



**Arborlab**

Creating Green Space  
Sustainability

# Arboricultural Completion Memorandum

**August 2022**

Job No. 35419





# Arboricultural Completion Memorandum

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**Prepared for:** Project Team

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**Re:** Preparatory root pruning for proposed tree relocation completion memo

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## 1. Introduction

- 1.1 Arborlab have been instructed by Malcolm Tait of The Building Intelligence Group to review the current project timelines for the Future Accommodation Strategy (FAS), with reference to the proposed relocation of the Museum Oak tree occurring in November 2023.
- 1.2 This resulted in the proposal to carry out preparatory root pruning of the Museum Oak to get ready for a possible relocation of the tree in 2023.
- 1.3 The root ball preparation and minor root pruning was carried out during the week of 11 to 15 July 2022. It was done to encourage the development of fine feeding roots, prior to the proposed tree relocation in 2023 and minimise any effects from the proposed relocation.
- 1.4 Previous work has been undertaken to assess the health of the tree's root system and measure its dimension to determine the feasibility of any transplant operation.
- 1.5 A project plan and site-specific management plan was developed and followed throughout the project.
- 1.6 This completion memorandum forms part of a certificate of compliance for the proposed preparatory root pruning only.

## 2. The site

- 2.1 The Heritage Oak is in the car park to the rear of Parliament House (The Beehive). There is a sloped access ramp to the east of the tree and car parking area to the north, south and west. The tree is growing within a garden area that was created during the refurbishment of the grounds in 1992.
- 2.2 The tree can be seen in the following aerial photograph Figure 1.

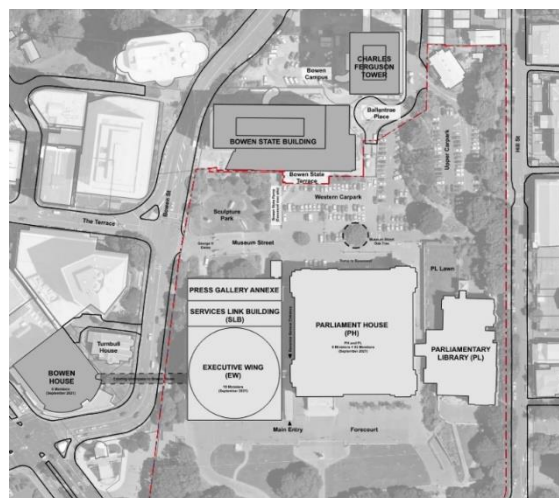


Figure 1: The site with the tree within the dashed circle.

2.3 The site has been heavily modified over the lifespan of the tree. After being planted in a cottage garden, the tree is now essentially in a car park between large buildings. The following photographs 1 and 2 show the tree in its original environment and then more recently.



**Photograph 1: Museum Street Oak Tree (centre left) c.1900 in the grounds of the Government Gardens cottage from Museum Street.**



**Photograph 2: Museum Street Oak Tree in June 2021.**



### 3. Tree assessment methodology

- 3.1 A Visual Tree Assessment (VTA) consistent with modern arboricultural practices (Mattheck and Breloer, 1994) was conducted during April 2021. The assessment was carried out at ground level which is classified as a 'Level 2' assessment (Dunster et al., 2013).
- 3.2 Hand-held laser range finding devices have been used to record data onsite. The tree girth has been measured conventionally with a tape measure and the height and canopy spread measured with the laser range finder. Although considered to be acceptable for a general tree survey, all measurements should be considered an approximate with a degree of error.
- 3.3 Several previous reports and studies have been reviewed and aided the overall assessment of the feasibility of relocating the tree. In addition, on site investigations to determine root growth and architecture were carried out. A climbing inspection was also undertaken to inspect the larger scaffold branches and any cavities or pruning wounds.
- 3.4 Soil testing was carried out to determine soil health along with fungal and bacterial activity,
- 3.5 The cavity at the base of the trunk was assessed using sonic tomography in September of 2019.

### 4. Limitations

- 4.1 It should be noted that trees are dynamic organisms affected by environmental, biotic and mechanical stressors, which can impact health, vitality and structural integrity. Response symptoms of stress can often not be apparent within trees for a number of years. Given the changeable nature of trees, the nature of transplant operations, tree assessments are generally relevant for a 6–12-month period.
- 4.2 A visual assessment of the soil profile was made in conjunction with a soil texture test.<sup>1</sup>

### 5. Regulatory considerations

- 5.1 The tree is listed on the Heritage Trees list in Chapter 21 of Volume 1 of the Wellington City District Plan.

**Table 1: Wellington City District Plan Heritage Tree Reference**

Symbol Reference	Number	Street	Map Reference:	Species	Common name
187		Museum Street	18	Quercus robur	English Oak

<sup>1</sup> <https://www.agric.wa.gov.au/soil-constraints/soil-texture-estimating-hand> or for a video explanation <https://www.youtube.com/watch?v=GWZwbVJCNec>



5.2 The following section from the District Plan is the rules applicable to listed heritage trees.

**21C HERITAGE RULES: TREES**

**21C.1 Permitted Activities**

The following activities are Permitted Activities provided they comply with any specified conditions.

**21C.1.1** The minor trimming of any listed tree that will not adversely affect the health or appearance of the tree is a Permitted Activity.

Minor trimming is:

- The removal of broken branches, dead wood or diseased vegetation
- The removal of branches interfering with buildings, structures, overhead wires or utility networks, but only to the extent that they are touching those buildings, or structures, or interfering with those overhead wires or utility networks
- Other trimming necessary to maintain the health of a listed tree, certified by a person with an appropriate level of expertise.

**21C.1.2** Any activity within the dripline of a listed tree is a Permitted Activity except for:

- the destruction, removal or partial removal of the listed tree
- the alteration of existing ground levels by excavations or deposition of soil including thrust boring and directional drilling
- the covering of the ground by erection of any building or structure or the storage of goods, including the parking of vehicles
- the laying of any impervious surface
- the discharge of any toxic substance

unless certified by a person with an appropriate level of expertise that the health of the tree will not be adversely affected.

**Figure 2: Permitted Activity Standards.**

5.3 The work was determined to meet the permitted activity standards and carried out under a Certificate of Compliance - Notice of Decision - 1 Molesworth St - SR 515845.

**6. Findings of tree assessments**

**Table 2: Tree Details**

Botanical name	Height (m)	Trunk girth (m)	Canopy radii (m) – N, S, E and W	Form	Structure	Health
<i>Quercus robur</i>	14.1	2.74	7.6, 7.1, 6.5 and 7.6m	Good	Good	Good

6.1 The Form, Structure and Health assessment are selected from the following ranges.

Form	Structure	Health
Poor	Hazardous	Poor
Fair	Poor	Fair
Good	Fair	Good
Excellent	Good	Excellent



- 6.2 The tree's health and vitality are considered to be good. There is a dense canopy with good extension growth and numerous emergent buds ready for development in spring/summer. Some new leaf growth was observed during the root preparation work, but only small amounts.

## 7. Proposed relocation root ball.

- 7.1 In general, a root ball of up to 10 to 12 times the diameter of the main stem measured at 300mm from ground level needs to be achieved to ensure a successful transplant (Harris et al 2010).
- 7.2 With a diameter of approximately 1 meter at 300mm from ground level, the root ball requirements above would be approximately 10 meters. However, the tree's root system is mostly contained within the planted area and is dense and compact within that area.
- 7.3 The soil area within the proposed root ball size of 4.6m by 6.7m by 1.6m had a significant quantity of root mass within the planted area and was denser than expected. This indicated the tree has developed a more compact and contained root system. This is likely to have been influenced by the previous root ball preparation, the soil preparation and irrigation within the current site.

## 8. Timing of relocation

- 8.1 The ideal time to relocate an Oak tree is within June and July, after leaf fall and prior to the development of new leaves. The tree relocation and associated root disturbance should not occur in summer (November), when water demand for transpiration is high and there is an increased risk of leaves wilting and premature shedding.
- 8.2 In November, the Museum Oak will have developed new leaves and they will likely be fully formed.
- 8.3 To reduce the effects of any relocation some preparatory root work is proposed.
- 8.4 In addition, it has been confirmed that the tree will be relocated in one operation and not stored temporarily, and later shifted to its final location. This will allow the new location to be properly prepared, and a high level of after care to be carried out.

## 9. Preparatory root pruning and soil work.

- 9.1 To encourage further fine or feeder growth and ultimately reduce the likely stress on the tree prior to any relocation some preparation work and minor root pruning has been carried out.
- 9.2 Fine root production general in *Quercus robur* generally occurs in the growing season, late spring to summer months (Hendrick and Pregitzer, 1992; Ruess et al., 2003; McCormack et al., 2014; Montagnoli et al., 2019).
- 9.3 Winter or the dormant season is therefore the most appropriate time to carry out the root pruning. Any root pruning should be done after leaf abscission or at least one month before buds burst,





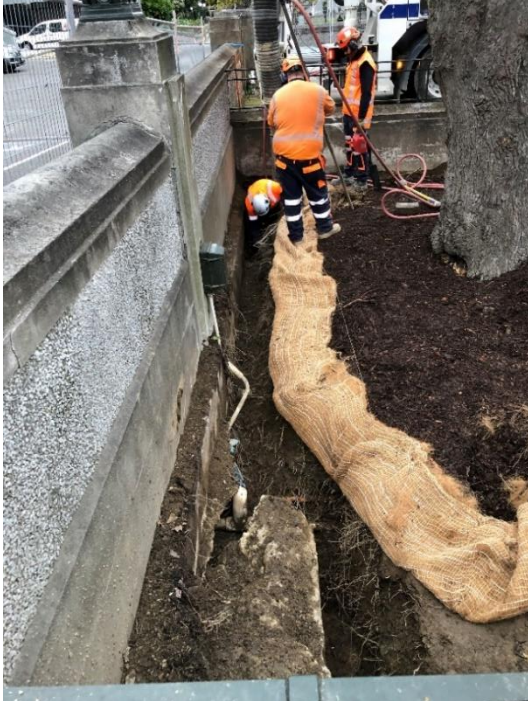
and spring foliage growth.

- 9.4 The preparatory work and minor root pruning was carried out at the edge of the tree's root zone i.e., just inside the planter bed and at the edge of any proposed relocation root ball.
- 9.5 Air specialist air vacuum machine was used to expose the roots. The trench was approximately 1.2m deep and 500mm wide. To minimise the root loss, the exposed roots were pruned at the outer edge of the trench and where practicable folded back against the root ball before it was wrapped.
- 9.6 The following photographs 3 and 4 show the excavation work in progress.



**Photographs 3 and 4. The excavation work in progress.**

9.7 All excavations were carried out in such a way as to minimise any root loss within the proposed root ball area. As the excavations progressed the roots were covered with coconut matting to prevent desiccation and damage. The following photographs 1 to 4, show the exposed trench and roots at the edge of the root ball.



**Photographs 1 and 2. Exposed roots protected during air excavation**



**Photographs 3 and 4. Roots covered with coconut matting at the end of day 1.**

- 9.8 After the excavation work was completed and minor root pruning has been carried out the exposed roots were protected and partly prepared for the proposed relocation. To further minimise any soil loss and drying of the root ball was wrapped in a protective cloth (Hessian or Wool mulch). This was pinned back into the root ball, to hold it in place. The following photographs 5 to 8 show the root ball wrapped in coconut matting and wool mulch.



**Photographs 5 and 6. Eastern and Northern sides of wrapped root ball respectively.**



**Photographs 7 and 8. Western and Southern sides of wrapped root ball respectively.**

9.9 Of note was the weather during the work. Heavy rain occurred on the first two days and light drizzle for the remainder of the week. This negated the need to water the coconut matting and wool mulch. It also meant some of the photographs are of poor quality.

9.10 Once the excavations were complete and the root ball wrapped the hole was back filled with the excavated soil, except for a section along the southern and eastern sides which were backfilled with topsoil and excavated material. Topsoil was used here as the excavated material had become so wet it had turned to a slurry and was therefore not suitable for root growth, The following photograph 9 shows the slurry that was not used to back fill the holes.



**Photograph 9. Slurry not suitable for root growth.**

9.11 The following photographs 10 to 13 show the back filled excavations.



**Photographs 10 and 11. Back filled excavations on the Eastern and Northern sides respectively.**



**Photographs 12 and 13. Back filled excavations on the Western and Southern sides respectively.**

9.12 Finally, the entire root ball was mulched with aged weed free mulch to suppress any weed growth, keep the soil moist and provide nutrients to encourage further root development. The following photographs 14 and 15 show the mulch in place.



**Photographs 14 and 15. The mulch in place.**



9.13 The preparatory root pruning will reduce any relocation shock (if the tree is relocated), by encouraging a flush of new feeder roots within the proposed root ball area. By carrying out this root pruning a year prior to the proposed relocation the tree will have a growing season to produce the flush of root growth.

## 10. Conclusion

10.1 The existing rooting environment, root density and condition, tree health and condition have all been previously investigated.

10.2 The tree is now proposed to be relocated in November 2023. To best prepare the tree for this relocation some preparatory root work and wrapping has been carried out. In addition, the tree will be relocated directly into its new location without being temporarily stored to provide a high level of aftercare and minimise root disturbance.

10.3 The excavations, minor preparatory root pruning and wrapping of the exposed roots will encourage further fine and feeder root growth within the proposed relocation root ball area. This will reduce the likelihood of any relocation shock.

10.4 The preparatory root pruning has been carried out without the need to remove any large diameter roots and the area has been backfilled and covered with mulch to further encourage fine root growth.

10.5 The work was completed in line with the project plan, there were no health and safety issues to report, and no concerns raised by the public or other stakeholders.

## 11. Recommendations

11.1 The irrigation should be reinstated inclusive of a soil moisture monitoring system. This should be completed prior to the weather becoming drier, so November. This system should be calibrated to ensure optimum soil moisture levels are achieved and maintained, thus creating the most favourable growing conditions for the tree and its roots.

11.2 An inspection pipe should be installed in the lowest (southeast) corner at the edge of the root ball. This pipe should be accessible for inspection to check water levels and ensure overwatering does not occur. The pipe should be approximately 1.4m below ground level.

11.3 Leaf duff from other English oaks should be applied within the planter bed to improve the overall soil health and condition.

11.4 An oak propagation specialist should be engaged to carry out a site visit and provide some summary actions to undertake successful propagation of the tree.

11.5 The tree should be reinspected in spring to assess the new foliage growth, foliar density, and foliar colour.



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11.6 On a monthly basis a visual inspection should take place to monitor the following.

- i) Irrigation
- ii) Soil Moisture
- iii) Tree health and growth

11.7 A monthly update should be provided with a summary quarterly report with findings and action in December, March and June.

11.8 Review the existing relocation plan and based on these findings and previous investigatory work develop an updated relocation plan should be developed with input from the project team and main contractor.