ARBORICULTURAL INSPECTION REPORT

BUCHAN CAVES RESERVE, NORTH ARM TREE INSPECTION SURVEY, 2023

OCTOBER 2023 (UPDATED 9/05/2024)
VERSION 2 FINAL

Prepared by Stephen Fitzgerald
for:
Parks Victoria

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Buchan Caves Reserve, North Arm Tree Inspection Survey, 2023

Arboriculture Pty Ltd

Prepared for Parks Victoria

Contents

Attachments:

1. Tree Retention, Removal & Replacement Plan Buchan Caves Reserve North Arm Drainage Redevelopment Plan (A1, 1:350)

2. Tree TPZ Encroachment Analysis Plan Buchan Caves Reserve North Arm Drainage Redevelopment Plan (A1, 1:350)

Document Version Control

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REPORT 10768.92023

Arboricultural Inspection Report
Buchan Caves Reserve, North Arm Tree Inspection Survey, 2023

Brief

Arboriculture Pty Ltd has been retained by Parks Victoria to carry out a tree survey of trees within the North Arm area of Buchan Caves Reserve and provide advice and recommendations regarding tree protection during planned future works.

Scope of services

A tree survey is required to allow the impact of the proposed works on the existing trees to be understood and mitigation options developed. The scope requires assessment of all trees within the zone of works as marked and summarised as documented in the attached drawing set (Buchan Caves Reserve North Arm Drainage Redevelopment, Crossco Consulting Pty Ltd, 2022).

The survey and assessment is to include:

- Review of existing arborist reports;
- The August 2022 Tree Removal and Replanting Plan (Attachment 5) has been put forward for endorsement by stakeholders. The consultant is to review the proposed tree removals and replanting in the context of the proposed civil design.
- Review of proposed construction works and recommendation on scope or methodology to mitigate impact on trees (if applicable);
- Identify data gaps and advise on required risk assessments in the context of the proposed works;
- Identify tree protection zones & highlight the impact the TPZs have on the design;
- Tree numbering must use existing numbering system as per the Earth Tech Heritage Tree Plan 2005 (Attachment 2) incorporating tree numbering system for entire reserve;
- Recommendation on retention worthiness value/appropriateness considering the proposed works.

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Method

Tree survey

A survey of trees within the project area was carried out on the 18th and 19th of July 2023.

Details of trees likely to suffer disturbances due to planned works were inspected and details recorded including species, estimated heights and widths, stem diameters at breast height (DBH), health and structure, retention value and comments. Trees were checked for conditions that could impose unreasonable risk to people or property in their vicinity and recommendations were made for any remedial actions.

Recommendations for tree maintenance or removal are made as appropriate for each tree independent of construction impacts. This allows Parks Victoria to review which trees to retain or remove based on all the information provided. As such it is possible to have a tree recommended for removal but also advice for the same tree regarding minimising construction impacts (e.g. tree #633). In such a case if Parks Victoria decided it was in their interests to retain the tree then arboricultural oversight would need to take place during excavation within its TPZ.

Where trees were mapped to coincide with tree locations shown in the Earth Tech *Heritage Tree Plan Buchan Caves Reserve* of 2005 ("2005 tree plan"), the reference number on the plan was added to the inspection data and used to reference the tree in this report and its attached plans. Where mapped trees did not coincide with any tree on the 2005 tree plan a reference number was given for the purpose of reference in this report. These new tree reference numbers are prefixed with '23' referencing 40 trees (tree #2301 to 2340). These tree numbers are only intended for the purpose of the current project and it is a recommendation of this report that a new numbering system and up-to-date tree plan for the entire Buchan Caves Reserve (with the extents similar to, or modified from the 2005 tree plan) be devised for future tree surveys.

Photos were taken with a Panasonic digital camera (see Appendix 1).

Analysis and report

A desktop analysis of probable impacts of landscape works (excavation for a swale and associated landscape works) was carried out using AS4970-2009 *Protection of Trees on Development Sites*.

Under Australian Standard AS4970-2009 TPZ encroachments with an area of up to 10% of a tree's TPZ (tree protection zone) are considered *minor* encroachments provided they are outside the SRZ (structural root zone). TPZ encroachments of 10% or more are considered *major* encroachments.

For the impact analysis, the consultant arborist determines if the impact within the encroached area (e.g. depth of cut or fill, permeable or non-permeable surface, etc.) is likely to affect the tree's health or stability and to what degree. Desktop impact analysis can be further supported by fieldwork (e.g. non-destructive digging) to discover actual roots within the encroached TPZ area that would be damaged or destroyed.

In considering the impacts of proposed TPZ encroachments the arborist may take into account the presence of existing or past structures or obstacles affecting root growth. Tree roots are opportunistic and grow where conditions are conducive: roots do not proliferate in dry soils or soils with high bulk density which may be considered obstacles to root growth.

Reports and documents reviewed

Author	Title	Date	Details
Earth Tech	Heritage Tree Plan Buchan Caves Reserve	February 2005	Main survey map reference used in past reports for Parks Victoria
Hawker, John, Horticulturist, Tree & Landscape	Buchan Caves North Arm Tree Assessment	21-23/5/2020	Table of tree survey data with references to 2005 Earth Tech tree plan
Bairnsdale Tree Services Pty Ltd (Peter Marshall)	Arboricultural Tree Inspection	10/10/2020	Tree inspection and condition report of trees in 5 nominated areas at Buchan Reserve including North Arm
Hawker, John, Horticulturist, Tree & Landscape	North Arm Tree Assessment	20/11/2020	Letter to Kim Wilson, Historic Heritage Consultant, Parks Victoria
Hawker, John, Horticulturist	Buchan Caves Tree Removal and Replanting Plan	August, 2022	Most current tree report prior to this project
Crossco Consulting Pty Ltd	Buchan Caves Reserve North Arm Drainage Redevelopment	19/12/2022 (Design Issue for review)	Drawings 2508/1000 to 2508/1013, Revision D, Updated 14/12/2023
Crossco Consulting Pty Ltd	Various CAD dwg drawing files showing updated details	16/03/2024	Swale CL & Chainages (16-03-2024).dwg Swale Contours (16-03-2024).dwg Swale Linework (16-03-2024).dwg Swale Rock Linework (16-03-2024).dwg Rehab Area Linework, CL, chainage (16-03-2024).dwg

Summary Tree Details

Most of the trees (67%, 56 trees) mapped and recorded are exotic species originating from outside of Australia. The remaining mapped and recorded trees are Victorian native species (28%, 23 trees) and Australian native trees originating from outside of Victoria (5%, 4 trees[1]).

Eighty-six (86) trees near the proposed swale and amenities block in the North Arm area were inspected and details recorded. Trees near the amenities block

[1] Three of the Australian native specimens are most likely Victorian species but identification to species level was not possible in the field and as such they are classed more broadly.

were included to assist future plans and designs for that area. Trees near the proposed swale were inspected with particular regard to likely impacts of excavations for the proposed swale. See the attached *Tree Encroachment Analysis Plan, Buchan Caves Reserve, North Arm Drainage Redevelopment Plan*.

All other trees within reach of public areas and property within the North Arm area were inspected with regard to risk but details not recorded or tree location mapped unless remedial actions were required for risk abatement. Tree management recommendations related to risk or other general maintenance requirements made independent of construction impact assessments, are given under *Maintenance Actions* for tree record in Appendix 1.

Tree stumps (where they were noticed) were mapped and later cross-referenced with tree numbers shown on Earth Tech Heritage Tree Plan. See attached *Tree Retention, Removal & Replacement Plan, Buchan Caves Reserve, North Arm Drainage Redevelopment* Plan.

Retention Value

Very High

Eight (8) trees in the inspection area were classed as very high retention value. The trees include three (3) exotic specimens: two (2) *Populus x canadensis* and a single *Ulmus glabra* 'Lutescens' thought to possibly date from the Linaker planting period. The actual determination of significance should be checked against the November 2020 Significant Tree Assessment (not supplied or reviewed for this report). The remaining five (5) trees are large, mature, most likely naturally occurring, indigenous specimens. See Table 3 below for tree reference numbers.

High

Eighteen (18) trees were classed as high retention value. These consist of 11 exotic specimens, five (5) Victorian native specimens and two (2) Australian native specimens. The Australian native specimens are most likely Victorian species but identification to species level was not possible in the field and as such they are classed more broadly. Based on the information in the 2022 Hawker report, the exotic trees in the North Arm area are not from the Linaker planting period but were planted later in the 1960s. As such the trees are expected to have lower heritage value compared to those planted during the Linaker period but still contribute to the character afforded by deciduous exotic trees. The actual determination of significance of these trees should be checked against the November 2020 Significant Tree Assessment (not reviewed for this report).

The Victorian native species classed as high retention value were generally of an earlier maturity, smaller specimens or having poorer health or structure compared to the very high retention value Victorian native trees.

Medium

Forty-three (43) trees were classed as medium retention value. Most of the medium retention value trees are exotic specimens (31 trees) at an earlier stage of maturity, are weedy (e.g. *Pinus halepensis*, *Fraxinus angustifolia*) or have poorer health or structure compared to high retention value trees. Ten (10) of the medium retention value trees are Victorian native specimens that are likely

planted specimens (e.g tree #2324, *Callitris glaucophylla*, #581 & 2331, *Brachychiton populneus*) or poorer health or structure compared to high retention value Victorian native trees. Two (2) of the medium retention value trees were classed as Australian native species. One of these specimens (tree #2329) is most likely a Victorian species but identification to species level was not possible in the field and as such they are classed more broadly.

Low

Fourteen (14) trees were classed as low retention value specimens. Eleven (11) are exotic specimens (mainly semimature) some with fire-damaged stems. Three (3) trees are semimature Victorian native specimens with two (2), trees #2335 and 2336 being heavily possum grazed and declining Yellow Box and one being a semimature *Corymbia maculata* that is thought to be a planted specimen. While there is a natural stand of *Corymbia maculata* near the nearby Mottle Range Flora Reserve, it was thought that this specimen was most likely planted.

Table 1 Tree reference numbers: Tree retention value categories

Retention Value	Tree Ref #	Count of Specimens
Very High	153,154,167,580,594,623,632,2330	8
High	540,541,548,562,563,567,570,571, 574,575,2318,2322,2327,2328,2331, 2332,2337,2340	18
Medium	539,543,544,545,565,572,581,595,598, 599,600,601,602,609,626,627,628,629, 630,2301,2303,2304,2305,2306,2310, 2311,2312,2313,2314,2315,2316,2317, 2319,2320,2321,2324,2325,2326,2329, 2333,2334,2338,2339	43
Low	538,561,564,568,624,625,633,2302,2307, 2308,2309,2323,2335,2336	14

Impact Assessment

North Arm swale excavation

The proposed excavation of a swale along the east side of the North Arm area falls within the TPZ (tree protection zone as per AS4970-2009) areas of 54 existing exotic and naturally occurring native trees. The nominal 5m wide excavation has battered sides with a 2.5m wide flat base and is to be rock beached and shaped to provide protection where scouring would be expected.

For the purpose of this impact analysis, the estimated possible impacts of the excavation have considered the location of the nearest edge of the batter to the stem of the tree and the distance, location and swale depth.

Where the excavation encompasses the stem of the tree it is considered 'lost' without further analysis. Where excavation is well within the SRZ (structural root zone as per AS4970-2009) of the tree, structural root damage is assumed and, depending on the size of the tree and the existence of any surface roots noted during the survey, the impact is considered high, moderate to high or lost.

Encroachments from excavations that start outside the SRZ but within the tree's TPZ are judged as moderate or minor impacts.

Recent modifications (2024) were made to designs reduce impacts on trees include diversion of stormwater to flow across the ground (road and grassed area) between chainages CH280 and CH320 and carrying out ground rehabilitation works from chainage CH390 to CH540 in lieu of creating a swale.

Table 2 Summary of count of tree impact determinations for each tree retention value category. Minor and moderate impacts are combined for brevity. See Table 2 below for tree ref. numbers

Impact	Retention Value			
	Very High	High	Medium	Low
No impact	4	6	24	8
Minor impact	4	1	3	0
Moderate impact	0	1	0	0
Moderate to high impact	0	1	1	0
Lost	0	9	15	6

Table 3 Tree reference numbers: impact determinations for each retention value category Single underlined numbers are trees recommended for removal in this report. Double-underlined numbers are recommended for removal in the report of Hawker and also in this report. Numbers with asterisks are recommended for removal only in this report.

Impact	Retention Value			
	Very High	High	Medium	Low
No impact	153, 154, 580, 2330	2327, 2328, 2331, 2332, 2337, 2340	581, 598, 599, 600, 601, 602, 609, 628, 2301, 2303, 2304, 2306, 2310, 2312, 2313, 2321, 2324, 2325, 2326, 2329, 2333, 2334, 2338, 2339	625, 633, 2307*, 2308*, 2309*, 2323, 2335, 2336
Minor impact	167, 594, 623, 632	2318	630, 2311, 2316	
Moderate impact		2322		
Moderate to high impact		540	627	
Lost		541, 548, 562, 563, 567, 570, 571, 574, 575	539, 543, 544, 545, 565, 572, 595, 626, 629, 2305, 2314, 2315, 2317, 2319, 2320	538, 561, 564, 568, 624, 2302

Very High Retention Value Trees

None of the 8 very high retention value trees are likely to be lost due to excavation impacts necessary for the proposed swale.

High Retention Value Trees

Tree #541 is a mature Walnut tree that has its stem within the excavation footprint and as such will not be retainable (is indicated as lost in this report).

Trees #563, 567 and 571 are mature exotic Raywood Ash that have their main stems or large parts of their SRZ areas in the direct path of the planned swale and are not retainable (are indicated as lost in this report).

Trees #562, 570, 574 and 575 are mature exotic Common Lime that have their main stems in the direct path of the planned swale and as such are not retainable (area indicated as lost in this report).

Tree #548 is a mature Oriental Plane near the water treatment plant. While the impact analysis suggests the tree is likely to be lost it is recommended that efforts be undertaken to achieve the functional design outcomes of the swale while minimising damage to the tree's root system. This will require careful hand digging and/or NDD (non-destructive digging using air or water) under the

supervision of an arborist during the works. Following or during the works the arborist will determine if the tree can be safely retained (or possibly recommend further investigation such as a tree stability test if significant roots were severed).

Tree #2340 is a local indigenous Buchan Blue Wattle that is not impacted by the planned swale but is partially encroached by the track reconstruction works.

The impact of the track reconstruction is expected to be low but the works within the tree's TPZ should be overseen by an arborist

Medium Retention Value Trees

Fifteen (15) trees have their main stems or large parts of their SRZ areas in the direct path of the planned swale and are not retainable (are indicated as lost in this report). These are mainly younger or smaller trees that do not have significant landscape value or have reduced life-expectancies. See Table 3 above for tree numbers.

Low Retention Value Trees

Six (6) low retention value trees have been assessed as 'lost' due to impacts from the swale excavation. These are mainly younger or smaller trees that have low landscape value, poor health (and unlikely to recover) or have reduced life-expectancies. See Table 3 above for tree numbers. See Table 3 above for tree numbers.

Other trees not impacted by construction but recommended for removal

The 2023 tree inspection survey recommends the removal of seven (7) trees for reasons of health or structure independent of impact considerations. Four (4) of these trees are included in the 2022 *Buchan Caves Tree Removal and Replanting Plan* (J. Hawker) where they are also recommended for removal. The additional four (4) trees are not including the 2022 report of Hawker. The trees recommended for removal are all rated as *low* retention value in this report. These trees are #538, 564, 568, 633, 2307, 2308 and 2309.

The 2022 report of Hawker recommends the removal of eight (8) of the trees that are also included in the current tree survey. In addition to those listed above are trees #561, 565, 572 and 602. All but tree #602 have been assessed as being lost to landscape impacts. Tree #602 is a medium retention value tree that Hawker recommends for removal due to it being lopped for powerline clearance. The tree could however be retained if proper clearance pruning is carried out periodically.

North Arm gravel track reconstruction

An existing gravel track is to be reconstructed between chainages CH 0.00 and CH 250.00. The reconstruction is to be class 3 fine crushed rock to 200mm depth.

For the impact assessment of the gravel track reconstruction, it is assumed that:

- The finished level may be flexible to allow the crushed rock added to be slightly higher if or where surface roots of retained trees are encountered;

- The crushed rock is to be placed mostly within the footprint of the existing track (except where it is to be widened at chainage 240 to allow for cars to turn);
- Excavation is to be nominally 200mm depth or less, possibly with levels above existing to form the desired surface levels and fall.

Trees not surveyed near gravel track

Nine trees between chainage 150 and 200 (chainages on east side of North Arm) may have their TPZ areas encroached by the track reconstruction (see Table 4 below).

The impact of the track reconstruction near these trees is expected to be low however the works near the trees should be overseen by an arborist.

Table 4 Trees not surveyed that may be impacted by track reconstruction

Tree #	Species
579	*Hesperocyparis macrocarpa*
582	*Eucalyptus melliodora*
583	*Eucalyptus melliodora*
586	*Tilia x europaea*
587	*Fraxinus* 'Raywood'
588	*Tilia x europaea*
589	*Fraxinus* 'Raywood'
590	*Fraxinus angustifolia*
591	*Brachychiton populneus*

Impacts Discussion

Tree roots and TPZ encroachment

The depth at which tree roots occur in many soils has been traditionally misrepresented. It is now known that trees in urban areas tend to have generally extensive but shallow root systems. Because of common misconceptions trees often suffer root injury during the construction of buildings and landscapes as well as from trenches dug for services, irrigation systems and the like. Tree decline often occurs over a number of years. Three to five years seems to be a common time period following significant root disturbances unless massive root damage is suffered or a tree is particularly sensitive when sudden decline often occurs or the tree suffers root-plate failure and topples. Once symptoms of decline are noticed it is usually too late to prevent decline and eventual tree death.

To minimise impacts from root damage and other construction activities the Australian Standard AS 4970 – 2009, *Protection of trees on development sites*, specifies a tree protection zone (TPZ) based on a tree's trunk diameter. The TPZ is:

> "*A specified area above and below ground and at a given distance from the trunk set aside for the protection of a tree's roots and crown to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by development.*" (AS 4970 paragraph 1.4.7).

For all trees apart from tree ferns, palms and other monocotyledon trees, the TPZ is calculated as an area with a radius (measured from the tree trunk centre) equivalent to 12 times the tree's DBH (diameter at breast height or 1.4m above ground) with a minimum of 2m and a maximum of 15m.

Similar to the TPZ, an area known as the structural root zone (SRZ) is where roots important to a tree's structural stability theoretically exist. The SRZ is:

> "*The area around the base of a tree required for the tree's 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. This zone considers a tree's structural stability only, not the root zone required for a tree's vigour and long-term viability, which will usually be a much larger area* (AS 4970 paragraph 1.4.5).

Construction damage to tree roots often occurs when excavation occurs within the top 1m of soil. Excavation can cause significant injury, depending on tree species, soil type and excavation distance from the tree. Excavation as shallow as 10-20cm can be detrimental within the SRZ of the tree or where large parts of the TPZ are encroached. Significant impacts to long-term tree health also occur when soil compaction (usually from heavy machinery or vehicles), fill or sealed surfaces prevent free air and moisture movement between the soil and atmosphere.

Both the TPZ and SRZ areas are hypothetical and tree roots may exist within them to a greater or lesser extent depending on a number of factors including soil and moisture conditions, past disturbances and the existence of obstacles below and above the soil including sealed surfaces. Where there is any question regarding the actual existence of tree roots, exploration trenches can be excavated using special low-impact techniques. High velocity water used in 'hydro excavation' is able to loosen and shift soil from around even small diameter roots without significant damage and can be used to uncover and 'map' the size and location of tree roots.

The Australian Standard (AS4970-2009, *Protection of trees on development sites*) allows for encroachment of the TPZ of a retained tree of up to 10% of the calculated area providing the disturbance is outside the SRZ (structural root zone) and providing the lost area is compensated for elsewhere contiguous with the TPZ. Where more than 10% of the TPZ is proposed to be disturbed the encroachment is considered to be major and it must be demonstrated by the arborist that the tree(s) would remain viable.

Minimising impacts and retaining trees

The proposed swale repair and construction methodology allows the contractor to respond to the existing landscape and conditions to some degree. The contractor is to pick the best-fit alignment and work in a manner that minimises disturbance to surrounding vegetation.

As subgrade conditions cannot be known until excavation works are underway subgrade improvement may be required in some areas. Improvement will consist of the removal and replacement of unsuitable foundations (soil, rock, etc.) and replacement with reinforced foundation layers. In such cases, the excavation dimensions allowed for in this impact analysis could vary.

Taking into account the variable nature of the works and uncertainty regarding the exact location of significant tree roots, it is recommended that an arborist be onsite during excavations near trees being retained that have impact summaries of "Moderate", "Moderate to High" and "High impact" (as noted on attached *Tree TPZ Encroachment Analysis Plan* and *Tree Retention, Removal & Replacement Plan* and in Appendix 1 Tree Assessment Records.

It is recommended that Parks Victoria:

- Review the tree removal recommendations made by Arboriculture (this report) and John Hawker (2022 report and referenced in this report) and approve or reject each recommendation;
- Commit to a course of action with regard to impact minimisation for trees that are desired to be retained but still likely to be subject to medium, medium to high or high construction impacts;
- Engage a suitable consultant arborist to work with construction contractors and oversee excavations for the proposed swale and reconstruction of the track within the TPZ areas of impacted trees being retained.

Tree removal/pruning permit requirements

Planning Scheme

The property is subject to Schedule 4 to the Heritage Overlay (HO241) in the East Gippsland Shire Planning Scheme.

Victorian Heritage Register (H1978)

"… as a mature example of the landscape work of Hugh Linaker, a pioneering designer of public landscapes; the 1930s landscaping at Buchan has been carefully tended and sympathetically augmented in subsequent years and is exemplified by the mature trees in the reserve, the high proportion of deciduous exotic species, the road layout and small rustic rotunda"

The North Arm plantings of Linden and Claret Ash were made in the mid-1960s (Hawker, 2022).

As the property is more than 0.4ha Clause 52.17 of the Planning Scheme (*Native Vegetation*) applies.

'Native vegetation' consists of 'plants that are indigenous to Victoria, including trees, shrubs, herbs, and grasses' (Clause 73.01). A planning permit from the Responsible Authority is required to remove, destroy or lop native vegetation, subject to certain exemptions (Clause 52.17). Planted vegetation is exempt from permit requirements:

> Native vegetation that is to be removed, destroyed or lopped that was either planted or grown as a result of direct seeding. This exemption does not apply to native vegetation planted or managed with public funding for the purpose of land protection or enhancing biodiversity unless the removal, destruction or lopping of the native vegetation is in accordance with written permission of the agency (or its successor) that provided the funding.

Native vegetation including trees on the property are protected under the Victorian Planning Provisions. Clause 52.17 of the Planning Schemes requires all native vegetation proposed for removal to be quantified and offset. This applies to all native trees whether alive or dead, as well as maintenance works where more than 1/3 of the canopy is proposed for removal. A permit is required under Clause 52.17 for the removal destruction or lopping of native vegetation. See https://planning-schemes.delwp.vic.gov.au/schemes/vpps/52_17.pdf for details of permit requirements and exemptions.

Review of Reports

A review of the reports of, John Hawker, Horticulturist and Bairnsdale Tree Services was undertaken.

Bairnsdale Tree Services report

The report of Bairnsdale Tree Services recommended the removal or pruning of more than 60 trees in the North Arm area. While species are given there are no reference numbers used and the plan of trees in the north arm (page 11) does not reference any information regarding the tree points.

The scale of the tree plan and lack of references make it impossible to accurately discern which trees are meant for removal or pruning. The report does indicate that trees are marked with a yellow 'X' however so they may be located easily in the field.

In a phone discussion with Peter Marshall, the report author, it was ascertained that the work had been done. No trees with yellow 'X' marks were noticed during the 2023 tree survey and it appeared that many trees had been removed and others pruned.

Requiring arborists to use tree reference numbering and accurate plans in future would make such reports more accurate and useful. It is acknowledged however that the report followed bushfires and there would have been an urgency to have the information in the report to take action to reduce tree risk within the Buchan Caves reserve.

John Hawker, Horticulturist report

The *Buchan Caves Tree Removal and Replanting Plan*, August 2022 by John Hawker, Horticulturist was reviewed. As this report is confined to trees within the North Arm area, only the part of the report dealing with that area was reviewed in detail.
The brief for the 2022 report was to:

> Develop a long-term plan for tree replanting and tree management, suitable for lodging with Heritage Victoria under the Heritage Act 2017, and including:
>
> - Drawings showing the replanting plan, including identification of each tree species, and geo-location.
> - Recommendations for ground cover plantings in suitable locations.
> - Recommendations for dealing with senescence of surviving trees.
> - Plan for sourcing and propagation of nursery stock, including the establishment of a contract grower for propagation of species not readily available.
> - Timeline for implementation (anticipating a period of up to 2-5 years for this landscape work to be implemented).
> - Prepare suite of works suitable for declaration of a permit exemption under the Heritage Act 2017 by Heritage Victoria.

While a methodology was not included in the report it is apparent that the tree survey information is based on a survey carried out in May 2020 with the tables contained in the report updated from that to reflect changed conditions since 2020.

Errors noticed in the tables that cover the North Arm (section 2.2 Sheet 3 Tree Removals, page 9 and section 2.3 Sheet 2 Tree Removals, page 11):

- Tree 531, *Fraxinus angustifolia* is listed as a stump but the tree still exists;
- Tree 532, *Tilia* x *europaea* is listed as a stump but the tree still exists;
- Tree 632, *Eucalyptus viminalis* is listed as a stump but a large *Eucalyptus elata* tree exists at that location.

No drawings or replanting plans were part of the 2022 report but an additional report (tables and plans only), *Buchan Caves North Arm Tree Assessment* of May 2020 was supplied in addition to the 2022 report.

The May 2020 report does include marked maps (2005 Earth Tech) under *Tree Planting Plans 2020* however the information in the report does not fully coincide with that in the 2022 report.

The report does not include several items in the brief: *Drawings showing the replanting plan* (including geolocation); *Plan for sourcing and propagation of nursery stock, including the establishment of a contract grower for propagation of species; Timeline for implementation*.

While not listed as a requirement in the brief it is recommended that planting plans for high-profile public land include:

- species recommended as appropriate to meet any heritage requirements;
- indigenous species recommended as appropriate for the local environment;
- species recommended as appropriate for expected future climate;
- forecast climate change impacts on current tree species[2];
- weedy species that should be avoided or actively removed[3];
- reference to AS2303 – 2018, Tree stock for landscape use and recommendations that stock meet AS2303;
- advice, diagrams and text describing modern tree planting techniques (including the removal of stump grindings where a stump previously existed) and aftercare.

Additional Information to guide future tree management and planting

Maps and plans

The 2005 plans of Earth Tech are outdated and include many trees that no longer exist as well as omitting trees that have been planted, grown or matured since 2005. In addition, the plans are not available in digital (CAD [computer-aided design] or GIS [geographical information systems]) formats so cannot be easily and accurately used in the field or in a desktop mapping application. Annotated reproductions ('marked-up') of the Earth Tech plans used in reports are invariably degraded quality making it difficult to discern tree numbers.

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[2] A useful tool for assessing possible future climate impacts on species is the online Climate Assessment Tool https://cat.bgci.org/

[3] An environmental weed list appropriate for Murrindindi can be found at https://www.gbcma.vic.gov.au/downloads/WeedsOfTheGB/GBWeedBook3rdEdLR.pdf

It is recommended that any future tree surveys be done by arborists/horticulturists using mapping grade or better GNSS (Global Navigation Satellite System) devices capable of sub-metre accuracy or better for plotting trees. Those doing tree surveys can work with surveyors to capture accurate tree points but the surveyor's work and that of the arborist usually do not coincide leaving the arborist to 'guestimate' the position of trees that were overlooked by the surveyor.

Tree survey plans should be required to be in a confirmed projected coordinate system, preferably GDA2020 MGA Zone 55 (EPSG:7855). Projected coordinate systems allow accuracy for areas that fall within their zone and can be measured in meters without being reprojected. Using GDA2020 ensures interoperability with project personnel working in other disciplines such as engineering, ecology, cultural heritage, etc.

Popular geographic coordinate systems such as WGS84 and web-map based projected systems such as WGS 84 Web Mercator (Google Web Mercator) are not recommended due to accuracy, ambiguity and incompatibility issues. All digital files (e.g shapefiles, mid/mif, dwg, dxf, georeferenced TIFF images, ECW images, etc.) should have accompanying meta data that defines or states the coordinate system. Shapefiles commonly used in GIS applications should have accompanying 'prj' files that define their coordinate system.

When specifying digital spatial data requirements for tree surveys GIS formats should be preferred to CAD (dwg, dxf, etc.) as coordinate system information is often embedded in the digital data along with the attributes of the trees or other objects being mapped.

When it is necessary to share digital spatial data in old deprecated coordinate systems the coordinate system should be made clear. This is especially important when sharing CAD formats such as dwg or dxf where the coordinate system is often ambiguous.

It is recommended that a master set of digital tree location plans be kept by Parks Victoria and updated to reflect the latest updates and the plans be supplied to arborists/horticulturists or others concerned with tree location to ensure consistency and quality of information.

It is useful to require tree survey data to be supplied in an electronic table format (e.g. Microsoft Excel) including 'X' and 'Y' coordinates for each tree. Such columns should, ideally, indicate the coordinate system used (e.g. "GDA2020_55_X", "GDA2020_55_Y") in the column heading.

Tree numbering

The tree numbering used in the 2005 Earth Tech survey needs to be updated to reflect the changes in the landscape that have occurred since 2005.

Where the location of new plantings is known but no tree exists the location could be given a tree number as a 'vacant planting site' perhaps with a reference to any heritage or otherwise significant tree that previously existed at the location.

It is recommended that any future full tree survey adopt a new numbering system. Where it is necessary for historical continuity a data field or table column could be specified for referencing the 2005 tree number. Ideally, a full survey

would be done following the foreseeable major landscape works and other improvements that will require tree removal and replacement.

Heritage trees

Trees within the North Arm area are not from the Linaker planting period but were planted later in the 1960s and the North Arm does not appear in Linaker's 1929 planting plan. The North Arm is however part of the Buchan Caves Reserve which is included on the Victorian Heritage Register (VHR) and protected under the Heritage Act.

Horticultural consultant John Hawker who has expertise in heritage matters has previously advised that tree removals within the North Arm area will have no impact on the cultural heritage values of the reserve and a permit exemption was appropriate (Hawker, 20/11/2020). The Heritage Permit P34404 for the removal of hazardous trees and woody weeds in the reserve following the 2019/2020 bushfire does not discern the North Arm area from the rest of the reserve.

Clarification of the significance of individually managed trees within the Buchan Caves Reserve would be helpful when considering management options for particular trees or areas especially if management is less constrained by the Heritage Act.

It is recommended that future tree survey data fields include a 'significance' field or column to indicate any cultural heritage (Aboriginal and non-Aboriginal), environmental, horticultural or botanical significance any particular tree may have.

This significance information could be drawn from past reports as well as other sources and would be useful in guiding and prioritising future management and replacement of the tree as well as help identify if any particular permits were required for actions concerning the tree.

Recommendations

- A final tree/vegetation management and protection plan should be prepared in accordance with AS4970-2009 *Protection of trees on development sites;*
- Tree protection measures during the swale and track works should in include provision for an arborist to oversee works within the TPZs of trees indicated for retention;
- The determination of permit requirements should be made by Planning consultants and should consider heritage overlays, heritage permits under the Planning and Environment Act, any Cultural Heritage requirements and Native Vegetation (Clause 52.17) in particular.

Should any matters in this report require clarification please contact me,

Stephen Fitzgerald
BAppSc (Melb.) AdvCertHort, AdvCertArb. (Burnley)

Appendix 1 – Tree Assessment Records

Tree assessment records contain tree conditions and dimensions from the 2023 inspection by Arboriculture of trees in areas where they are potentially impacted by planned landscape works (proposed swale).

The records have summary assessments of impacts of excavation encroachments, TPZ encroachment area percentage and whether the SRZ is likely to be encroached by excavation, maintenance actions recommended independent of impact assessment outcomes and tree removal recommendations made in the 2022 report of John Hawker, horticulturist denoted by square brackets, thus '[JH 2022: N/A]', '[JH 2022: Remove]' or '[JH 2022: Remove & replace]'. An additional comment by Arboriculture P/L may be made regarding John Hawker's recommendation within the square brackets.

All records for very high, high retention value trees and most records for medium retention value trees have photos of the tree, and, where helpful for the purpose of the impact assessment, a photo of surface roots or similar within the swale works area.

No: 2301 **Species:** *Chamaecyparis lawsoniana* **Common Name:** Lawson's Cypress

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Semimature **DBH:** 20 cm **Est. Width:** 7m **Height:** 7m **Health:** Good **Structure:** Good **TPZ*:** 2.4m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from north-west: Tree 2301 smaller tree in foreground

No: 2302 **Species:** *Juglans regia* **Common Name:** Walnut

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Low

Age: Semimature **DBH:** 29 cm **Est. Width:** 6m **Height:** 6m **Health:** Fair **Structure:** Poor **TPZ*:** 3.48m

Defects: Bifurcation defects of stem

Maintenance Actions: No works required

Comments: Stem is within excavation area, [JH 2022: N/A] TPZ Encroach: 77%. SRZ Encroached?: Yes

Assessment: Lost

Image 1 from north-west: Tree 2302 smaller tree in foreground

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 2303 **Species:** *Fraxinus excelsior 'Aurea'* **Common Name:** Golden Ash

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Semimature **DBH:** 11 cm **Est. Width:** 4m **Height:** 6m **Health:** Good **Structure:** Good **TPZ*:** 2m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from north: Tree 2303

No: 2304 **Species:** *Quercus sp.* **Common Name:** Unidentified Quercus species

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Semimature **DBH:** 10 cm **Est. Width:** 4m **Height:** 8m **Health:** Good **Structure:** Good **TPZ*:** 2m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

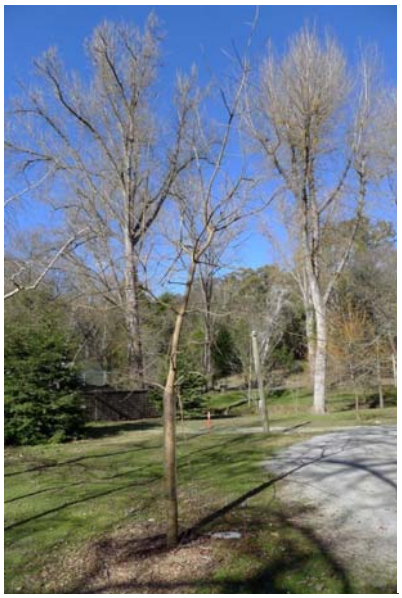


Image 1 from north-west: Tree 2304

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 2305 **Species:** *Juglans regia* **Common Name:** Walnut

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Mature **DBH:** 28 cm **Est. Width:** 8m **Height:** 15-19m **Health:** Good **Structure:** Fair **TPZ*:** 3.36m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Stem is within excavation area, Possibly self sown, [JH 2022: N/A] TPZ Encroach: 55%. SRZ Encroached?: Yes

Assessment: Lost

Image 1 from west: Tree 2305 and trees 2305 and 2306

No: 2306 **Species:** *Juglans sp.* **Common Name:** Walnut (unknow species)

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Mature **DBH:** 32 cm **Est. Width:** 10m **Height:** 10-14m **Health:** Good **Structure:** Good **TPZ*:** 3.84m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Large root buttresses uphill away from works - retain, Possibly self sown or root suckers from nearby tree [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 2307 **Species:** *Fraxinus excelsior 'Aurea'* **Common Name:** Golden Ash

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Low

Age: Semimature **DBH:** 8 cm x **Est. Width:** 2m **Height:** 4m **Health:** Fair **Structure:** Poor **TPZ*:** 2m

Defects: Sun scald, General poor form

Maintenance Actions: Low Priority Actions: Tree Removal

Comments: [JH 2022: N/A], Reasons for tree removal (2023): Decline of landscape value TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from north-west: Tree 2307

No: 2308 **Species:** *Pinus halepensis* **Common Name:** Allepo Pine

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Low

Age: Mature **DBH:** 53 cm **Est. Width:** 12m **Height:** 25-29m **Health:** Dead **Structure:** Poor **TPZ*:** 6.36m

Defects: General decline of structure

Maintenance Actions: Medium Priority Actions: Tree Removal

Comments: Fire damage, [JH 2022: N/A], Reasons for tree removal (2023): Dead TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from south-west: Tree 2308

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 2309 **Species:** *Pinus halepensis* **Common Name:** Allepo Pine

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Low

Age: Mature **DBH:** 91 cm **Est. Width:** 12m **Height:** 25-29m **Health:** Dead **Structure:** Poor **TPZ*:** 10.92m

Defects: General decline of structure

Maintenance Actions: Medium Priority Actions: Tree Removal

Comments: Fire damage, [JH 2022: N/A], Reasons for tree removal (2023): Dead TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from south-west: Tree 2309

No: 2310 **Species:** *Pinus halepensis* **Common Name:** Allepo Pine

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Mature **DBH:** 51 cm **Est. Width:** 12m **Height:** 25-29m **Health:** Fair **Structure:** Poor **TPZ*:** 6.12m

Defects: Bifurcation defects of stem

Maintenance Actions: No works required

Comments: Species/cultivar identification required, Fire damage, [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from south-west: Tree 2310

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 2311 **Species:** *Pinus halepensis* **Common Name:** Allepo Pine

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Mature **DBH:** 65 cm **Est. Width:** 18m **Height:** 25-29m **Health:** Fair **Structure:** Poor **TPZ*:** 7.8m

Defects: Bifurcation defects of stem

Maintenance Actions: No works required

Comments: Fire damage, [JH 2022: N/A] TPZ Encroach: 8%. SRZ Encroached?: No

Assessment: Minor impact

Image 1 from south-west: Tree 2311

No: 2312 **Species:** *Pinus halepensis* **Common Name:** Allepo Pine

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Mature **DBH:** 37 cm **Est. Width:** 8m **Height:** 25-29m **Health:** Fair **Structure:** Poor **TPZ*:** 4.44m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Fire damage, [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from south-west: Tree 2312 and 2313

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 2313 **Species:** *Pinus halepensis* **Common Name:** Allepo Pine

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Mature **DBH:** 44 cm **Est. Width:** 14m **Height:** 25-29m **Health:** Fair **Structure:** Fair **TPZ*:** 5.28m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Fire damage, [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

No: 2314 **Species:** *Liquidambar styraciflua* **Common Name:** Liquidamber

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Semimature **DBH:** 24 cm **Est. Width:** 5m **Height:** 10-14m **Health:** Good **Structure:** Fair **TPZ*:** 2.88m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Stem is within excavation area, [JH 2022: N/A] TPZ Encroach: 68%. SRZ Encroached?: Yes

Assessment: Lost

Image 1 from north-west: Tree 2314

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 2315 **Species:** *Fraxinus excelsior 'Aurea'* **Common Name:** Golden Ash

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Semimature **DBH:** 23 cm **Est. Width:** 5m **Height:** 10-14m **Health:** Good **Structure:** Fair **TPZ*:** 2.76m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Stem is within excavation area, [JH 2022: N/A] TPZ Encroach: 74%. SRZ Encroached?: Yes

Assessment: Lost

Image 1 from south-west: Tree 2315

No: 2316 **Species:** *Acer sp. cv* **Common Name:** Cultivated variety of Acer

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Semimature **DBH:** 10 cm **Est. Width:** 5m **Height:** 3m **Health:** Good **Structure:** Fair **TPZ*:** 2m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Species/cultivar identification required, possum guard, [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: Minor impact

Image 1 from south-east: Tree 2316

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 2317 **Species:** *Eucalyptus melliodora* **Common Name:** Yellow Box

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Vic Native **Retention Value:** Medium

Age: Semimature **DBH:** 12 cm **Est. Width:** 4m **Height:** 3m **Health:** Dead **Structure:** Fair **TPZ*:** 2m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Stem is within excavation area, [JH 2022: N/A] TPZ Encroach: 54%. SRZ Encroached?: Yes

Assessment: Lost

No: 2318 **Species:** *Melicytus dentatus* **Common Name:** Tree Violet

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Vic Native **Retention Value:** High

Age: Mature **DBH:** 18 cm **Est. Width:** 3m **Height:** 5m **Health:** Fair **Structure:** Poor **TPZ*:** 2.16m

Defects: Minor or none noticed

Maintenance Actions: Low Priority Actions: Prune to lift branches over works as required

Comments: Local indigenous shrub, [JH 2022: N/A] TPZ Encroach: 7%. SRZ Encroached?: No

Assessment: Minor impact

Image 1 from south-west: Tree 2318

No: 2319 **Species:** *Hakea laurina* **Common Name:** Pincushion Hakea

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Aus Native **Retention Value:** Medium

Age: Young **DBH:** 1 cm x **Est. Width:** 1m **Height:** 2m **Health:** Good **Structure:** Good **TPZ*:** 2m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Shrub with fiborous root system is likley to tolerate excavation, [JH 2022: N/A] TPZ Encroach: 48%. SRZ Encroached?: Yes

Assessment: Lost

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 2320 **Species:** *Eucalyptus melliodora* **Common Name:** Yellow Box

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Vic Native **Retention Value:** Medium

Age: Mature **DBH:** 35 cm **Est. Width:** 6m **Height:** 10-14m **Health:** Poor **Structure:** Poor **TPZ*:** 4.2m

Defects: Fire damage, Bifurcation defects of stem

Maintenance Actions: Medium Priority Actions: Protect from possum grazing

Comments: [JH 2022: N/A] TPZ Encroach: 38%. SRZ Encroached?: Yes

Assessment: Lost

Image 1 from south-west: Tree 2320

No: 2321 **Species:** *Acer rubrum* **Common Name:** Red Maple

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Young **DBH:** 5 cm x **Est. Width:** 3m **Height:** 4m **Health:** Good **Structure:** Fair **TPZ*:** 2m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Species/cultivar identification required [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from south-east: Tree 2321

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 2322 **Species:** *Eucalyptus melliodora* **Common Name:** Yellow Box

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Vic Native **Retention Value:** High

Age: Mature **DBH:** 35 cm **Est. Width:** 7m **Height:** 15-19m **Health:** Poor **Structure:** Fair **TPZ*:** 4.2m

Defects: Fire damage (slight)

Maintenance Actions: Medium Priority Actions: Protect from possum grazing

Comments: [JH 2022: N/A] TPZ Encroach: 17%. SRZ Encroached?: No

Assessment: Moderate impact

Image 1 from west: Tree 2322

No: 2323 **Species:** *Corymbia maculata* **Common Name:** Spotted Gum

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Vic Native **Retention Value:** Low

Age: Semimature **DBH:** 12 cm **Est. Width:** 4m **Height:** 10-14m **Health:** Good **Structure:** Good **TPZ*:** 2m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Stormwater permitted to flow across the ground (comprising road and grassed area) in this area [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from west: Tree 2323 624 and 626, right to left

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 2324 **Species:** *Callitris glaucophylla* **Common Name:** White Cypress Pine

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Vic Native **Retention Value:** Medium

Age: Mature **DBH:** 16 cm **Est. Width:** 3m **Height:** 10-14m **Health:** Good **Structure:** Good **TPZ*:** 2m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Suitable species for future plantings. Check species ID - possibly another Callitris species. Callitris are native to Victoria with natural stands occuring in the Snowy River National Park to the east of Buchan, [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from north: Tree 2324 foreground

No: 2325 **Species:** *Chamaecyparis lawsoniana* **Common Name:** Lawson's Cypress

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Semimature **DBH:** 13 cm **Est. Width:** 4m **Height:** 8m **Health:** Good **Structure:** Good **TPZ*:** 2m

Defects: Minor or none noticed

Maintenance Actions: Medium Priority Actions: Remove stake

Comments: [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from west: Tree 2325

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 2326 **Species:** *Fraxinus sp.* **Common Name:** Ash

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Young **DBH:** 1 cm x **Est. Width:** 1m **Height:** 2m **Health:** Good **Structure:** Good **TPZ*:** 2m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Species/cultivar identification required [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from west: Tree 2326

No: 2327 **Species:** *Eucalyptus sp.* **Common Name:** Eucalypt

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Aus Native **Retention Value:** High

Age: Semimature **DBH:** 35 cm **Est. Width:** 6m **Height:** 20-24m **Health:** Good **Structure:** Poor **TPZ*:** 4.2m

Defects: Fire damage

Maintenance Actions: No works required

Comments: [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from west: Tree 2327 smaller tree on right, 2328 larger tree left, 2329 smaller tree far left

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 2328 **Species:** *Eucalyptus viminalis* **Common Name:** Manna Gum

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Vic Native **Retention Value:** High

Age: Mature **DBH:** 81 cm **Est. Width:** 15m **Height:** 25-29m **Health:** Poor **Structure:** Poor **TPZ*:** 9.72m

Defects: Fire damage, Bifurcation defects of stem

Maintenance Actions: No works required

Comments: Appears to be recovering health after fire damage, Stem within excavation area. Erosion bank close to east side of stem, [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from north-east: Tree 2328 base of stem near erosion

No: 2329 **Species:** *Eucalyptus sp.* **Common Name:** Eucalypt

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Aus Native **Retention Value:** Medium

Age: Semimature **DBH:** 24 cm **Est. Width:** 4m **Height:** 10-14m **Health:** Good **Structure:** Fair **TPZ*:** 2.88m

Defects: Fire damage (slight)

Maintenance Actions: No works required

Comments: [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 2330 **Species:** *Eucalyptus melliodora* **Common Name:** Yellow Box

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Vic Native **Retention Value:** Very High

Age: Mature **DBH:** 56 cm **Est. Width:** 16m **Height:** 25-29m **Health:** Fair **Structure:** Fair **TPZ*:** 6.72m

Defects: Fire damage, Large dead branches

Maintenance Actions: Medium Priority Actions: Deadwood >5 cm over table

Comments: [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from north-west: Tree 2330 right, 2331 left

No: 2331 **Species:** *Eucalyptus melliodora* **Common Name:** Yellow Box

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Vic Native **Retention Value:** High

Age: Mature **DBH:** 40 cm **Est. Width:** 8m **Height:** 15-19m **Health:** Poor **Structure:** Fair **TPZ*:** 4.8m

Defects: Fire damage

Maintenance Actions: No works required

Comments: Within rehabilitation works area, [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 2332 **Species:** *Eucalyptus sp.* **Common Name:** Eucalypt

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Aus Native **Retention Value:** High

Age: Mature **DBH:** 50 cm **Est. Width:** 10m **Height:** 20-24m **Health:** Fair **Structure:** Fair **TPZ*:** 6m

Defects: Fire damage

Maintenance Actions: No works required

Comments: Within rehabilitation works area, [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from west: Tree 2332

No: 2333 **Species:** *Pinus sp.* **Common Name:** Pine (unidentified species)

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Semimature **DBH:** 23 cm **Est. Width:** 6m **Height:** 9m **Health:** Good **Structure:** Fair **TPZ*:** 2.76m

Defects: Bifurcation defects of stem

Maintenance Actions: No works required

Comments: [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from north: Tree 2333

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 2334 **Species:** *Picea sitchensis* **Common Name:** Sitka Spruce

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Young **DBH:** 1 cm x **Est. Width:** 1m **Height:** 1m **Health:** Good **Structure:** Good **TPZ*:** 2m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from north: Tree 2334

No: 2335 **Species:** *Eucalyptus melliodora* **Common Name:** Yellow Box

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Vic Native **Retention Value:** Low

Age: Semimature **DBH:** 16 cm **Est. Width:** 2m **Height:** 10-14m **Health:** Dead **Structure:** Poor **TPZ*:** 2m

Defects: Minor or none noticed

Maintenance Actions: High Priority Actions: Fit possum guard

Comments: Tree appears almost dead but still has buds and a few leaves. Tree could possibly recover if possum protection is done very soon, [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from north: Tree 2335 right stem, 2336 left stem

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 2336 **Species:** *Eucalyptus melliodora* **Common Name:** Yellow Box

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Vic Native **Retention Value:** Low

Age: Semimature **DBH:** 10 cm **Est. Width:** 2m **Height:** 10-14m **Health:** Dead **Structure:** Poor **TPZ*:** 2m

Defects: Minor or none noticed

Maintenance Actions: High Priority Actions: Fit possum guard

Comments: Tree appears almost dead but still has buds and a few leaves. Tree could possibly recover if possum protection is done very soon, [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

No: 2337 **Species:** *Fraxinus 'Raywood'* **Common Name:** Raywood Ash

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** High

Age: Mature **DBH:** 40 cm **Est. Width:** 10m **Height:** 15-19m **Health:** Good **Structure:** Good **TPZ*:** 4.8m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from north-west: Tree 2337

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 2338 **Species:** *Abies sp.* **Common Name:** Fir

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Young **DBH:** 1 cm x **Est. Width:** 1m **Height:** 1m **Health:** Fair **Structure:** Good **TPZ*:** 2m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Species/cultivar identification required [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from east: Tree 2338

No: 2339 **Species:** *Brachychiton populneus* **Common Name:** Kurrajong

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Vic Native **Retention Value:** Medium

Age: Semimature **DBH:** 19 cm **Est. Width:** 2m **Height:** 6m **Health:** Good **Structure:** Good **TPZ*:** 2.28m

Defects: Bifurcation defect of stem

Maintenance Actions: Low Priority Actions: Formative prune - remove bifurcated stem

Comments: Near HV powerlines may be a maintenance issue in next decade or so, [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from north: Tree 2339

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 2340 **Species:** *Acacia caerulescens* **Common Name:** Buchan Blue Wattle

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Vic Native **Retention Value:** High

Age: Mature **DBH:** 19 cm **Est. Width:** 5m **Height:** 15-19m **Health:** Good **Structure:** Good **TPZ*:** 2.28m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Local indigenous species: EPBC listed as vulnerable, [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from east: Tree 2340 centre

No: 153 **Species:** *Populus x canadensis* **Common Name:** Grey Poplar

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Very High

Age: Mature **DBH:** 86 cm **Est. Width:** 30m **Height:** 30+ **Health:** Fair **Structure:** Good **TPZ*:** 10.32m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from north: Tree 153

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 154 **Species:** *Populus x canadensis* **Common Name:** Grey Poplar

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Very High

Age: Mature **DBH:** 115 cm **Est. Width:** 30m **Height:** 30+ **Health:** Fair **Structure:** Good **TPZ*:** 13.8m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from north-west: Tree 154

No: 167 **Species:** *Ulmus glabra 'Lutescens'* **Common Name:** Golden Wych Elm

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Very High

Age: Mature **DBH:** 126 cm **Est. Width:** 30m **Height:** 25-29m **Health:** Good **Structure:** Poor **TPZ*:** 15m

Defects: Bifurcation defects of stem

Maintenance Actions: Medium Priority Actions: Check & adjust or replace cable-bracing

Comments: 6 dynamic braces installed- check age and inspection history, [JH 2022: N/A] TPZ Encroach: 1%. SRZ Encroached?: No

Assessment: Minor impact

Image 1 from north: Tree 167

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 538 **Species:** *Gleditsia triacanthos 'Sunburst'* **Common Name:** Sunburst Honey Locust.

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Low

Age: Mature **DBH:** 15 cm **Est. Width:** 5m **Height:** 10-14m **Health:** Poor **Structure:** Poor **TPZ*:** 2m

Defects: Sun scald, General poor form

Maintenance Actions: Low Priority Actions: Tree Removal

Comments: Stem is within excavation area, [JH 2022: Remove], Reasons for tree removal (2023): Decline of landscape value TPZ Encroach: 97%. SRZ Encroached?: Yes

Assessment: Lost

Image 1 from north-west: Tree 538

No: 539 **Species:** *Juglans regia* **Common Name:** Walnut

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Mature **DBH:** 29 cm **Est. Width:** 8m **Height:** 10-14m **Health:** Good **Structure:** Fair **TPZ*:** 3.48m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Possibly self sown, [JH 2022: N/A] TPZ Encroach: 27%. SRZ Encroached?: Yes

Assessment: Lost

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 540 **Species:** *Juglans regia* **Common Name:** Walnut

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** High

Age: Mature **DBH:** 40 cm **Est. Width:** 8m **Height:** 15-19m **Health:** Good **Structure:** Good **TPZ*:** 4.8m

Defects: Bifurcation defects of stem (partial)

Maintenance Actions: No works required

Comments: No buttressing on north east side (works side), [JH 2022: N/A] TPZ Encroach: 28%. SRZ Encroached?: Yes

Assessment: Moderate to high impact

Image 1 from north-west: Tree 540 swale route - no buttressing on north east side (works side)

No: 541 **Species:** *Juglans regia* **Common Name:** Walnut

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** High

Age: Mature **DBH:** 54 cm **Est. Width:** 14m **Height:** 15-19m **Health:** Good **Structure:** Good **TPZ*:** 6.48m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Stem is within excavation area, [JH 2022: N/A] TPZ Encroach: 55%. SRZ Encroached?: Yes

Assessment: Lost

Image 1 from west: Tree 541 background right, tree 540 left

Image 2 from north-west: Tree 541 swale route - surface root and buttress heading north

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 543 **Species:** *Betula pendula* **Common Name:** Silver Birch

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Mature **DBH:** 17 cm **Est. Width:** 4m **Height:** 15-19m **Health:** Fair **Structure:** Good **TPZ*:** 2.04m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Stem is within excavation area, [JH 2022: N/A] TPZ Encroach: 100%. SRZ Encroached?: Yes

Assessment: Lost

No: 544 **Species:** *Betula pendula* **Common Name:** Silver Birch

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Mature **DBH:** 13 cm **Est. Width:** 4m **Height:** 10-14m **Health:** Fair **Structure:** Good **TPZ*:** 2m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Stem is within excavation area, [JH 2022: N/A] TPZ Encroach: 63%. SRZ Encroached?: Yes

Assessment: Lost

No: 545 **Species:** *Betula pendula* **Common Name:** Silver Birch

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Mature **DBH:** 26 cm **Est. Width:** 6m **Height:** 15-19m **Health:** Fair **Structure:** Good **TPZ*:** 3.12m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Stem is within excavation area, [JH 2022: N/A] TPZ Encroach: 62%. SRZ Encroached?: Yes

Assessment: Lost

Image 1 from north-west: Tree 545 (background), tree 544 centre, tree 543 left

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 548 **Species:** *Platanus orientalis* **Common Name:** Oriental Plane

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** High

Age: Mature **DBH:** 80 cm **Est. Width:** 19m **Height:** 20-24m **Health:** Fair **Structure:** Fair **TPZ*:** 9.6m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Tree is deemed lost but efforts to achieve functional design of the swale while retaining the tree should be attempted during works. Carefull hand digging or NDD (non-destructive digging using air or water) should be used. [JH 2022: N/A] TPZ Encroach: 38%. SRZ Encroached?: Yes

Assessment: Lost

Image 1 from north-west: Tree 548

Image 2 from north-west: Tree 548 proposed swale route

No: 561 **Species:** *Fraxinus angustifolia* **Common Name:** Desert Ash

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Low

Age: Semimature **DBH:** 23 cm **Est. Width:** 5m **Height:** 10-14m **Health:** ? **Structure:** Fair **TPZ*:** 2.76m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Stem is within excavation area, [JH 2022: Remove] TPZ Encroach: 92%. SRZ Encroached?: Yes

Assessment: Lost

Image 1 from south-west: Tree 561 background right, tree 562 left

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 562 **Species:** *Tilia europaea* **Common Name:** Common Lime

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** High

Age: Mature **DBH:** 46 cm **Est. Width:** 12m **Height:** 25-29m **Health:** Fair **Structure:** Poor **TPZ*:** 5.52m

Defects: Bifurcation defects of stem

Maintenance Actions: No works required

Comments: Stem is within excavation area, [JH 2022: N/A] TPZ Encroach: 52%. SRZ Encroached?: Yes

Assessment: Lost

Image 1 from south-west: Tree 562 left taller tree

No: 563 **Species:** *Fraxinus 'Raywood'* **Common Name:** Raywood Ash

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** High

Age: Mature **DBH:** 66 cm **Est. Width:** 15m **Height:** 30+ **Health:** Fair **Structure:** Fair **TPZ*:** 7.92m

Defects: Minor or none noticed

Maintenance Actions: Medium Priority Actions: Deadwood >50mm diameter

Comments: Large root buttresses away from works but some surface roots 2.7m east of stem centre, Stem very close to excavation area, [JH 2022: N/A] TPZ Encroach: 42%. SRZ Encroached?: Yes

Assessment: Lost

Image 1 from south-west: Tree 563 left

Image 2 from east: Tree 563 swale route - surface roots

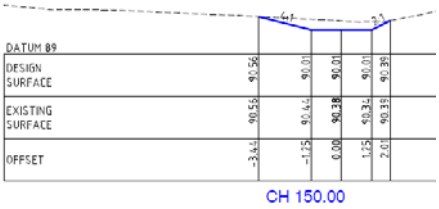


Image 3: Tree 563 nearest cross section

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 564 **Species:** *Populus nigra var. italica* **Common Name:** Lombardy Poplar

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Low

Age: Mature **DBH:** 21 cm **Est. Width:** 2m **Height:** 20-24m **Health:** Poor **Structure:** Poor **TPZ*:** 2.52m

Defects: Poor stem taper

Maintenance Actions: Low Priority Actions: Tree Removal

Comments: Health appears to be declining, [JH 2022: Remove], Reasons for tree removal (2023): Defective structure & poor form TPZ Encroach: 80%. SRZ Encroached?: Yes

Assessment: Lost

No: 565 **Species:** *Fraxinus angustifolia* **Common Name:** Desert Ash

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Mature **DBH:** 28 cm **Est. Width:** 8m **Height:** 10-14m **Health:** Fair **Structure:** Fair **TPZ*:** 3.36m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Stem is within excavation area, [JH 2022: Remove] TPZ Encroach: 97%. SRZ Encroached?: Yes

Assessment: Lost

Image 1 from south-west: Tree 565

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 567 **Species:** *Fraxinus 'Raywood'* **Common Name:** Raywood Ash

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** High

Age: Mature **DBH:** 81 cm **Est. Width:** 20m **Height:** 30+ **Health:** Fair **Structure:** Fair **TPZ*:** 9.72m

Defects: Minor or none noticed

Maintenance Actions: Low Priority Actions: Deadwood >50mm diameter

Comments: One root flare in direction of works. Stem within excavation area, [JH 2022: N/A] TPZ Encroach: 36%. SRZ Encroached?: Yes

Assessment: Lost

Image 1 from south-west: Tree 567

Image 2 from north: Tree 567 swale route - one root flare in direction of works

No: 568 **Species:** *Populus nigra var. italica* **Common Name:** Lombardy Poplar

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Low

Age: Mature **DBH:** 21 cm **Est. Width:** 2m **Height:** 20-24m **Health:** Poor **Structure:** Poor **TPZ*:** 2.52m

Defects: Poor stem taper, Decay in base of stem

Maintenance Actions: Low Priority Actions: Tree Removal

Comments: Fire damage, [JH 2022: Remove], Reasons for tree removal (2023): Defective structure & poor form TPZ Encroach: 89%. SRZ Encroached?: Yes

Assessment: Lost

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 570 **Species:** *Tilia europaea* **Common Name:** Common Lime

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** High

Age: Mature **DBH:** 47 cm **Est. Width:** 15m **Height:** 25-29m **Health:** Fair **Structure:** Fair **TPZ*:** 5.64m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Stem is within excavation area, [JH 2022: N/A] TPZ Encroach: 59%. SRZ Encroached?: Yes

Assessment: Lost

Image 1 from north-west: Tree 570

No: 571 **Species:** *Fraxinus 'Raywood'* **Common Name:** Raywood Ash

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** High

Age: Mature **DBH:** 50 cm **Est. Width:** 20m **Height:** 30+ **Health:** Fair **Structure:** Fair **TPZ*:** 6m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Surface roots to1.6m of stem on east side. Stem within excavation area, [JH 2022: N/A] TPZ Encroach: 58%. SRZ Encroached?: Yes

Assessment: Lost

Image 1 from north-west: Tree 571

Image 2 from north: Tree 571 swale route - surface roots

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 572 **Species:** *Populus nigra var. italica* **Common Name:** Lombardy Poplar

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Mature **DBH:** 42 cm **Est. Width:** 3m **Height:** 20-24m **Health:** Fair **Structure:** Fair **TPZ*:** 5.04m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Stem is within excavation area, [JH 2022: Remove] TPZ Encroach: 48%. SRZ Encroached?: Yes

Assessment: Lost

Image 1 from west: Tree 572

No: 574 **Species:** *Tilia europaea* **Common Name:** Common Lime

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** High

Age: Mature **DBH:** 53 cm **Est. Width:** 12m **Height:** 20-24m **Health:** Fair **Structure:** Fair **TPZ*:** 6.36m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Stem within excavation area, [JH 2022: N/A] TPZ Encroach: 55%. SRZ Encroached?: Yes

Assessment: Lost

Image 1 from south-west: Tree 574

Image 2 from north: Tree 574 swale route - surface roots to1m of stem on east side

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 575 **Species:** *Tilia europaea* **Common Name:** Common Lime

Inspection Date: 18/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** High

Age: Mature **DBH:** 62 cm **Est. Width:** 12m **Height:** 20-24m **Health:** Fair **Structure:** Fair **TPZ*:** 7.44m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Stem is within excavation area, [JH 2022: N/A] TPZ Encroach: 45%. SRZ Encroached?: Yes

Assessment: Lost

Image 1 from south-west: Tree 575

Image 2 from north: Tree 575 swale route

No: 580 **Species:** *Eucalyptus sp.* **Common Name:** Eucalypt

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Vic Native **Retention Value:** Very High

Age: Mature **DBH:** 115 cm **Est. Width:** 20m **Height:** 30+ **Health:** Good **Structure:** Fair **TPZ*:** 13.8m

Defects: Recent major branch failures on north side

Maintenance Actions: High Priority Actions: Deadwood >5 cm over path or areas occupied by people daily

Comments: Species identification required, no fruit or buds found (possibly E.mannifera), [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from north-west: Tree 580

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 581 **Species:** *Brachychiton populneus* **Common Name:** Kurrajong

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Vic Native **Retention Value:** Medium

Age: Mature **DBH:** 32 cm **Est. Width:** 8m **Height:** 10-14m **Health:** Good **Structure:** Good **TPZ*:** 3.84m

Defects: Minor or none noticed

Maintenance Actions: Medium Priority Actions: Remove stake

Comments: Remove stake before it becomes embedded in stem, [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from east: Tree 581

No: 594 **Species:** *Eucalyptus viminalis* **Common Name:** Manna Gum

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Vic Native **Retention Value:** Very High

Age: Mature **DBH:** 108 cm **Est. Width:** 23m **Height:** 25-29m **Health:** Poor **Structure:** Fair **TPZ*:** 12.96m

Defects: Fire damage

Maintenance Actions: Low Priority Actions: Deadwood >5 cm over road

Comments: Fire damaged. Health appears to be recovering following fire. Species is possibly E. rubida, Surface roots to 3.4m of stem centre, Stormwater permitted to flow across the ground (comprising road and grassed area) to avoid swale in TPZ [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: Minor impact

Image 1 from south: Tree 594

Image 2 from west: Tree 594 surface roots to 3.4m of stem centre

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 595 **Species:** *Quercus rubra* **Common Name:** Red Oak

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Semimature **DBH:** 12 cm **Est. Width:** 5m **Height:** 9m **Health:** Good **Structure:** Good **TPZ*:** 2m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Stem within excavation, [JH 2022: N/A] TPZ Encroach: 78%. SRZ Encroached?: Yes

Assessment: Lost

Image 1 from south-west: Tree 595

No: 598 **Species:** *Eucalyptus melliodora* **Common Name:** Yellow Box

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Vic Native **Retention Value:** Medium

Age: Semimature **DBH:** 28 cm **Est. Width:** 5m **Height:** 15-19m **Health:** Poor **Structure:** Fair **TPZ*:** 3.36m

Defects: Minor or none noticed

Maintenance Actions: High Priority Actions: Protect from possum grazing

Comments: Tree appears almost dead but still has buds and a few leaves Could possibly recover if possum protection is done very soon, [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

No: 599 **Species:** *Eucalyptus melliodora* **Common Name:** Yellow Box

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Vic Native **Retention Value:** Medium

Age: Semimature **DBH:** 24 cm **Est. Width:** 4m **Height:** 15-19m **Health:** Poor **Structure:** Fair **TPZ*:** 2.88m

Defects: Minor or none noticed

Maintenance Actions: High Priority Actions: Protect from possum grazing

Comments: Tree appears almost dead but still has buds and a few leaves Could possibly recover if possum protection is done very soon, [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

No: 600 **Species:** *Eucalyptus melliodora* **Common Name:** Yellow Box

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Vic Native **Retention Value:** Medium

Age: Semimature **DBH:** 22 cm **Est. Width:** 5m **Height:** 15-19m **Health:** Poor **Structure:** Fair **TPZ*:** 2.64m

Defects: Minor or none noticed

Maintenance Actions: High Priority Actions: Protect from possum grazing

Comments: Tree appears almost dead but still has buds and a few leaves Could possibly recover if possum protection is done very soon, [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 601 **Species:** *Allocasuarina littoralis* **Common Name:** Black She-oak

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Vic Native **Retention Value:** Medium

Age: Mature **DBH:** 29 cm **Est. Width:** 8m **Height:** 10-14m **Health:** Fair **Structure:** Fair **TPZ*:** 3.48m

Defects: Minor or none noticed

Maintenance Actions: High Priority Actions: Ensure HV clearance checks are carried out if responsible for clearance maintenance

Comments: Below HV powerlines may be a maintenance issue in future, most likely a planted specimen, [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

No: 602 **Species:** *Brachychiton populneus* **Common Name:** Kurrajong

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Vic Native **Retention Value:** Medium

Age: Mature **DBH:** 32 cm **Est. Width:** 8m **Height:** 10-14m **Health:** Good **Structure:** Good **TPZ*:** 3.84m

Defects: Minor or none noticed

Maintenance Actions: High Priority Actions: Ensure HV clearance checks are carried out if responsible for clearance maintenance

Comments: Below HV powerlines may be a maintenance issue in future, [JH 2022: Remove] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from north-east: Tree 602

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 609 **Species:** *Tilia europaea* **Common Name:** Common Lime

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Mature **DBH:** 53 cm **Est. Width:** 9m **Height:** 15-19m **Health:** Fair **Structure:** Poor **TPZ*:** 6.36m

Defects: Lesions of dieback longitudinally along many branches

Maintenance Actions: No works required

Comments: Tree has been reduced using reduction cuts possibly due to past dieback, Appears to be recovering health, [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from north: Tree 609

No: 623 **Species:** *Eucalyptus viminalis* **Common Name:** Manna Gum

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Vic Native **Retention Value:** Very High

Age: Mature **DBH:** 108 cm **Est. Width:** 23m **Height:** 25-29m **Health:** Fair **Structure:** Fair **TPZ*:** 12.96m

Defects: Fire damage, Root plate heave on north east side

Maintenance Actions: Low Priority Actions: Deadwood >5 cm over shelter, stability test (if retained)

Comments: Stability test for root plate movement carried out by ArbKey, Stormwater permitted to flow across the ground (comprising road and grassed area) to avoid swale in TPZ, [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: Minor impact

Image 1 from north-west: Tree 623

Image 2 from north-west: Tree 623 root plate heave on north east side has stabilised

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 624 **Species:** *Fraxinus angustifolia* **Common Name:** Desert Ash

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Low

Age: Semimature **DBH:** 29 cm **Est. Width:** 9m **Height:** 10-14m **Health:** Fair **Structure:** Good **TPZ*:** 3.48m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: SRZ is within excavation area, [JH 2022: N/A] TPZ Encroach: 34%. SRZ Encroached?: Yes

Assessment: Lost

No: 625 **Species:** *Fraxinus excelsior 'Aurea'* **Common Name:** Golden Ash

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Low

Age: Semimature **DBH:** 17 cm **Est. Width:** 5m **Height:** 8m **Health:** Poor **Structure:** Fair **TPZ*:** 2.04m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from west: Tree 625

No: 626 **Species:** *Fraxinus angustifolia* **Common Name:** Desert Ash

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Mature **DBH:** 57 cm **Est. Width:** 16m **Height:** 15-19m **Health:** Fair **Structure:** Fair **TPZ*:** 6.84m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Stem is within excavation area, [JH 2022: N/A] TPZ Encroach: 47%. SRZ Encroached?: Yes

Assessment: Lost

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 627 **Species:** *Fraxinus angustifolia* **Common Name:** Desert Ash

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Mature **DBH:** 50 cm **Est. Width:** 13m **Height:** 15-19m **Health:** Good **Structure:** Fair **TPZ*:** 6m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Tree may possibly be saved with careful work overseen by arborist[JH 2022: N/A] TPZ Encroach: 22%. SRZ Encroached?: No

Assessment: Moderate to high impact

Image 1 from north-west: Tree 627

No: 628 **Species:** *Tilia cordata* **Common Name:** Small-leaved Linden

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Semimature **DBH:** 25 cm **Est. Width:** 6m **Height:** 10-14m **Health:** Good **Structure:** Good **TPZ*:** 3m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: [JH 2022: N/A] TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from north-west: Tree 628

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 629 **Species:** *Fraxinus angustifolia* **Common Name:** Desert Ash

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Mature **DBH:** 49 cm **Est. Width:** 14m **Height:** 15-19m **Health:** Fair **Structure:** Fair **TPZ*:** 5.88m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Stem is within excavation area, [JH 2022: N/A] TPZ Encroach: 56%. SRZ Encroached?: Yes

Assessment: Lost

Image 1 from north-west: Tree 629

No: 630 **Species:** *Tilia cordata* **Common Name:** Small-leaved Linden

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Medium

Age: Mature **DBH:** 46 cm **Est. Width:** 9m **Height:** 20-24m **Health:** Fair **Structure:** Poor **TPZ*:** 5.52m

Defects: Bifurcation defects of stem

Maintenance Actions: No works required

Comments: [JH 2022: N/A] TPZ Encroach: 9%. SRZ Encroached?: No

Assessment: Minor impact

Image 1 from north-west: Tree 630

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

No: 632 **Species:** *Eucalyptus elata* **Common Name:** River Peppermint

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Vic Native **Retention Value:** Very High

Age: Mature **DBH:** 116 cm **Est. Width:** 24m **Height:** 30+ **Health:** Good **Structure:** Good **TPZ*:** 13.92m

Defects: Minor or none noticed

Maintenance Actions: No works required

Comments: Retain: Very High retention value tree, [JH 2022: Remove and replace with Eucalyptus viminalis (Error in tree number. 632 is a large Manna Gum S. Fitzgerald)] TPZ Encroach: 9%. SRZ Encroached?: No

Assessment: Minor impact

Image 1 from north-west: Tree 632

No: 633 **Species:** *Fraxinus angustifolia* **Common Name:** Desert Ash

Inspection Date: 19/07/2023 **No of trees:** 1 **Veg Type:** Exotic **Retention Value:** Low

Age: Mature **DBH:** 59 cm **Est. Width:** 16m **Height:** 15-19m **Health:** Fair **Structure:** Fair **TPZ*:** 7.08m

Defects: General decline of structure

Maintenance Actions: Tree removal

Comments: Appears to be in decline, [JH 2022: Remove], Reasons for tree removal (2023): Declining health TPZ Encroach: 0%. SRZ Encroached?: No

Assessment: No impact

Image 1 from north-west: Tree 633

* TPZ based on Australian Standard AS 4970 - 2009 Protection of Trees on Development Sites (Standards Australia, 2009)

Appendix 2 Definitions and Methods

<table>
<tr><td>Tree Number</td><td>A number referencing a tree location record to the tree location plans.</td></tr>
<tr><td>Species</td><td>Botanical Name (field identified)</td></tr>
<tr><td>Common Name</td><td>Common name for species (Horticultural Flora of South-Eastern Australia (R. Spencer, volumes 1-5, 1995-2005) are referenced wherever possible)</td></tr>
<tr><td>Age (class)</td><td>This field describes the stage of maturity of the tree or dominant specimens in a tree group as indicated by its form.

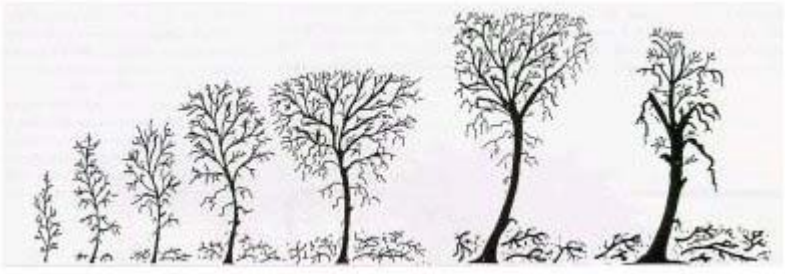
Young — Seedling or sapling stage

Semi-mature — Approaching its expected form and size

Mature — Expected ultimate form and size of tree before decline

Over-mature — Mature tree exhibiting signs of age related structural decline

Occasionally stunted or atypical specimens were found that, despite being old in years, appeared semi-mature.

 
<table><tr><td>Young</td><td>Semi-mature</td><td>Mature</td><td>Over-mature</td></tr></table></td></tr>
<tr><td>Health</td><td>Health of a tree as determined by factors such as leaf colour and size, shoot growth extension and percentage of living canopy:

Dead — < 10% of canopy living (shoots & stems dead)

Poor — Determined by any single or combination of factors above. Tree health is declining or has declined usually due to pest, disease, senescence, unsuitable site conditions or physiological damage such as root severance or root death due to soil cut, fill or compaction.

Fair — Tree is in ‘normal’ health. Some pests, diseases, deadwood, minor crown dieback may be present but not considered to be severely affecting the tree’s health.

Good — Tree is largely unaffected by pests, diseases and has no significant deadwood or crown dieback.</td></tr>
<tr><td>Landscape Life Expectancy</td><td>Landscape life expectancy is the estimated number of years (or range) a tree could be expected to live in a reasonably healthy and safe condition given moderate weather conditions and reasonable maintenance.</td></tr>
</table>

Structure	Determined by both the existence of defects in the tree's structure. Hazard — Tree structures that are highly likely to fail in the near future causing a hazard threat to people or property in its vicinity. Poor — Trees with structural defects such as bifurcated trunks, significant wounds or cavities, noticeable girdling roots. Poor tree structures are common and not necessarily a cause for concern. Remedy with pruning or cable bracing may be an option. Fair — Indicates trees with some minor structural defects. Good — Trees with few if any significant form or structural defects
DBH	Trunk diameter measured at breast height (1.4m above ground). If the trunk divides into branches or stems at or below 1.4 metres then an equivalent single stem diameter is calculated from the DBH measurements of the individual stems using the formula: $Total\ DBH = \sqrt{(DBH_1)^2 + (DBH_2)^2 + (DBH_3)^2}$ If a buttress or deformity exists at 1.4m then the DBH is measured immediately above this point. See Australian Standard AS 4970, *Protection of Trees on Development Sites*, Appendix A for details of procedure used. DBH measurement is useful for categorising the size of trees for analysis and is also used in calculations: e.g. calculating the nominal TPZ.
DAB	Diameter above buttress. The trunk diameter measured immediately above the root buttress. The DAB is used to calculate the SRZ.
Works / Actions	List of recommended works. Works are specified as required to mitigate hazard or improve the landscape life expectancy of the tree. Where possible, terms specified in Australian Standard AS 4373-2007 *Pruning of Amenity Trees* are used.
Priority (action)	**Action Priorities** are categorised as *Low*, *Medium*, *High* or *Urgent*. ***Low*** work priorities are those that are not concerned with conditions that affect the immediate health and safety of trees (or people and property) and/or trees that are not considered valuable enough to warrant immediate attention. These works are mostly removal of small branches lodged in the tree crown or removal of branch stubs. It is recommended that these works be carried out optionally and when convenient over the next **24 months**. Tree work priorities may be increased to Medium on subsequent inspections if required. ***Medium*** work priorities are specified if the work will improve the tree's health, safety and/or aesthetics or the safety of the area (people or property) if carried out in the short term. These works are often specified for trees with larger broken lodged branches and occupying a high profile position or frequently used area within the landscape. Tree removals in this category are those that do not pose high-risk danger to persons or property. It is recommended that these works be carried out within the next **6 to 12 months**. ***High*** work priorities are specified where a tree condition poses a significant safety hazard to people or property or the tree and works are considered significant enough to warrant immediate attention. Trees requiring high priority work will include those with large broken lodged branches, flawed or damaged structures (crown, trunk or roots) that are likely to lead to failure causing property damage, injury or death. Works in this classification

	should be carried out within **3 months** or sooner if budgets and convenience allow. ***Urgent*** work priorities are usually specified where a tree condition causes an imminent safety hazard to people or property. Works in this classification should be carried out **as soon as possible**.
Retention Value	All trees surveyed were assigned a 'retention value'. Retention value can aid in decision making regarding cost vs. benefit as well as prioritisation of resources and planning. Factors contributing to retention value include: • tree origin; • age; • significance; • habitat value (hollows being used by fauna, etc); • species suitability to the urban residential/naturalistic parkland situation, and • condition (health and structure). Self-sown, remnant indigenous and planted indigenous trees of known local seed source were generally rated higher than trees from non-indigenous or unknown seed sources. Trees considered as being in a potentially dangerous condition rated lowest regardless of their significance or origins. Other tree species that rated low were weedy species, tree species regarded as being inappropriate to the urban residential situation and specimens with low life expectancy. **No Retention Value** trees are those that would usually be best removed if landscape renovation or development were to take place in their vicinity. Trees should be removed if recommended specifically or if they are dead or have poor structure/health. Retention value for trees outside the subject property may be indicated as 'N/A' as these trees are presumed to be outside the control of the property owner or developer. **Low Retention** trees should have low priority compared to development considerations. Trees considered to have low retention value should be eventually removed or replaced whether or not development goes ahead. **Medium Retention** trees could be retained if desired but could be removed to allow for development at the discretion of the developer or planner. They are trees that are considered to be appropriate to their planting situation but not necessarily of high cultural, historical or landscape value. They range from young specimens with fair to good health with no significant structural defects, to mature trees in fair to good health with defects that may be managed by arboricultural or landscape planning techniques. Trees may contribute to the immediate landscape but would not contribute greatly to the wider landscape. **High Retention** trees are those assessed as being of significant environmental, cultural or other significance and in suitable condition to be safely retained (remedial arboricultural works or landscape planning may be required for their retention). These trees should be preserved wherever possible and may justify some alterations of design. **Very High Retention** trees are similar to High Retention trees but are considered to be remnant indigenous specimens or trees with other significance that may be of or eligible for State or National recognition.

	These trees should be preserved wherever possible and would usually justify alterations of development design to allow for their preservation.
Risk	Evaluation of risk using recognised published method. In this case the Bartlett Method' (Smiley, E. T., Fraedrich, B. R., Hendrickson, N. (2002) Tree Risk Management, Charlotte NC, Bartlett Tree Research Laboratories) Each tree receives a score out of 15 as the result of multiple site and tree factors assessed. **Risk Rating Method** The method is basic and capable of being used in large scale tree data capture situations. The arborist makes an estimate of tree failure potential and the consequences of failure including the frequency of occupation of a site based on their experience. Limitations are that the method is not based on quantitative data and is very simple – as such it should be used as a guide only. Total Risk Score is derived by the addition of 2 criteria: **Failure Potential/Defect Severity (F)** — **Score** Critical Risk – Failure imminent — 10 High Risk – Failure likely especially in storms — 7 Moderate Risk – Failure possible especially in severe storms — 4 Low Risk – Failure unlikely — 1 **Consequence of Failure (C)** Considers potential for injury/loss should a failure occur based on such factors as size of defective part, target value and frequency of use Severe Consequence — 5 Moderate Consequence — 3 Low Consequence — 1 **Total Risk Rating (= F + C)** 13-15 Critical Risk: Failure imminent; Personal Injury and/or property damage inevitable (lower end of scale indicates lower potential for injury) 10-12 High Risk: Failure likely especially during storms; Personal injury and/or property damage likely (lower end of scale indicates lower potential for injury/property damage) 7-9 Moderate Risk: Failure unlikely, and/or high risk of failure but low risk of property damage/personal injury <7 Low Risk: Failure unlikely and low risk of property damage
SRZ	The structural root zone (SRZ) is the area around the base of a tree required for its 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. This zone considers a tree's structural stability only, not the root zone required for a tree's vigour and long-term viability, which will usually be a much larger area (AS 4970, *Protection of trees on development sites*). An indicative SRZ radius can be determined from the trunk diameter measured immediately above the root buttress (DAB or diameter above buttress) according to AS 4970, *Protection of trees on development sites*.

TPZ	The tree protection zone (TPZ) is a specified area above and below ground and at a given distance from the trunk set aside for the protection of a tree's roots and crown to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by development (AS 4970, *Protection of trees on development sites*). The nominal TPZ is calculated from the DBH according to AS 4970, *Protection of trees on development sites*.
Comments	General comments regarding individual trees or conditions.

Visual Inspection

Visual tree inspection is part of a process of assessing trees for conditions that may affect safety. An inspection is made of a tree for signs or symptoms of defects. Only when indications of defects are found which are considered serious enough, is further investigation recommended or undertaken. Further investigation may be a closer visual examination (such as accessing the tree canopy via climbing techniques or by way of an Elevated Platform Vehicle) or a rigorous, detailed technical examination using mechanical or electronic instruments (eg. sound or stress-wave timer device or devices that measure the force needed to drill test holes into the tree).

Visual Tree Assessment (VTA) is a method described by biomechanical engineer Dr Claus Mattheck in his book *The Body Language of Trees* (Mattheck & Breloer 1994). It involves visual inspection of the tree and provides guidelines for identifying symptoms of stress in trees caused by defects. It is based on the *Axiom of uniform stress* in which trees grow in such a way that all stresses on their surfaces are distributed evenly (Mattheck & Breloer 1994). Where this state is disturbed the tree repairs its structure by forming locally thicker annual rings. These reparative structures are recognised as symptoms of internal defects in the tree.

References

Mattheck, C., and Breloer, H. 1994, *The Body Language of Trees: A Handbook for Failure Analysis.*, HMSO Publications. London