Aurecon
The University of Melbourne Parkville Campus
Arboricultural Impact Assessment

9 October 2023

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Job number: 04535v3

04535v3

9 October 2023

Liam Utri
Aurecon
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Level 8, 850 Collins Street
Docklands VIC 3008

Arboricultural Impact Assessment Report regarding thirteen (13) trees located within the vicinity of the proposed Australian Institute for Infectious Disease (AIID) facility at The University of Melbourne – Parkville Campus, Grattan Street, Parkville

Dear Liam,

We are pleased to provide you with the following Arboricultural Impact Assessment Report for thirteen (13) trees within the grounds of The University of Melbourne – Parkville Campus.

Complete use of this report is authorised under the conditions limiting its use as stated in Appendix A Item 7 of "*Arboricultural Reporting Assumptions and Limiting Conditions*".

Should you have any queries relating to this report, its recommendations, or the options considered please do not hesitate to contact us on 1300 272 671.

Regards,

Adam Demler
Consulting Arborist
Grad. cert. (Arb.), AQF Level 8

Version	Date	Author	Rationale
1	19 July 2023	Adam Demler	First Issue
2	1 September 2023	Adam Demler	Plan update
3	9 October 2023	Andy Clark	Update to Tree 1979 and 1980

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1 Executive Summary

1.1.1 The following is an Arboricultural Impact Assessment (Report) regarding thirteen (13) trees located within the grounds of the Australian Institute for Infectious Disease (AIID) facility within the Melbourne Biomedical Precinct in Parkville. The subject site was identified by Aurecon (the Client) as possessing trees that may be impacted upon by a proposed development.

1.1.2 In part, the project scope was to nominate subject trees that can be retained, or require removal to facilitate the proposed development, as well as identify and reduce potential conflicts between subject trees and site development. Accurate information on the area required for tree retention and methods/techniques suitable for tree protection during construction have been provided.

1.1.3 All subject trees were identified as City of Melbourne (CoM) street plantings and therefore hold protection under the CoM Tree Policy 2021.

1.1.4 Trees 1987 and 1988 are situated adjacent overhead gantry. The project arborist is to provide tree pruning specifications after review of the relevant final onsite specifications and methodologies.

1.1.5 Tree retention values have been determined based upon a modified version of the British Standard and which have been prescribed into one of the following four (4) categories, A, B, C and U. Refer to Appendix C for further detail. Generally, relevant consent authorities will consider:

- A retention value trees as a site constraint and may require alterations to the proposed development design and/or specific protection measures to allow retention, unless the proposed development outweighs the retention value of the tree
- B retention value trees as a site constraint consideration, lesser changes should be considered to retain such trees
- C retention value trees are not considered a site constraint
- U retention value trees are considered a site opportunity, as such trees are recommended for removal regardless of the proposed development.

1.1.6 Trees impacted by the proposed development:

Category	Description	Total	Removal		Retain	
			located within development footprint	irrespective of future development	with specific protection	with generic protection
A	High retention value trees	0				
B	Moderate retention value trees	6	1979, 1980, 1986, 1989			1987, 1988
C	Low retention value trees	7	1977, 1978, 1981, 1982, 1983, 1984, 1985			
U	Trees to be removed irrespective of proposed development	0				

1.1.7 The site is adjacent to a place (Royal Parade) on the Victorian Heritage Register (VHR no.H2198) thus Trees 1987, 1988 and 1989 are considered to hold heritage significance. It is a condition of a heritage report that replanting is to be undertaken with English Elms (*Ulmus procera*) to maintain the landscape character identified in the statement of significance.

2 Introduction

2.1.1 Civica ArborSafe was engaged by Liam Utri of Aurecon to complete an Arboricultural Impact Assessment Report on thirteen (13) trees located in the vicinity of The University of Melbourne – Parkville Campus.

2.1.2 The site is located within the Australian Institute for Infectious Disease (AIID) facility at the Melbourne Biomedical Precinct in Parkville, and jointly owned by the University of Melbourne, Burnet Institute and Doherty Institute. The AIID is proposed for full demolishment (including basement levels) and is to be replaced with a twelve storey, above ground research building.

2.1.3 The report has been requested as part of a Development Application (DA).

2.1.4 The report was intended to provide information on site trees and how they may be impacted upon by the proposed development. Report findings and recommendations provided are based upon guidance provided within Australian Standard AS 4970–2009: *Protection of Trees on Development Sites*.

2.1.5 Observations and recommendations provided within this report are based upon information provided by the Client and an arborist site visit.

3 Scope

3.1.1 Carry out a visual examination of the nominated trees located within the vicinity of the proposed development, including trees located on council footpaths.

3.1.2 Provide an objective appraisal of the subject trees in relation to their species, estimated age, health, structural condition, useful life expectancy (ULE) and viability within the landscape.

3.1.3 Based on the findings of this investigation, provide independent recommendations on the retention value of the trees.

3.1.4 Nominate subject trees that can be retained or require removal to facilitate the development.

3.1.5 Identify and reduce potential conflicts between subject trees and site development by providing accurate information on the area required for tree retention and methods/techniques suitable for tree protection during construction.

3.1.6 Provide information on restricted activities within the area nominated for tree protection, as well as suitable construction methods to be adopted during demolition and/or construction.

4 Methodology

4.1 Data Collection

4.1.1 James Mackenzie of Civica ArborSafe carried out a site inspection of the subject trees on 23 February 2023.

4.1.2 Adam Demler of Civica ArborSafe authored a Preliminary Arboricultural Report (PAR) (Ref JNC03998) dated 15 March (2023).

4.1.3 Trees that are the subject of this report (Figure 2) were identified during discussions with the Client, reviewing relevant supplied development documentation and reviewing the description of a non-exempt 'Tree' as identified within the City of Melbourne (CoM) Tree Policy 2021 (City of Melbourne, 2021) whereby:

- Any tree which has a part of its trunk growing on council managed land and is known to the CoM
- Native vegetation
- Where a tree(s) is listed on the Exceptional Tree Register and afforded protection through the planning scheme.

4.1.4 Small trees/shrubs within the site have been omitted from the report based on their species, current size and/or potential future size and contribution to local amenity.

4.1.5 The subject trees were inspected from the ground using the initial component of Visual Tree Assessment (VTA) (Mattheck, 1994). No foliage or soil samples were taken and no aerial, underground or internal investigations were undertaken.

4.1.6 Tree height and crown width were estimated and have been provided in a variety of ranges with 5m increments. Trunk diameter at breast height (DBH) and trunk diameter at the root crown (DRB) were measured with a diameter tape and provided to the nearest centimetre.

4.1.7 AutoCAD LT was used to determine encroachments into the Tree Protection Zones.

4.1.8 Environmental and Heritage information may be sourced from VicPlan. The source of all information has been referenced accordingly.

4.1.9 Data collected on site was analysed by Adam Demler, collated into report format, and relevant recommendations were formulated.

4.1.10 Tree protection zones (TPZ) and structural root zones (SRZ) were calculated in accordance with the Australian Standard AS 4970–2009: *Protection of Trees on Development Sites* (refer to Section 7.6).

4.1.11 Retention values have been determined based upon a modified version of the British Standard BS 5837–2012: *Trees in Relation to Design, Demolition and Construction* (refer to Appendix C).

4.1.12 All photographs were taken at the time of the site inspections by the assessor and have not been altered for brightness or contrast, nor have they been cropped.

4.1.13 Plans of the existing site and of the proposed development were provided to ArborSafe on 10 July 2023.

4.1.14 No proposed underground service locations have been reviewed in the preparation of this report.

5 Observations

5.1 Location

5.1.1 The site was located within the CoM Local Government Area (LGA).

5.1.2 The subject site was located within the grounds of The University of Melbourne – Parkville Campus, located within 213-221 Berkeley Street, Melbourne, 3000 (Figure 1). Specifically, the subject site included the areas formally recognised by plan numbers: PS520127; PP2796B; PS537134; and SP26203.

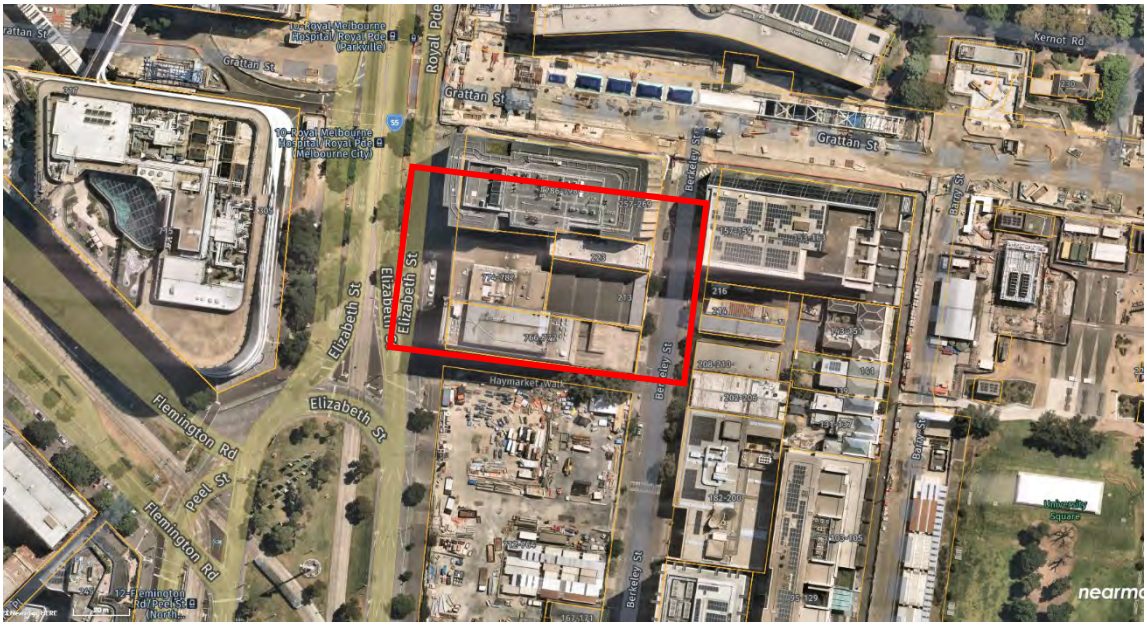

Figure 1. Aerial imagery showing property boundaries and street names. Red line delineates approximate area containing the subject trees. (NearMap, n.d.)

5.2 Site Trees

5.2.1 The subject trees are all located outside of the subject site on streetscapes owned and maintained by the CoM.

5.2.2 The trees are all located adjacent to council streets and footpaths, growing in tree plots. Tree plots often contain harsh growing environments which limit lateral root development when compared to the growing conditions of a tree within an open landscape.

5.2.3 Verbal discussion with a CoM arborist were had on 3 March 2023. The CoM arborist advised that it was unlikely that any tree engineered planting design (such as structural soil cells, a structural soil, or root barrier) was located nearby to the subject trees. A dial before you dig (DBYD) search did not indicate irrigation or any other underground infrastructure that may influence root development within the search parameters of the site.

5.2.4 The subject trees (Figure 2) were added to an existing ArborPlan tree survey for the University of Melbourne, Parkville Campus and as such have been assigned with unique tree identification numbers between 1977-1989. Due to the trees being council street tree assets, the trees were not physically tagged.

5.2.5 The trees are mostly examples of exotic species with the exception of Tree 1986 which is not endemic to Victoria. The trees were juvenile to semi-mature in age. All trees were showing signs of good health with defects which weren't considered to have reduced their Useful Life Expectancy (ULE).

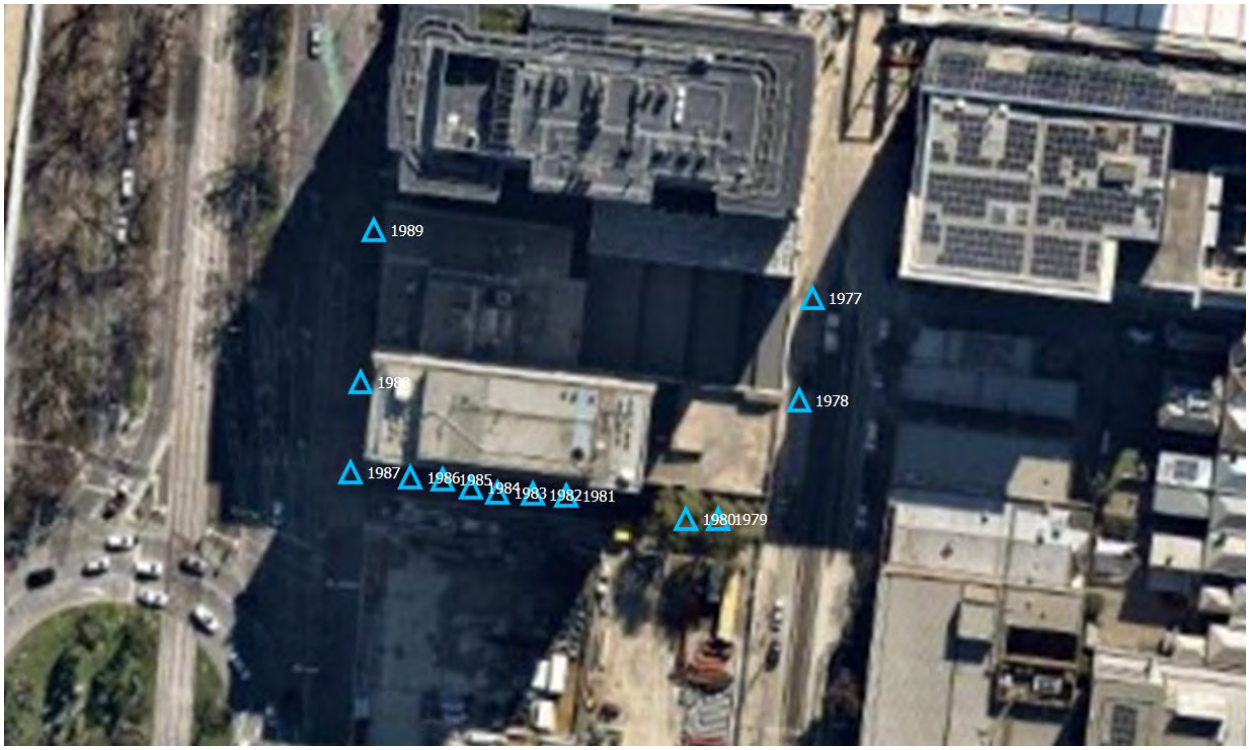

Figure 2. Site map showing subject trees. Note that icon colour indicates trees current risk rating (not Retention Value). Tree attributes are to be obtained from D – Tree Assessment Data. (ArborPlan, February 2023).

5.2.6 Heritage Status

5.2.7 The site contained areas listed within a Heritage Overlay (HO) (Refer Figures 3-7) (Victoria State Government - Department of Transport and Planning, n.d.). Three (3) trees (Trees 1987, 1988, 1989) were located on the southern aspect of Victorian Heritage Register (VHR) no. H2198 (Royal Parade) (PS Map ref. HO977) and possess heritage value.

5.2.8 Within a statement of significance, trees within Royal Parade are described as:

two inner plantations comprise concrete-curbed, grassed medians planted with mature elms and two outer plantations consist of lines of mature elms planted in 1913 in the grass verges between the footpaths and road. The predominant species is English Elm (Ulmus procera) with approximately four hundred trees contributing to the park-like setting (Victorian Heritage Register, 2023).

5.2.9 The subject tree species are consistent with the statement of significance, although they represented much more recent examples of planted specimens.

Figure 3. Royal Parade view (Victorian Heritage Register, 2023)

Figure 4. Royal Parade central carriageway (Victorian Heritage Register, 2023)

Figure 5. Royal Parade west side in winter (Victorian Heritage Register, 2023)

The subject site, adjacent to the southern end of H2198 on the VHR.

Figure 6. H2198 Royal Parade plan (Victorian Heritage Register, 2023)

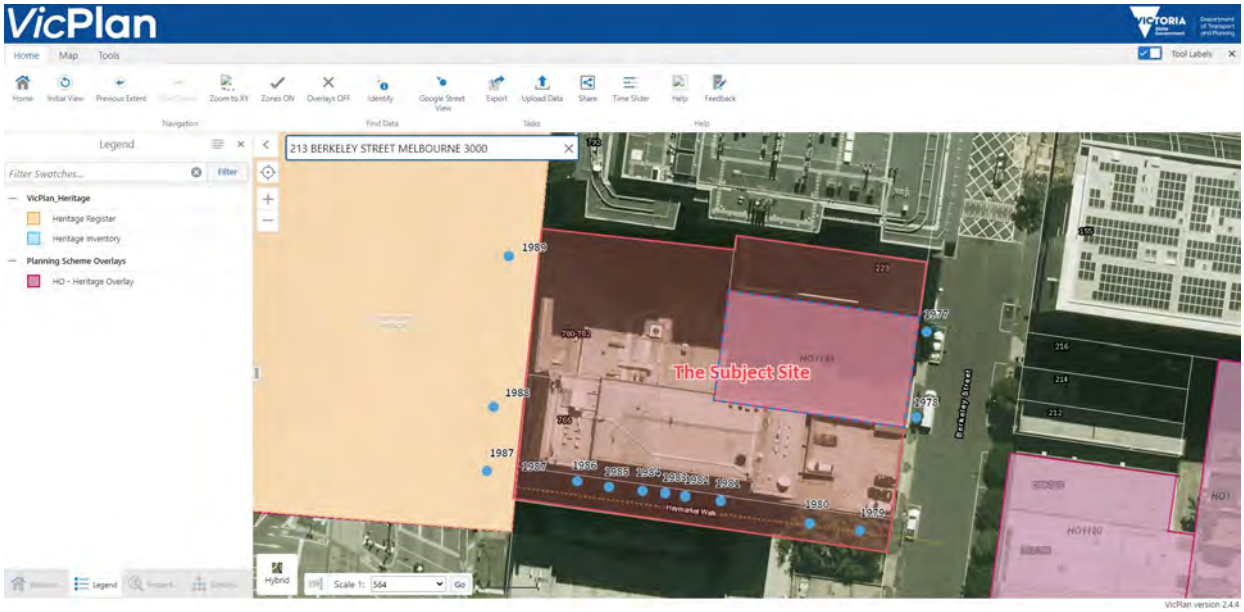

Figure 7. Heritage overlay detail. (Victoria State Government - Department of Transport and Planning, n.d.).

5.2.10 213 Berkley Street was identified as being subject to a Heritage Overlay (HO1129) however contained no trees.

5.2.11 Botanical and Environmental Status

5.2.12 The site trees were considered common species in the local area and as such held limited botanical significance.

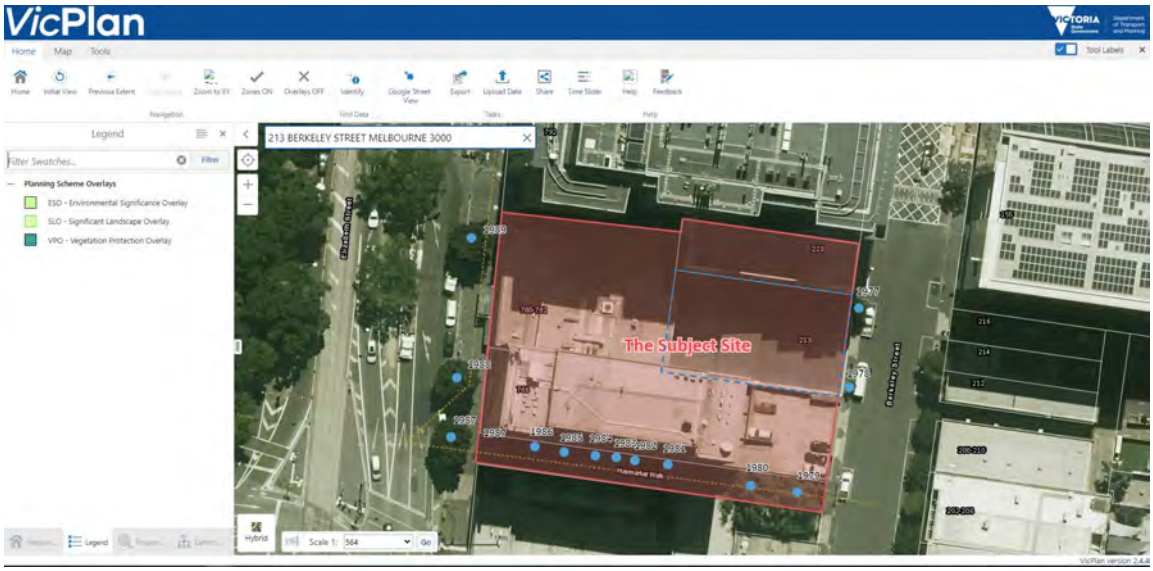

Figure 8. Image of protected vegetation overlay detail. (Victoria State Government - Department of Transport and Planning, n.d.)

6 Tree Retention Values

6.1 Determining Tree Retention Values

6.1.1 Tree Retention Value has been determined based on a combination of tree attributes. Tree retention value is categorised as per the British Standard BS 5837–2012: *Trees in Relation to Design, Demolition and Construction*. Attributes considered when determining the retention value include tree health, structure and form, life expectancy, suitability of the tree in the context of local landscape. Arboricultural, cultural, environmental and heritage significance are all also considered within the subcategories identified.

6.1.2 Collectively tree attributes are reviewed and used to categorise tree value in a development context. Additional information explaining Tree Retention Value can be found in Appendix B – *Explanation of Tree Assessment Terms.*

6.2 Category A Trees (High Retention Value)

6.2.1 No trees were determined to be Category A Trees. Typically trees in this category are of high quality with an estimated remaining life expectancy of at least 25 years and of dimensions and prominence that it cannot be readily replaced in <20 years. The tree may make significant amenity contributions to the landscape and may make high environmental contributions. In some cases trees within this category may not meet the above criteria, however possess significant heritage or ecological value. Trees of this retention value warrant design consideration and amendment to ensure their viable retention.

6.3 Category B Trees (Moderate Retention Value)

6.3.1 Six (6) trees were considered to have a Moderate Retention Value. Typically trees in this category are of moderate quality with an estimated remaining life expectancy of 15–25 years and prominence of size dimensions that cannot be readily replaced within ten years. They may make moderate amenity contributions to the landscape and make low/moderate environmental contributions. Trees with this retention value warrant minor design consideration in an attempt to allow for their retention.

6.3.2 In the context of this site. Category B trees are those that cannot be readily replaced within 15 years.

6.3.3 Category B trees were numbered 1979, 1980, 1986, 1987, 1988 and 1989 and are shown in Figure 9.

Figure 9. Aerial image showing location of Moderate Retention Value Trees. Note tree icon colour does not indicate Retention Value. (ArborPlan, July 2023).

Figure 1. Category B Tree 1979, the largest crown size of the site trees. (James Mackenzie, 23 February 2023).

Figure 2. Category B Tree 1986. (James Mackenzie, 23 February 2023).

6.4 Category C Trees (Low Retention Value)

6.4.1 Seven (7) trees were identified as being Category C Trees. Trees in this category are of low quality with an estimated remaining life expectancy of 5–15 years, or young trees that are easily replaceable, may have poor health and/or structure, are easily replaceable, or are of undesirable species and do not warrant design consideration.

6.4.2 In the context of this site, Category C trees were: juvenile trees which can be easily replaced within 10 years or; Trees which are not expected to remain viable for more than 15 years due to their proximity to OHLE.

6.4.3 Category C trees were numbered 1977, 1978, 1981, 1982, 1983, 1984 and 1985 and are shown in Figure 10.

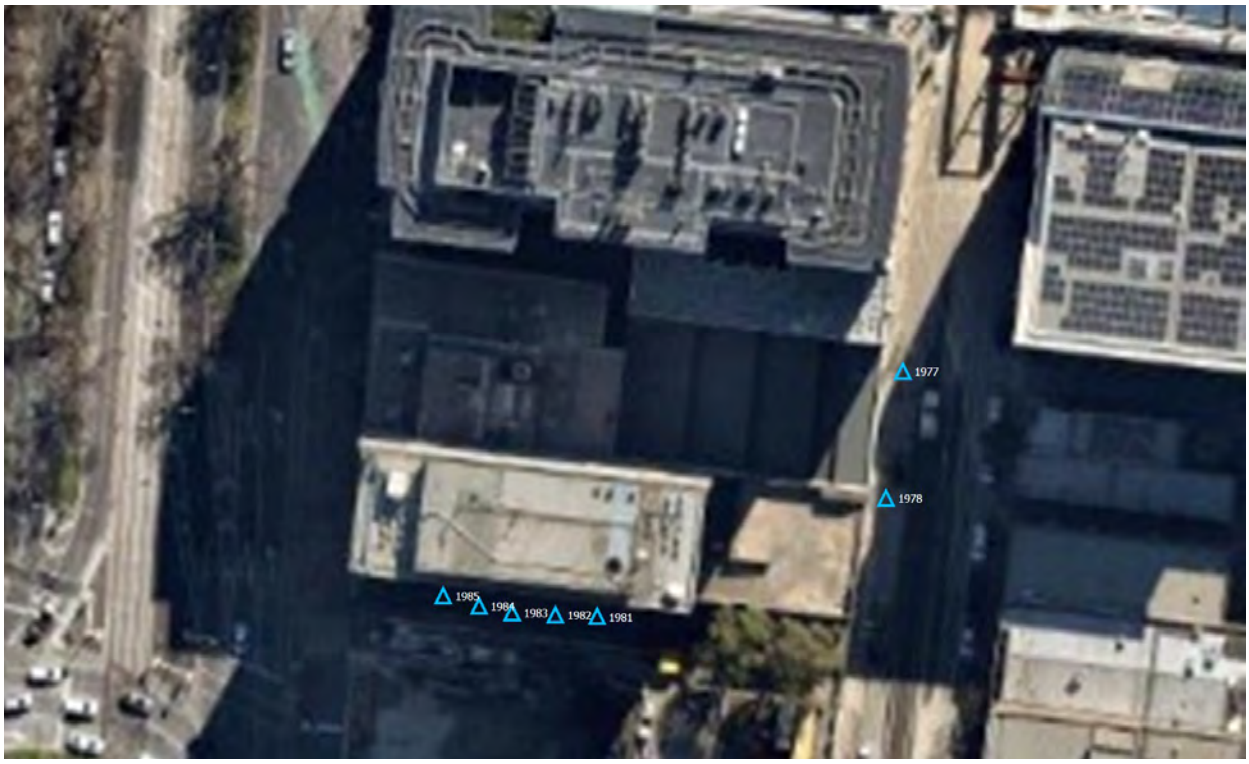

Figure 10. Aerial image showing location of Low Retention Value Trees. Note tree icon colour does not indicate Retention Value. (ArborPlan, July 2023).

Figure 11. Category C Tree 1981, looking west.
(James Mackenzie, 23 February 2023).

Figure 12. Category C Tree 1978, growing through LV powerlines.
(James Mackenzie, 23 February 2023).

6.5 Category U Trees (Unsuitable for Retention)

6.5.1 No trees were found to be in such a condition that they cannot realistically be retained as viable trees in the context of the current land use for longer than five years. These trees may be dead and/or of a species recognised as a weed that resulted in them being unretainable. These trees should be removed irrespective of any future development on the site.

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7 Discussion

7.1 Determining TPZ Encroachment

7.1.1 Major encroachment. As per the Australian Standard AS 4970–2009: *Protection of Trees on Development Sites*, a major encroachment into the TPZ of any tree is considered to occur when it is beyond 10% of the total TPZ area. Trees with major encroachment may require removal or, in certain instances, be retained with specific protection requirements throughout the construction stage.

7.1.2 Minor encroachment. Under the aforementioned standard, a minor encroachment is determined as being less than 10% of the total TPZ area. Trees with minor encroachment may be retained with specific, generic or no protection requirements throughout the construction stage.

7.1.3 No encroachment. Trees with no encroachment may be retained with generic or no protection requirements throughout the construction stage.

7.1.4 For the purposes of this report, trees to be removed or retained have been identified as those:

- Requiring removal due to a level of encroachment into their TPZ that would likely result in a detrimental impact upon their future health and/or stability
- Retainable and requiring specific protection requirements throughout construction (i.e. generic requirements plus arborist supervision and careful construction methods within their TPZ)
- Retainable and requiring generic tree protection measures only (i.e. protective fencing and restriction of activities within the TPZ).

7.2 Proposed Construction

7.2.1 The proposed development has been reviewed and in summary consists of the full demolishment (including basement levels) of existing buildings to be replaced with a twelve-storey above ground research building, and landscaping in the form of Haymarket Walk.

7.3 Impact of Proposed Development

7.3.1 Review of the proposed design has been undertaken in the context of tree retention and removal across the site.

7.3.2 Tree 1989 is affected by direct conflict with the proposed crossover into the AIID loading dock and would require removal under the current design. To retain Tree 1989 a redesign or relocation of the development would be required. Refer to Appendix D for full detail.

7.3.3 The other main development impact which affects trees, but not necessarily to the point of requiring immediate removal, is through significant root damage due to major TPZ encroachment. These can largely be placed into three (3) categories – soil compaction, level changes or direct root severance.

7.3.4 Negative tree impacts can manifest as either a reduction in health and/or vigour due to root loss (absorption and/or transport roots) resulting in a reduction in water and nutrient absorption capability or on tree stability if larger roots are impacted. Ultimately, the outcome for the trees depends on a number of variable factors including species, age, current health, TPZ encroachment percentage, soil type, topography, previous site use and the proposed design and construction methodology.

7.3.5 Compacted soils, especially artificially compacted soils such as those found under driveways or building platforms, have a higher bulk density down to a deeper level of subsoil. Bulk density is the term used for describing the weight of soil per unit volume. The broad engineering thinking is that the higher the density the more stable the road surface due to less soil movement in expansion, contraction, or compression. A higher bulk density is produced by compacting the soil to reduce available pore space between the soil particles.

7.3.6 The effect of compacted soils on plants is somewhat influenced by the soil type but generally a reduction in available pore space reduces the available area for oxygen and water within the soil. A reduction in available soil water and oxygen inhibits root activity within the soil, as they are essential for root elongation and growth, and the lack of these properties is considered a major limiting factor.

7.3.7 A similar reduction in root activity, due to a reduction in pore space, can occur following significant soil level changes across the TPZ, although this generally occurs over a longer time frame than if the roots were directly severed. Root severance has the same effect, reduction in root function and capability, but on an instantaneous time scale where there is no time for the tree to adjust.

7.3.8 The assumption of allowable encroachment and minimal long-term health or structural impacts to the trees rely on a combination of the following being used - root sensitive construction methods being adhered to within the TPZ, minimal excavation within the TPZ to limit root severance (i.e. construction placed outside the TPZ where possible), fill rather than excavation utilised to affect level changes where possible (i.e. to minimise root severance and allow the trees root system time to adjust), no construction occurring within the SRZ, compensatory area being available around the unimpacted aspects of the trees and the enhancement of the existing TPZ area (i.e. mulched, soil conditioning and irrigation when required).

7.3.9 The development will affect ten (10) site trees through excavation encroachment(s) into their respective TPZs (numbered 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986). It is anticipated that trees with encroachments from the existing basement footprint will not be affected where no further encroachment occurs. Trees 1981-1986 are all within 0.5m of the existing building and will not be retainable without extensive precautions in place, which would not be feasible under their current retention score (Categories B and C).

7.3.10 Tree 1977 is located on the Berkeley Street footpath adjacent to a proposed substation located on the northeast corner of the proposed AIID building. There will be requirements for truck access and cranage for CitiPower to access the substation. There are no pruning options which conform with best industry practices, namely Australian Standard AS 4373–2007: *Pruning of Amenity Trees* which will allow for CitiPower to access the substation. A relocation of the substation will be required to retain Tree 1977.

7.3.11 Tree 1978 will impede with the setup of scaffolding and/or overhead gantries adjacent to Berkely Street. Due to its low retention score (Category C), it does not warrant the resources required to retain this tree.

7.3.12 Trees 1979 and 1980 hold a Medium retention score (Category B) and are recommended for removal to facilitate the proposed landscape design intent.

8 Tree Protection and Management Recommendations

8.1.1 Refer to the Tree Protection Plan (TPP) attached in Appendix E.

8.2 Tree Removal

8.2.1 Eleven (11) trees would require removal based on the supplied design proposal. These trees would require removal to allow the proposed development:

Recommendation	Category A High retention value		Category B Moderate retention value		Category C Low Retention value		Category U No retention value	
	Qty	Tree numbers	Qty	Tree numbers	Qty	Tree numbers	Qty	Tree numbers
Remove for development	0		4	1979, 1980, 1986, 1989	7	1977, 1978, 1981, 1982, 1983, 1984, 1985	0	

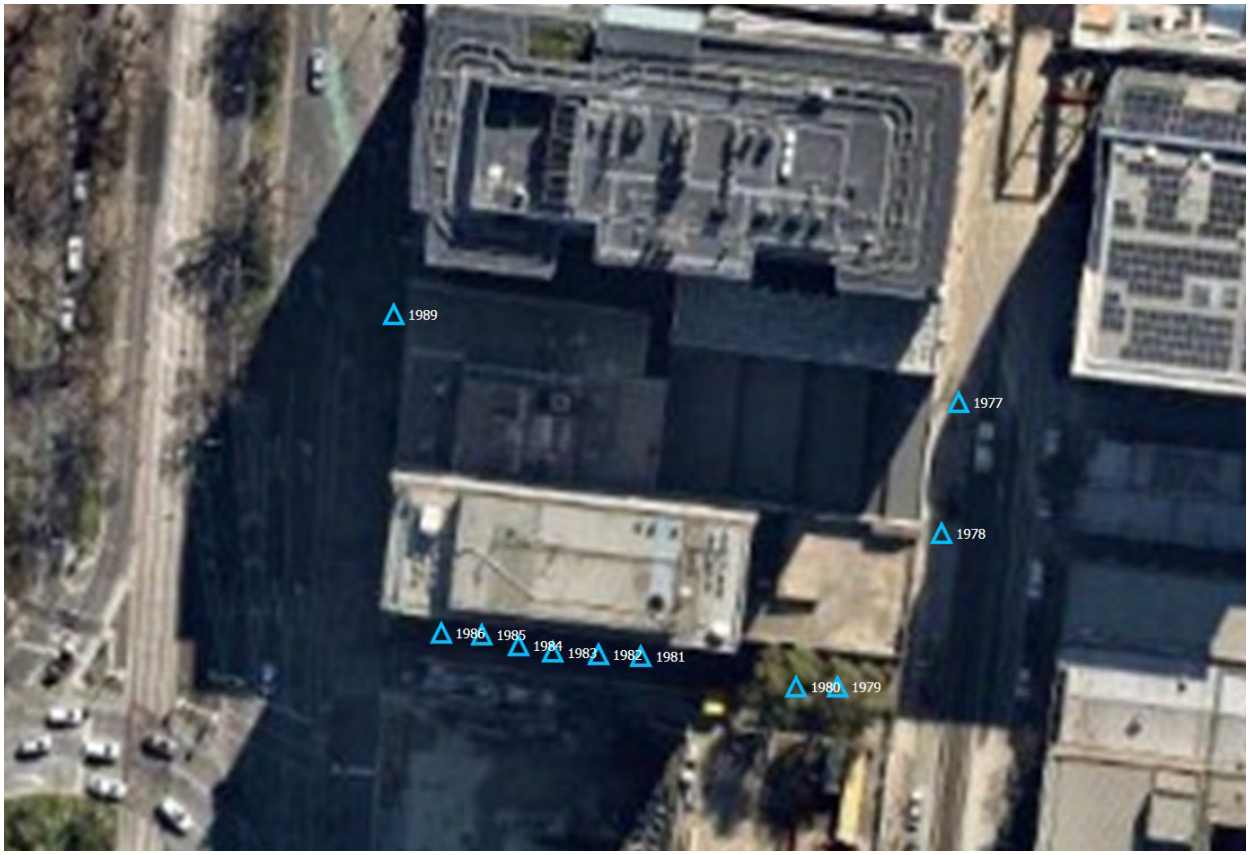


Figure 13. Site map showing trees requiring removal to facilitate the development. (ArborPlan, February 2023).

8.3 Tree Retention

8.3.1 Two (2) trees were recommended for retention and require specific and/or generic protection measures during demolition/construction to ensure they remain viable following the completion of works.

Recommendation	Category A High retention value		Category B Moderate retention value		Category C Low Retention value	
	Qty	Tree numbers	Qty	Tree numbers	Qty	Tree numbers
Retain with generic protection requirements	0		2	1987, 1988	0	

8.4 Proposed Pruning

8.4.1 No pruning should take place without direct consent from the project arborist and the City of Melbourne. Further arborist consultation will be required to facilitate overhead gantry positioning for Trees 1987 and 1988. Following review of relevant methodology, the project arborist will provide pruning specifications to be approved by the City of Melbourne.

8.4.2 All pruning is recommended to be completed in accordance with the Australian Standard AS 4373–2007: *Pruning of Amenity Trees* (Standards Australia, 2007) and undertaken by a suitably qualified arborist (minimum AQF 3 arborist).

8.4.3 Reduction pruning should focus on the removal of smaller diameter branches where feasible and remove no greater than 10% of each tree's total live crown mass. Branches no greater than 50mm diameter are to be removed unless specifically approved by the project arborist.

8.5 Generic Protection and Reporting Measures

8.5.1 All retained trees require generic protection measure (Figure 14). Refer to Section 8.5–8.8 for further detail.

Figure 14. Site map showing tree requiring generic protection measures. (ArborPlan, February 2023).

8.5.2 All trees to be retained require protection during the construction stage. Tree protection measures include a range of:

- Activities restricted within the TPZ
- Protective fencing
- Trunk and ground protection
- Tree protection signage
- Involvement from the project arborist
- Project milestones
- Compliance reporting

8.6 Activities Prohibited within the TPZ

- Machine excavation including trenching
- Storage
- Preparation of chemicals, including cement products
- Parking of vehicles and plant
- Refuelling
- Dumping of waste
- Wash down and cleaning of equipment
- Placement of fill
- Lighting of fires
- Soil level changes
- Temporary or permanent installation of utilities and signs
- Physical damage to the tree

8.7 Protective Fencing Specification

8.7.1 In the absence of a more comprehensive site perimeter barrier, protective fencing (Figure 15) is to be installed as far as practicable from the trunk of any retained trees. Fencing should be erected as per the image below before any machinery or materials are brought to site and before commencement of works (including demolition).

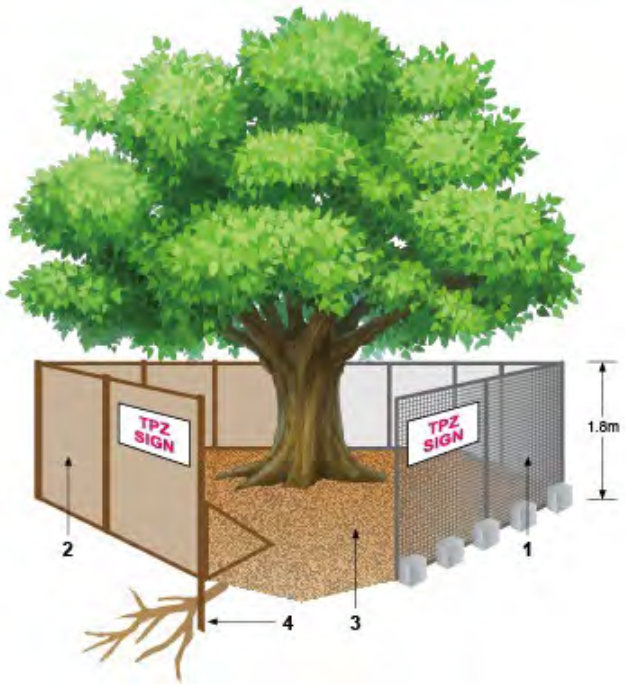
8.7.2 In some areas of the site (i.e. protection of trees on neighbouring properties) existing boundary fencing may be used as an alternative to protective fencing.

8.7.3 Once erected, protective fencing must not be removed or altered without approval from the project arborist. The TPZ fencing should be secured to restrict access.

8.7.4 TPZ fencing is to be a minimum of 1.8m high and mesh or wire between posts must be highly visible. Fence posts and supports should have a diameter greater than 20mm and should ideally be freestanding, otherwise be located clear of the roots. See image below.

8.7.5 Tree protection fencing must remain intact throughout all proposed construction works and must only be dismantled after their conclusion. The temporary dismantling of tree protection fencing must only be done with the authorisation of a consulting arborist and/or the responsible authority.

8.7.6 The subject trees themselves must also not to be used as a billboard to support advertising material. Affixing nails or screws into the trunks of trees to display signs of any type is not a recommended practice in the successful retention of trees.



Legend:

1. Chain wire mesh panels with shade cloth attached (if required), held in place with concrete feet
2. Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ
3. Mulch installation across surface of TPZ (at discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage materials of any kind are permitted within the TPZ
4. Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.

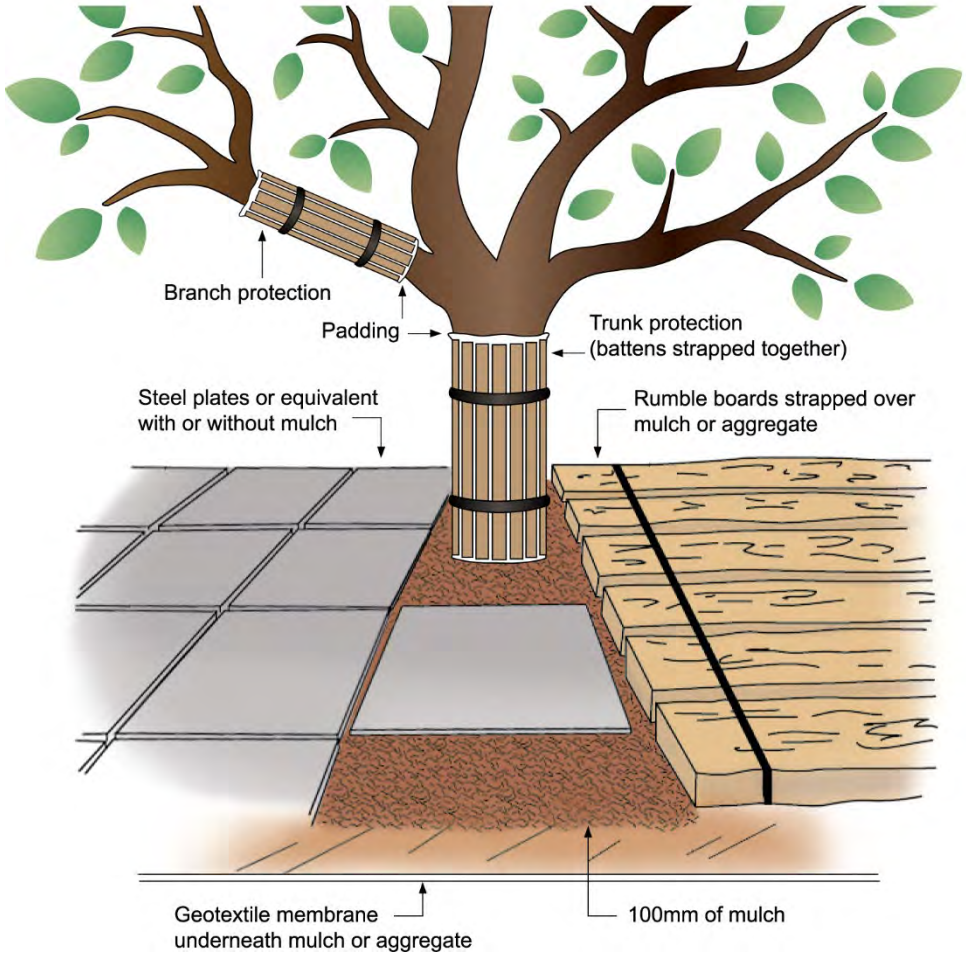
Figure 15. Depicts standard fencing techniques. (AS 4970–2009).

8.8 Trunk and Ground Protection

8.8.1 Given that proposed works are often within the TPZs of retained trees, standard protective fencing may not always be a viable method of protection. In these areas trunk protection and ground protection should be installed prior to the commencement of works and remain in place until after construction works have been completed.

8.8.2 Where construction access into the TPZ of retained trees cannot be avoided, the root zone of each tree must be protected using either steel plates or rumble board strapped over mulch/aggregate until such a time as permanent above ground surfacing (cellular confinement system or similar) is to be installed.

8.8.3 Trunk and ground protection (Figure 16) should be undertaken in line with the Australian Standard AS 4790–2009: *Protection of Trees on Development Sites* as per the image below:



Notes:

1. For trunk and branch protection use boards and padding that will prevent damage to bark. Boards are to be strapped to trees, not nailed or screwed.
2. Rumble boards should be of a suitable thickness to prevent soil compaction and root damage.

Figure 16. Depicts trunk and ground protection techniques. (AS 4970–2009).

8.9 Tree Protection Signs

8.9.1 Signs identifying the TPZ (Figure 17) should be placed at 10m intervals around the edge of the TPZ and should be visible from within the development site.

Figure 17. Depicts standard fencing techniques. (AS 4970–2009).

8.10 Project Arborist

8.10.1 An official project arborist must be commissioned to oversee the tree protection, any works within the TPZ's and complete regular monitoring compliance certification.

8.10.2 The project arborist must have minimum five (5) years industry experience in the field of arboriculture, horticulture with relevant demonstrated experience in tree management on construction sites, and diploma level qualifications in arboriculture – AQF Level 5.

8.10.3 Inspections are to be conducted by the project arborist at several key points during the construction in order to ensure that protection measures are being adhered to during construction stages and decline in tree health or additional remediation measures can be identified.

8.11 Project Milestones

8.11.1 The following visits and milestones were recommended as to when on-site tree inspection by the project arborist is required:

Item	Purpose of Visit	Timing of Visit(s)	Prerequisites
1	Pre-start induction	Following sign off from Item 1. Contractor to provide a minimum of five days advance notice for this visit.	Prior to commencement of works. All parties involved in the project to attend.
2	Supervision of works in TPZ's including all demolition, regrading and excavations	Whenever there is work planned to be performed within the TPZ's. Contractor to provide a minimum of five days advance notice for such visits.	
3	Regular site inspections	Minimum frequency monthly for the duration of the project.	The checklist must be completed by the project arborist at each site inspection and signed by both parties.
4	Final sign off	Following completion of works.	Practical completion of works and prior to tree protection removal.

8.12 Compliance Reporting

8.12.1 Following each inspection, the project arborist shall prepare a report detailing the condition of the trees. These reports should certify whether or not the works have been completed in compliance with the consent relating to tree protection.

8.12.2 These reports should contain photographic evidence where required to demonstrate that the work has been carried out as specified.

8.12.3 Matters to be monitored and included in these reports should include tree condition, tree protection measures and impact of site works which may arise from changes to the approved plans.

8.12.4 The reports and compliance statements shall be submitted to the project manager (as well as the Clients' nominated representative) following each inspection.

8.12.5 The reports and any non-compliance statements shall be submitted to the project manager (as well as the Clients' nominated representative) if tree protection conditions have been breached. Reports should contain clear remedial action specifications to minimise any adverse impact on any subject tree.

8.13 Offset Tree Planting

8.13.1 Offset planting should reflect the number of trees removed and the initial loss of amenity and biomass. New trees should be of long-term potential and sourced from a reputable supplier.

8.13.2 It is a condition of a heritage report that replanting is to be undertaken with English Elms (*Ulmus procera*) to maintain the landscape character identified in the statement of significance.

8.13.3 Replacement tree species must suit their location on the site in terms of their potential physical size and their tolerance(s) to the surrounding environmental conditions. To avoid unethical or unprofessional tree selection and/or their placement within the landscape, replacement tree species must be selected in consultation with a consulting arborist, who can also assist in implementing successful tree establishment techniques.

8.13.4 Replacement tree species must have the genetic potential to reach a mature size potential of those trees removed to facilitate the development. As a guide, potential height will be a minimum of 10m (or more) and produce a spreading canopy so as they may provide amenity value to the property and contribute to the tree canopy of the surrounding area in the future.

8.14 Additional Excavation/Trenching within TPZs

8.14.1 In the event additional excavation is required within the TPZs of retained trees identified within this report, or any other site trees, arborist involvement will be required to ensure works are undertaken in accordance with the Australian Standard AS 4970–2009: *Protection of Trees on Development Sites.*

8.14.2 Where excavation or trenching is required to facilitate installation of underground services within the TPZs of any site trees arborist supervision is required. Works should be undertaken using techniques that are sensitive to tree roots to avoid unnecessary damage. Such techniques include:

1. Excavation by hand
2. Excavation using a high-pressure water jet and vacuum truck
3. Excavation using an Air Spade with vacuum truck.

8.14.3 Machine excavation should be prohibited within the TPZs of retained trees unless undertaken at the direct consent from the project arborist and/or the responsible authority.

8.15 Plant Health Care

8.15.1 When managing a tree affected by development incursions within its TPZ, plant tonic and growth stimulant drenching should be undertaken. Plant tonic and growth stimulant drenching is the process of adding diluted products directly to the root area of a tree to promote and assist trees to cope with loss of roots during the development process. They also assist trees to provide better resistance to sap sucking insects and fungal attack/disease and improve the establishment of beneficial microbial populations and nutrient uptake.

8.16 Irrigation

8.16.1 Regular checks are required to ensure retained trees are receiving the correct amount of water. The majority of a tree's fine water absorbing roots are located in the top 10–30cm of soil. To undertake a basic soil moisture test, dig a small hole to a depth of 40cm at the dripline of the tree. If the soil is moist at this depth, water is not needed. Slow irrigation that provides an even coverage and targets the absorbing roots is the key to successful irrigation and encourages a deeper tree root system. Irrigation near the trunk is unnecessary as for most trees there are generally fewer water absorbing roots in this area. Irrigating the soil from half-way between the trunk and the dripline as well as beyond the dripline will provide water where it will most effectively be used. Preferably, water your trees during the cooler evening and early morning period when temperatures are lower, humidity is higher, and the air is calmer thereby reducing water evaporation from the soil surface. Irrigation in the middle of the day is not harmful to most trees however it is less efficient.

8.17 Mulching

8.17.1 Mulching regulates soil moisture and temperature levels, suppresses weeds, minimises soil compaction and reduces run off during periods of heavy rain. Acquiring wood chip mulch from programmed tree works (and by purchasing it from local tree contractors) would be a proactive way to improve the growing conditions around trees that ultimately will result in improved tree health and vitality.

8.17.2 Mulch should aim to cover an area at least as large as a tree's crown projection (and preferably larger) for it to be effective. It should also be laid at a uniform thickness of 75–100mm. Mulch should also be placed over damp to wet soil and never over dry soil. Application during the cooler months of the year is ideal. In areas where grass exists where you wish to mulch, spray the grass first with a non-selective herbicide and allow it to wilt and die before placement. This practice will negate grass growing up through the mulch over time.

8.17.3 Mulching within the canopy areas of trees not only improves long term tree health but also acts to reduce tree risk by reducing targets that pass and/or congregate under their canopies. This in turn will minimise the likelihood of injury in the event of a branch failure.

9 References

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Plans of the existing site and of the proposed development were provided to ArborSafe on 10 July 2023 and include:

- Site Plan - Arborist (Dwg No. SK0119), n.d,. Wilson Architects, Collingwood.

Appendix A. Arboricultural Reporting Assumptions and Limiting Conditions

1. Any legal description provided to the consultant is assumed to be correct. Any titles and ownership of any property are assumed to be good. No responsibility is assumed for matters legal in character.
2. It is assumed that any property/project is not in violation of any applicable codes, ordinances, statutes or other government regulations.
3. Care has been taken to obtain all information from reliable sources. All data has been verified in so far as possible, however, the consultant can neither guarantee nor be responsible for the accuracy of the information provided by others.
4. The consultant shall not be required to give testimony or to attend court by reason of this report unless subsequent contractual arrangements are made, including payment of an additional fee for such services.
5. Loss or alteration of any part of this report invalidates the entire report.
6. Possession of this report or a copy thereof does not imply right of publication or use for any purpose by anyone but the person to whom it is addressed, without the prior written consent of the consultant.
7. Neither all nor any part of the contents of this report, nor any copy thereof, shall be used for any purpose by anyone but the person to whom it is addressed, without the written consent of the consultant. Nor shall it be conveyed by anyone, including the Client, to the public through advertising, public relations, news, sales or other media, without the written consent of the consultant.
8. This report and any values expressed herein represent the opinion of the consultant and the consultant's fee is in no way contingent upon the reporting of a specified value, a stipulated result, the occurrence of a subsequent event, nor upon any finding to be reported.
9. Sketches, diagrams, graphs and photographs in this report, being intended as visual aids, are not necessarily to scale and should not be construed as engineering or architectural reports or surveys unless expressed otherwise.
10. Information contained in this report covers only those items that were examined and reflect the condition of those items at the time of inspection.
11. Inspection is limited to visual examination of accessible components without dissection, excavation or probing. There is no warranty or guarantee expressed or implied that the problems or deficiencies of the plants or property in question may not arise in the future.

Appendix B. Explanation of Tree Assessment Terms

Tree number: Refers to the individual identification number assigned within the ArborSafe software to each assessed tree on the site and the number which appears of the tree's tag.

Tree location: Refers to the easting and northing coordinates assigned to the location of the tree as obtained from the geo-referenced aerial image within the ArborSafe software.

Tree species: Provides the botanic name (genus, species, sub-species, variety and cultivar where applicable) in accordance with the International Code of Botanical Nomenclature (ICBN), and the accepted common name.

Trees in group: The number of trees encompassing a collective assessment of more than one tree. Typically grouped trees have similar attributes that can be encompassed within one data record.

Height: The estimated range in metres attributed to the tree from its base to the highest point of the canopy. Where required height will be estimated to the nearest metre.

Diameter at Breast Height (DBH): Refers to the tree's estimated trunk diameter measured 1.4m from ground level for a single trunked tree. These estimates increase in 50mm increments. Where required DBH will be measured to give an accurate measurement for single trunked trees, trees with multiple trunks, significant root buttressing, bifurcating close to ground level or trunk defects and will be measured as per the Australian Standard AS 4970–2009: *Protection of Trees on Development Sites*.

Tree Protection Zone (TPZ): A specified area above and below ground and at a given distance measured radially away from the centre of the tree's trunk and which is set aside for the protection of its roots and crown. It is the area required to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by development. The radius of the TPZ is calculated by multiplying its DBH by 12. TPZ radius = DBH × 12. (Note "Breast Height" is nominally measured as 1.4m from ground level).TPZ is a theoretical calculation and can be influenced by existing physical constraints such as buildings, drainage channels, retaining walls, etc. (Standards Australia, 2009).

Structural Root Zone (SRZ): The area close to the base of a tree required for the tree's anchorage and stability in the ground. The woody root growth and soil cohesion in this area are necessary to hold the tree upright. The SRZ is nominally circular with the trunk at its centre and is expressed by its radius in metres. SRZ radius = $(D \times 50)^{0.42 \times 0.64}$ (Standards Australia, 2009).

Canopy spread: The estimated range in metres attributed to the spread of the tree's canopy on its widest axis. Where required crown spread will be estimated to the nearest metre.

Origin: Refers to the origin of the species and its type.

Category	Description
Indigenous	Occurs naturally in the local area and is native to a given region or ecosystem.
State Native	Occurs naturally within State but is not indigenous.
Australian Native	Occurs naturally within Australia and its territories but is not a State native or indigenous.
Exotic Evergreen	Occurs naturally outside of Australia and its territories and typically retains its leaves throughout the year.
Exotic Deciduous	Occurs naturally outside of Australia and its territories and typically loses its leaves at least once a year.

Health: Refers to the health and vigour of the tree.

Category	Description
Excellent	Canopy full with even foliage density throughout, leaves are entire and are of an excellent size and colour for the species with no visible pathogen damage. Excellent growth indicators, e.g. seasonal extension growth. Exceptional specimen.
Good	Canopy full with minor variations in foliage density throughout, leaves are entire and are of good size and colour for the species with minimal or no visible pathogen damage. Good growth indicators, none or minimal deadwood.
Fair	Canopy with moderate variations in foliage density throughout, leaves not entire with reduced size and/or atypical in colour, moderate pathogen damage. Reduced growth indicators, visible amounts of deadwood, may contain epicormic growth.
Poor	Canopy density significantly reduced throughout, leaves are not entire, are significantly reduced in size and/or are discoloured, significant pathogen damage. Significant amounts of deadwood and/or epicormic growth, noticeable dieback of branch tips, possibly extensive.
Dead	No live plant material observed throughout the canopy, bark may be visibly delaminating from the trunk and/or branches.

Age: Refers to the life cycle of the tree.

Category	Description
Young	Newly planted small tree not fully established may be capable of being transplanted or easily replaced.
Juvenile	Tree is small in terms of its potential physical size and has not reached its full reproductive ability.
Semi-mature	Tree in active growth phase of life cycle and has not yet attained an expected maximum physical size for its species and/or its location.
Mature	Tree has reached an expected maximum physical size for the species and/or location and is showing a reduction in the rate of seasonal extension growth.
Senescent	Tree is approaching the end of its life cycle and is exhibiting a reduction in vigour often evidenced by natural deterioration in health and structure.

Structure: Refers to the structure of the tree from roots to crown.

Category	Description
Good	Sound branch attachments with no visible structural defects, e.g. included bark or acute angled unions. No visible wounds to the trunk and/or root plate. No fungal pathogens present.
Fair	Minor structural defects present, e.g. apical leaders sharing common union(s). Minor damage to structural roots. Small wounds present where decay could begin. No fungal pathogens present.
Poor	Moderate structural defects present, including bifurcations with included bark with union failure likely within 0–5 years. Wounding evident with cavities and/or decay present. Damage to structural roots.
Hazardous	Significant structural defects with failure imminent (3–6 months). Defects may include active splits and/or partial branch or root plate failures. Tree requires immediate arboricultural works to alleviate the associated risk.

Useful Life Expectancy (ULE): Useful life expectancy refers to an expected period of time the tree can be retained within the landscape before its amenity value declines to a point where it may detract from the appearance of the landscape and/or presents a greater risk and/or more hazards to people and/or property. ULE values consider tree species, current age, health, structure and location. ULE values are based on the tree at the time of assessment and do not consider future changes within the tree's location and environment which may influence the ULE value.

Category
0 Years
<5 Years
5–10 Years
10–15 Years
15–25 Years
25–50 Years
>50 Years

Defects: Visual observations made of the presenting defects of the tree and its growing environment that are, or have the capacity to impact upon, the health, structural condition and/or the useful life expectancy of the tree. Defects may include adverse physical traits or conditions, signs of structural weaknesses, plant disease and/or pest damage, tree impacts to assets or soil related issues.

Tree Significance: Includes environmental, social or historical reasons why the tree is significant to the site. The tree may also be rare under cultivation or have a rare or localised natural distribution.

Arborist Actions: A list of arboricultural and/or plant health care works that are aimed at maintaining or improving the tree's health, structural condition or form. Actions may also directly or indirectly reduce the risk potential of the tree such as via the removal of a particular branch or the moving of infrastructure from under its canopy.

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Appendix C. Tree Retention Values

Based upon a modified version of the British Standard BS 5837–2012: *Trees in relation to design, demolition and construction* – recommendations.

Category and definition	Criteria (including sub-categories where appropriate)		
Category U			
Trees in such a condition that they cannot realistically be retained as viable trees in the context of the current land use for longer than 5 years.	• Trees that have a severe structural defect that are not remediable such that their failure is expected within 12 months. • Trees that will become unviable after removal of other Category U trees (e.g. where for whatever reason the loss of companion shelter cannot be mitigated by pruning). • Trees that are dead or are showing signs of significant, immediate and irreversible overall decline. • Trees infected with pathogens of significance to the health and or safety of other trees nearby • Low quality trees suppressing adjacent trees of better quality. • Noxious weeds or species categorised as weeds within the local area. Note: Category U trees can have existing or potential conservation value* which might make it desirable to preserve.		
	1. Arboricultural Qualities	2. Landscape qualities	3. Cultural and environmental values
Category A			
Trees of High Quality with an estimated remaining life expectancy of at least 25 years and of dimensions and prominence that it cannot be readily replaced in <20 years.	Trees that are particularly good examples of their species, especially if rare or unusual (in the wild or under cultivation); or those that are important components of groups or avenues.	Trees or groups of significant visual importance as arboricultural and/or landscape features. (e.g. feature and landmark trees).	Trees, groups or plant communities of significant conservation, historical, commemorative or other value (e.g. remnant trees, aboriginal scar trees, critically endangered plant communities, trees listed specifically within a Heritage statement of significance).
Category B			
Trees of Moderate Quality with an estimated remaining life expectancy of 15–25 years and of dimensions and prominence that cannot be readily replaced within 10 years.	Trees that might be included within Category A but are downgraded because of diminished condition such that they are unlikely to be suitable for retention beyond 25 years.	Trees that are visible from surrounding properties and/or the street but make little visual contribution to the wider locality.	Trees with conservation or other cultural value (trees within conservation areas or landscapes described within a statement of significance, locally indigenous species).
Category C			
Trees of Low Quality with an estimated remaining life expectancy of 5–15 years, or young trees that are easily replaceable.	Trees of very limited value or such impaired condition that they do not qualify in higher categories.	Trees offering low or only temporary/transient landscape benefits.	Trees with no material conservation or other cultural value.

* Where trees would otherwise be categorised as U, B or C but have significant identifiable conservation, heritage or landscape value even though only for the short term, they may be upgraded, although they might be suitable for retention only.

Tree Quality

		Health**			
		Excellent/ Good	Fair	Poor	Dead
Structure	Good	A	B	C	U
	Fair	B	B	C	U
	Poor	C	C	U	U
	Hazard *	U	U	U	U

* Structural hazard that cannot be remediated through mitigation works to enable safe retention.

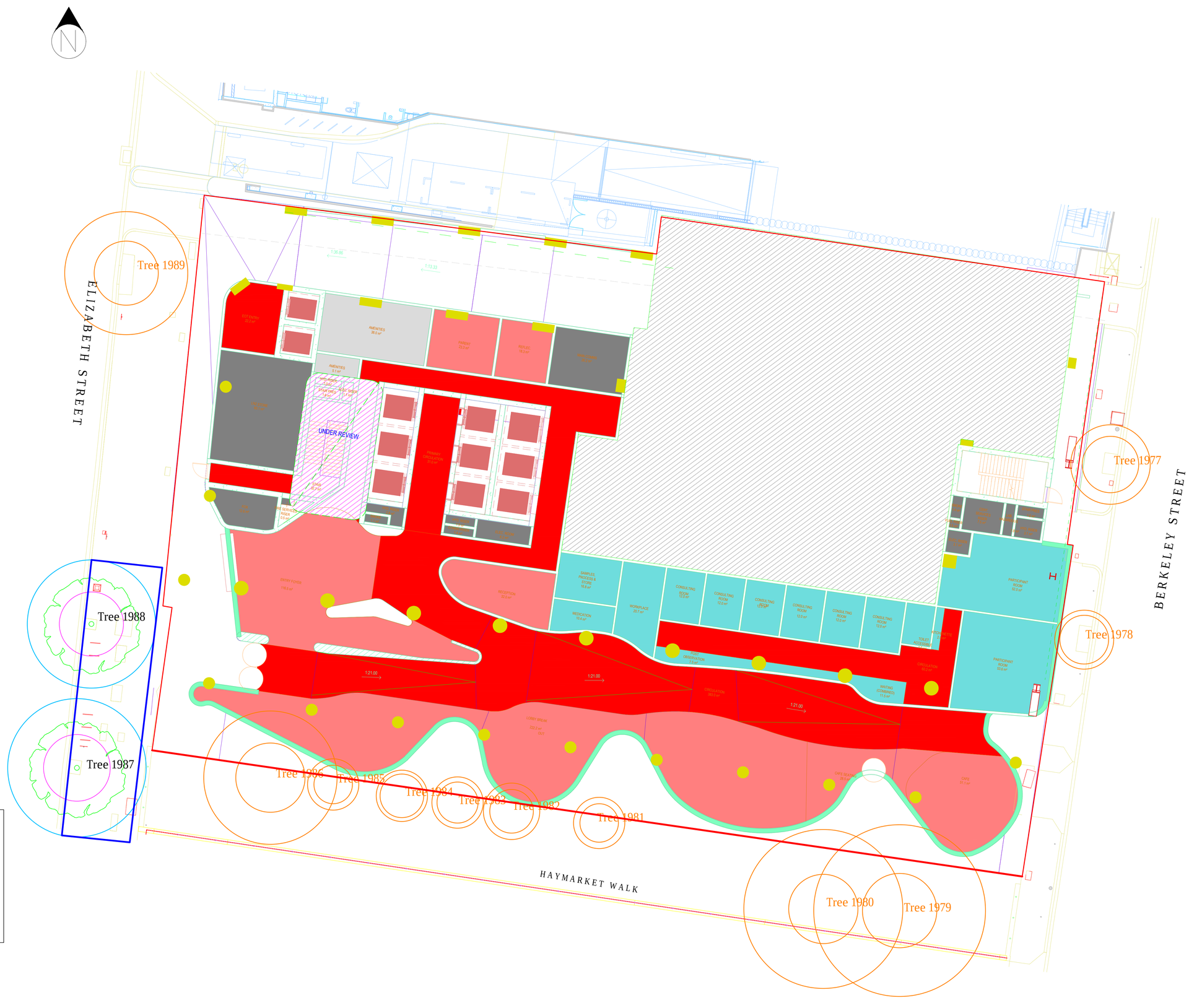
** Trees of short term reduced health that can be remediated via basic, low cost plant health care works (e.g. mulching, irrigation etc.) may be designated in a higher health rating to ensure correct retention value nomination.

Category A	Typically trees in this category are of high quality with an estimated remaining life expectancy of at least 25 years and of dimensions and prominence that it cannot be readily replaced in <20 years. The tree may make significant amenity contributions to the landscape and may make high environmental contributions. In some cases, trees within this category may not meet the above criteria, however possess significant heritage or ecological value. Trees of this retention value warrant design consideration and amendment to ensure their viable retention.
Category B	Typically trees in this category are of moderate quality with an estimated remaining life expectancy of 15–25 years and prominence of size dimensions that cannot be readily replaced within 10 years. They may make moderate amenity contributions to the landscape and make low/moderate environmental contributions. Trees with this retention value warrant lesser design consideration in an attempt to allow for their retention.
Category C	Trees in this category are of low quality with an estimated remaining life expectancy of 5–15 years, or young trees that are easily replaceable, may have poor health and/or structure, are easily replaceable, or are of undesirable species and do not warrant design consideration.
Category U	Trees in this category are found to be in such a condition that they cannot realistically be retained as viable trees in the context of the current land use for longer than five years. These trees may be dead and/or of a species recognised as a weed that resulted in them being unretainable.

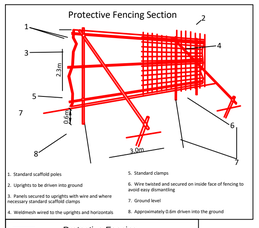
Appendix D. Tree Assessment Data

Tree no.	*Botanical Name*	Common Name	Origin	Trees in group	DBH Total (cm)	DRC (cm)	Radial TPZ (m)	TPZ area (m2)	Radial SRZ (m)	Tree Height (m)	Canopy (m)	Health	Structure	Age	TLE (Yrs.)	Defects	Significance	Tree Quality Score	Recommendation
1977	*Melia azedarach*	White Cedar	Exotic Deciduous	1	26	38	**3.1**	30.58	**2.2**	5-10	5-10	Good	Fair	Juvenile	25-50	Co-dominant stems; Damaging infrastructure; Deadwood/stubs < 30mm; Dieback; Exposed root(s); Suppressed;	Amenity value/shade;	C	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
1978	*Melia azedarach*	White Cedar	Exotic Deciduous	1	19	26	**2.3**	16.33	**1.9**	5-10	5-10	Good	Fair	Juvenile	25-50	Mechanical damage; Suppressed;	Amenity value/shade;	C	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
1979	*Populus sp.*	Poplar	Exotic Deciduous	1	56	76	**6.7**	141.87	**2.9**	10-15	10-15	Good	Good	Semi-Mature	25-50	Damaging infrastructure; Deadwood/stubs < 30mm; Epicormic growth; Exposed root(s); Hanger(s); Previous failure(s);	Amenity value/shade; Attractive landscape feature;	B	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
1980	*Populus sp.*	Poplar	Exotic Deciduous	1	52	63	**6.2**	122.33	**2.7**	10-15	5-10	Good	Fair	Semi-Mature	25-50	Deadwood/stubs > 30mm; Dieback; Epicormic growth; Previous failure(s);	Amenity value/shade;	B	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
1981	*Betula pendula*	Silver Birch	Exotic Deciduous	1	13	16	**2.0**	12.57	**1.5**	5-10	5-10	Good	Fair	Juvenile	25-50	Exposed root(s); Suppressed;	Amenity value/shade; Attractive landscape feature; Within group;	C	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
1982	*Betula pendula*	Silver Birch	Exotic Deciduous	1	18	21	**2.2**	14.66	**1.7**	5-10	5-10	Good	Fair	Juvenile	25-50	Exposed root(s); Suppressed;	Amenity value/shade; Attractive landscape feature; Within group;	C	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
1983	*Betula pendula*	Silver Birch	Exotic Deciduous	1	15	19	**2.0**	12.57	**1.6**	5-10	5-10	Good	Fair	Juvenile	25-50	Suppressed;	Amenity value/shade; Attractive landscape feature; Within group;	C	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
1984	*Betula pendula*	Silver Birch	Exotic Deciduous	1	17	20	**2.0**	13.07	**1.7**	5-10	5-10	Good	Fair	Juvenile	25-50	Suppressed;	Amenity value/shade; Attractive landscape feature; Within group;	C	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
1985	*Metrosideros sp.*	Metrosideros	Evergreen	1	10	12	**2.0**	12.57	**1.5**	<5	<5	Good	Fair	Juvenile	25-50	Suppressed; Wound(s);	Amenity value/shade;	C	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
1986	*Melaleuca quinquenervia*	Broad-leaved Paperbark	Australian Native	1	43	63	**5.2**	83.65	**2.7**	5-10	5-10	Good	Fair	Semi-Mature	25-50	Exposed root(s); Mechanical damage to root(s);	Amenity value/shade;	B	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
1987	*Ulmus procera*	English Elm	Exotic Deciduous	1	45	54	**5.4**	91.61	**2.6**	10-15	5-10	Good	Fair	Semi-Mature	25-50	Crack(s)/split(s); Damaging infrastructure; Exposed root(s); Mechanical damage to root(s); Suckers;	Amenity value/shade; Attractive landscape feature; Avenue tree; Heritage significance	B	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
1988	*Ulmus procera*	English Elm	Exotic Deciduous	1	42	50	**5.0**	79.80	**2.5**	10-15	5-10	Good	Good	Semi-Mature	25-50	Co-dominant stems; Damaging infrastructure; Exposed root(s); Mechanical damage to root(s); Suckers;	Amenity value/shade; Attractive landscape feature; Avenue tree; Heritage significance	B	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
1989	*Ulmus procera*	English Elm	Exotic Deciduous	1	40	50	**4.8**	72.38	**2.5**	5-10	5-10	Good	Good	Semi-Mature	25-50	Co-dominant stems; Damaging infrastructure; Exposed root(s); Included bark; Mechanical damage to root(s);	Amenity value/shade; Attractive landscape feature; Avenue tree; Heritage significance	B	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.

Appendix E. Tree Protection Plan



Protective Fencing Section



1. Standard scaffold poles
2. Uprights to be driven into ground
3. Panels secured to uprights with wire and where necessary standard scaffold clamps
4. Weldmesh wired to the uprights and horizontals
5. Standard clamps
6. Wire twisted and secured on inside face of fencing to avoid easy dismantling
7. Ground level
8. Approximately 0.6m driven into the ground

Protective Fencing

To be erected prior to the commencement of all works on site, and retained in place throughout construction. To comprise either 2.4m wooden site hoarding; or a 2.1m high scaffolding framework, with uprights at maximum 3.5m spacings, every other one braced to the ground with 45 degree struts; supporting standard anti-climb 'Heras' welded mesh fence panels secured with anti-lift devices to concrete or plastic bases pinned to the ground by scaffold uprights sunk to a minimum depth of 500mm; individual panels fixed to each other with at least 2 clamps and to scaffolding with heavy-duty cable ties. "TREE PROTECTION ZONE - KEEP OUT" or similar notices to be attached to every fifth panel.

LEGEND

Tree trunk & number:	Tree 1	Cat. A TPZ:	
Category U Crown & No:		Cat. B TPZ:	
Indicative Crown Spread		Cat. C TPZ:	
Proposed building footprint:		Tree to be removed for devt:	Tree 1
TPZ Fencing		SRZ (Structural Root Zone)	

Tree Retention Value

Trees have been categorised to allow an accurate account of which should and should not be a constraint. Tree categories are determined according to their health condition, quality and value.

Cat. U:- Trees to be removed irrespective of devt.
Cat. A:- Trees of high quality and value
Cat. B:- Trees of moderate quality and value
Cat. C:- Trees of low quality and value

Cat. A retention value trees should be retained, planned around and be protected from damage.

Cat. B retention value trees should be retained if possible.

Cat. C retention value trees will not be retained where they impose a significant constraint on development.

Cat. U retention value trees are unretainable for the forseeable future and typically recommended for removal irrespective of site development.

Tree Protection Zones (TPZs)

A model is used to assist in the prediction of the likely impact of development on retained trees. This model is based on the Diameter of Trunk at Breast Height (DBH) for an individual specimen.

TPZ = DBH x 12
(DBH measured at 1.5m on trunk)

It is recommended that an area around each retained tree should be protected from disturbance "in order to avoid (unacceptable) damage to the roots or rooting environment" (as a result of root severance or damage, or compaction or pollution of the soil).

These Tree Protection Zones ('TPZs') have been calculated for all retained trees and are shown as areas bordered in green, blue or grey according to tree category. These zones are normally portrayed as a circle of a fixed radius from the centre of the trunk.

The Structural Root Zone (SRZ) is the area required for tree stability. A larger area is required to maintain a viable tree. The SRZ only needs to be calculated when major encroachment into a TPZ is proposed. There are many factors that affect the size of the SRZ (e.g. tree height, crown area, soil type, soil moisture). The SRZ may also be influenced by natural or built structures, such as rocks and footings. An indicative SRZ radius can be determined from the trunk diameter measured immediately above the root buttress using the following formula:

SRZ radius = (D x 50)$^{0.42}$ x 0.64

Root investigation may provide more information on the extent of these roots.

Permissible Encroachment in TPZs

As per the Australian Standard AS4970-2009 *Protection of Trees on Development Sites* a major encroachment into the TPZ of any tree is considered to occur when it is beyond 10% of the total TPZ area. A minor encroachment is determined as being less than 10% of the total TPZ area. If the proposed encroachment is minor and is outside the SRZ, detailed root investigations should not be required. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ. If the proposed encroachment is major or inside the SRZ, the project arborist must demonstrate that the tree(s) would remain viable. The area lost to this encroachment should also be compensated for elsewhere and contiguous with the TPZ. This may require root investigation by non-destructive methods and consideration of relevant factors.

PROJECT:	Arboricultural Impact Assessment AIID Parkville Campus UOM		
CLIENT:	Aurecon		
DRAWING:	Tree Protection Plan		
DRAWING NO.:	04535_01	Rev. 2	09.10.2023
BASED ON:	AIID-WDL-AIID-CAD-AR-G01-0502[B]		
SCALE:	Do not scale		
DRAWN BY:	AD/NA		

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