss through excavation.

3. **Failure to identify and then discuss the potential for air and water input into the lower soil profiles through the culverted stream/sewer beneath the southern end of the Park:** As I mention in paragraph 2 of 4.3 above, the BC Report fails to identify or consider the potential for the culverted stream/sewer below the southern end of the Park to provide regular water and air recharge into the soil at depth below the surface. This is important to investigate because it provides a credible mechanism to allow healthy and sustained deep rooting of the trees below the depth investigated. Furthermore, and most importantly, these trees may have developed their entire root systems around this historic source of air and water, and any changes to it could threaten the survival of any trees that rely on it. In addition to the severance of roots that the contiguous piling may cause, more importantly, that work may significantly adversely affect the air and water supplies to vital roots that have grown accustomed to it over decades of development. None of this has been even identified in the BC Report, let alone discussed, which demonstrates a failure of thorough review and analysis.

4. **Reliance on dated technical references:** It is often the case that inexperienced writers attempting to hide weaknesses in their experience quote references and then fail to provide those references as an Appendix. Failure to reproduce references, especially old ones that are out of print, prevents the readers from verifying the reliability of the information and whether it can be reasonably applied in the way that is being advocated. That is the case with the BC Report, which quotes several dated references reputedly supporting assumptions, but no copies are produced to allow the readers to assess their relevance. Dated American references that bear little relevance to the very specific conditions found in London cannot be reasonably applied to this site as the solitary justification for assumptions that are just not supported by more recent

knowledge and experience. Indeed, such an approach contributes to the veneer of credibility that the BC Report attempts to cumulatively build, creating a potentially misleading analysis and conclusions.

5. **RPA assessment:** Although I accept that the interpretation of where RPAs are is a matter of judgement, the approach adopted in the BC Report seems to have been selective in favour of justifying the development rather than protecting the trees. Of course, this will always be a matter of opinion, but it is a British Standard recommendation to adopt the BS 5837 notional RPAs as a starting point and adjust according to the known circumstances and investigation data. As I have set out above, the investigation data is insufficient to draw any reliable conclusions about where critical RPAs are located. I have two primary concerns over the reasoning applied to the RPA assessments within the BC Report:

   - **Inconsistency between RPA assessment on each side of the Park:** As described in 5.2.1 of the BC Report, the RPAs for the eastern trees along the river wall have been plotted as displaced squares to allow for the wall and those for the eastern trees as a circle centred on each stem. Regarding the western trees, there is no displacement of the RPAs despite the statement within the CC Report quoted at 2.2(5) above advising that the rooting conditions are inadequate beneath the road in Millbank, and the RPAs should be offset into the site to allow for that. However, the RPAs on the eastern side have been displaced. This inconsistency is not explained and could be taken as a manipulation of the data to suit the purposes of playing down the potential impact on trees of excavation in the open areas of the Park.

   - **Inadequate extension of RPAs into the open area of the Park to compensate for the prevention of a symmetrical rooting footprint by the river wall:** Regarding the eastern trees, displacement of the square RPA is convenient for reducing RPAs into the development area, but it seems rather an unrealistic interpretation of where the RPA of each tree is likely to be. Each square obviously overlaps with adjacent RPAs quite significantly to the extent that some RPAs extend beneath the trunks of adjacent trees, which is clearly a practical nonsense. Although I accept that the BS is silent on the detail of this matter, it might be more realistic to reduce that sideways overlap and extend the length of the RPAs out into the open area of the Park, unless investigations proved that there were no roots in that area.

   In the absence of any reliable evidence that there are no roots at depth within the three-dimensional excavation envelope, the safest approach is to consider the whole of the Park as RPAs until proven to the contrary. This could be confirmed beyond any doubt by deeper investigations to establish where the roots of the trees are.

6. **Failure to provide a detailed AMS in advance:** I accept that the BS 5837 guidance does not require a detailed arboricultural method statement to be produced at this stage in the planning process, but it is feasible to do so, and it is regularly done. Indeed, WCC routinely require it, and our company produces them as a matter of course with all our submissions including as much detail as possible. Considering the obviously contentious nature of the proposal, it would have been prudent and entirely feasible

for the submission to include a detailed arboricultural method statement, and yet that was not done. There is no reason why such a document cannot be produced for this proposal, and in the light of the complexity of the project and the importance of the trees to be protected, more detail is essential to properly assess if it really is feasible to adequately protect the retained trees during such intense development activity.

4.7 Summary of my concerns

From what I have seen in the submitted documentation relating to trees, I summarise my concerns as follows:

1. **Inadequate investigations:** Despite statements to the contrary, both the SHA and the CC Reports do not establish the depth of rooting below 1m with any certainty.
2. **Misleading, unreliable, and incomplete analysis of investigations:** The BC Report does not properly or reliably explore and analyse the investigation data. It relies on tenuous links to outdated references that have no realistic relevance to the unique rooting conditions found in London. Furthermore, it fails to identify and evaluate the potential mechanism to support deep rooting provided by the culverted stream/sewer that runs beneath the southern end of the Park.
3. **The three-dimensional excavation envelope:** The biggest impact that this project can have on trees is through the installation of the contiguous piled containment for the structures below ground. These impacts can be through direct damage by cutting important roots, and indirectly by adversely affecting long-standing water and air inputs into the lower soil profile, both of which could threaten the long-term survival of the trees. The BC Report does not describe the full extent of the excavation envelope and it does not provide a proper, reliable, or credible assessment of its impact on roots at depth.

5 Further information and clarifications

As I explain above, there is not enough supporting information to reliably confirm that this proposal will have no significant adverse impacts on trees of national importance. For the full impact of this proposal on those trees to be properly assessed, the following further information and clarifications are needed to supplement the submitted documentation:

1. An analysis to show that the heritage importance and monetary value of the trees has been considered, in line with emerging national government aspirations and policy relating to the principles of natural capital accounting and net environmental gain.
2. Recognition that the whole of the Park provides rooting volume for the trees, or if that is disputed, proper and credible explanations to justify why that is not the case and where the RPAs are.
3. A full investigation of the extent and integrity of the culverted stream/sewer beneath the southern end of the Park to establish if it provides a mechanism for providing air and water to support rooting at depth.
4. Identification of the precise extent, i.e. the width, length, and depth, of the three-dimensional excavation envelope.
5. Reliable and credible investigations to establish the extent of roots that will be cut to create this excavation envelope, i.e. explorations along the boundary of that envelope down to its full depth.
6. A review of the air and water inputs into the soil profile at depth and whether creating the contiguous piling seal around the excavation envelope will adversely affect established air and water pathways through the soil that the existing trees may currently rely on.
7. A reliable and credible analysis of what the impacts on important trees will be, taking full account of any new site investigation data, relevant references, and relevant evidence from other projects in London.
8. Despite it not being a strict BS requirement, it is entirely feasible to produce a full arboricultural method statement in advance of planning consent. Due to the complexity of the project and the importance of the trees, such a document is essential to properly assess the impact on important trees and should be provided.

Appendix 1: Excel spreadsheet summary supporting the CAVAT tree valuations

CAVAT

CALCULATE VALUE OF TREE STOCK

Project: VTG

Name of Surveyor: JB

Date: 26/01/2019

CTI Factor (Please select): 200

Unit Value Factor 15.68

Cumulative Total: £13,632,383

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Created by Alexander Stein and Philip Handley

Tree Information			Step 1: Basic Value									Step 2: CTI Value		Step 3: Locational Value		Step 4: Structural Value		Step 5: Functional Value		Step 6: Amenity Value		Step 7: Final Value	FINAL VALUE
Tree No	Species ID	Location (Use new tree no. 1)	Stem Diameter (1)	Stem Diameter (2)	Stem Diameter (3)	Stem Diameter (4)	Stem Diameter (5)	Stem Diameter (6)	Stem Diameter (7)	Stem Diameter (8)	Stem Diameter (9)	Stem Diameter (10)	Basic Value	CTI Factor (Please select)	CTI Value	Accessibility Factor (Please select)	Location Value	Structural Factor (Please select)	Structural Value	Functional Factor (Please select)	Functional value	Amenity Factor (Please select)	Amenity Value	Life Expec. Factor (Please select)	
1	Plane												£ 39,248	200	£ 184,488	100	£ 184,488	100	£ 184,488	100	£ 184,488	30	£239,834	100	£239,834
2		70004	86										£ 39,094	200	£ 178,106	100	£ 178,106	100	£ 178,106	100	£ 178,106	30	£231,541	100	£231,541
3		70005	84.5										£ 38,539	200	£ 173,916	100	£ 173,916	100	£ 173,916	100	£ 173,916	30	£226,093	100	£226,093
4		70006	81.5										£ 37,426	200	£ 168,839	100	£ 168,839	100	£ 168,839	100	£ 168,839	30	£219,491	100	£219,491
5		70007	82										£ 33,833	200	£ 167,725	100	£ 167,725	100	£ 167,725	100	£ 167,725	30	£218,043	100	£218,043
6		70008	87.5										£ 36,439	200	£ 180,979	100	£ 180,979	100	£ 180,979	100	£ 180,979	30	£235,273	100	£235,273
7		70009	84.5										£ 39,094	200	£ 178,106	100	£ 178,106	100	£ 178,106	100	£ 178,106	30	£231,541	100	£231,541
8		70010	90										£ 39,094	200	£ 202,046	100	£ 202,046	100	£ 202,046	100	£ 202,046	30	£262,663	100	£262,663
9		70011	75.5										£ 71,094	200	£ 142,188	100	£ 142,188	100	£ 142,188	100	£ 142,188	30	£184,845	100	£184,845
10		70012	97										£ 117,350	200	£ 234,700	100	£ 234,700	100	£ 234,700	100	£ 234,700	30	£305,111	100	£305,111
11		70013	97.5										£ 118,553	200	£ 237,126	100	£ 237,126	100	£ 237,126	100	£ 237,126	30	£308,264	100	£308,264
12		70014	95										£ 140,137	200	£ 280,274	100	£ 280,274	100	£ 280,274	100	£ 280,274	30	£364,356	100	£364,356
13		70015	124										£ 191,771	200	£ 383,543	100	£ 383,543	100	£ 383,543	100	£ 383,543	30	£498,606	100	£498,606
14		70016	105										£ 137,505	200	£ 275,010	100	£ 275,010	100	£ 275,010	100	£ 275,010	30	£357,513	100	£357,513
15		70017	89										£ 86,792	200	£ 197,593	100	£ 197,593	100	£ 197,593	100	£ 197,593	30	£256,868	100	£256,868
16		70018	105										£ 140,137	200	£ 280,274	100	£ 280,274	100	£ 280,274	100	£ 280,274	30	£364,356	100	£364,356
17		70019	83										£ 85,929	200	£ 171,841	100	£ 171,841	100	£ 171,841	100	£ 171,841	30	£223,393	100	£223,393
18		70020	71										£ 52,672	200	£ 125,744	100	£ 125,744	100	£ 125,744	100	£ 125,744	30	£163,467	100	£163,467
19		70021	105										£ 137,505	200	£ 275,010	100	£ 275,010	100	£ 275,010	100	£ 275,010	30	£357,513	100	£357,513
20		70022	90										£ 101,024	200	£ 202,046	100	£ 202,046	100	£ 202,046	100	£ 202,046	30	£262,663	100	£262,663
21		70023	100										£ 124,721	200	£ 249,442	100	£ 249,442	100	£ 249,442	100	£ 249,442	30	£324,275	100	£324,275
22		70024	97										£ 117,350	200	£ 234,700	100	£ 234,700	100	£ 234,700	100	£ 234,700	30	£305,111	100	£305,111
23		70025	89										£ 86,792	200	£ 197,593	100	£ 197,593	100	£ 197,593	100	£ 197,593	30	£256,868	100	£256,868
24		70026	96.5										£ 121,009	200	£ 242,015	100	£ 242,015	100	£ 242,015	100	£ 242,015	30	£314,620	100	£314,620
25		70027	22.5										£ 6,888	200	£ 13,775	100	£ 13,775	100	£ 13,775	100	£ 13,775	30	£17,908	100	£17,908
26		70028	111										£ 153,669	200	£ 307,338	100	£ 307,338	100	£ 307,338	100	£ 307,338	30	£399,539	100	£399,539
27		70029	119										£ 176,619	200	£ 353,235	100	£ 353,235	100	£ 353,235	100	£ 353,235	30	£459,205	100	£459,205
28		70030	104										£ 134,699	200	£ 269,797	100	£ 269,797	100	£ 269,797	100	£ 269,797	30	£350,736	100	£350,736
29		70031	116										£ 167,025	200	£ 335,650	100	£ 335,650	100	£ 335,650	100	£ 335,650	30	£436,345	100	£436,345
30		70032	114										£ 152,089	200	£ 324,175	100	£ 324,175	100	£ 324,175	100	£ 324,175	30	£421,428	100	£421,428
31		70033	107										£ 307,425	200	£ 614,851	100	£ 614,851	100	£ 614,851	100	£ 614,851	30	£799,306	100	£799,306
32		70034	94.5										£ 111,379	200	£ 222,758	100	£ 222,758	100	£ 222,758	100	£ 222,758	30	£289,586	100	£289,586
33		70035	84										£ 88,033	200	£ 176,007	100	£ 176,007	100	£ 176,007	100	£ 176,007	30	£228,809	100	£228,809
34		70036	69										£ 148,181	200	£ 296,363	100	£ 296,363	100	£ 296,363	100	£ 296,363	30	£385,271	100	£385,271
35		70037	103										£ 145,475	200	£ 290,950	100	£ 290,950	100	£ 290,950	100	£ 290,950	30	£378,235	100	£378,235
36		70038	91										£ 135,282	200	£ 270,563	100	£ 270,563	100	£ 270,563	100	£ 270,563	30	£351,732	100	£351,732
37		70039	104										£ 134,699	200	£ 269,797	100	£ 269,797	100	£ 269,797	100	£ 269,797	30	£350,736	100	£350,736
38		70040	95										£ 112,681	200	£ 225,122	100	£ 225,122	100	£ 225,122	100	£ 225,122	30	£292,658	100	£292,658
39		70041	97										£ 117,350	200	£ 234,700	100	£ 234,700	100	£ 234,700	100	£ 234,700	30	£305,111	100	£305,111
40		70042	112										£ 156,453	200	£ 312,931	100	£ 312,931	100	£ 312,931	100	£ 312,931	30	£406,771	100	£406,771
41		70043	114										£ 152,089	200	£ 324,175	100	£ 324,175	100	£ 324,175	100	£ 324,175	30	£421,428	100	£421,428
42		70044	88										£ 96,594	200	£ 193,188	100	£ 193,188	100	£ 193,188	100	£ 193,188	30	£251,119	100	£251,119
43		70045	110										£ 150,913	200	£ 301,825	100	£ 301,825	100	£ 301,825	100	£ 301,825	30	£392,373	100	£392,373
44														200		100		100		100		30		100	
45														200		100		100		100		30		100	
46														200		100		100		100		30		100	
47														200		100		100		100		30		100	
48														200		100		100		100		30		100	
49														200		100		100		100		30		100	
50														200		100		100		100		30		100	
51														200		100		100		100		30		100	
52														200		100		100		100		30		100	
53														200		100		100		100		30		100	
54														200		100		100		100		30		100	
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56														200		100		100		100		30		100	
57														200		100		100		100		30		100	
58														200		100		100		100		30		100	
59														200		100		100		100		30		100	
60														200		100		100		100		30		100	
61														200		100		100		100		30		100	

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TREE CONSULTANCY

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