

Review of Environmental Factors Addendum 2

Wastewater Main Renewal - Slade Park, Austinmer


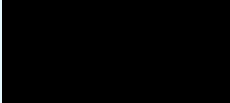
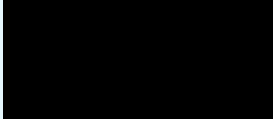
Determination

This Review of Environmental Factors Addendum (REFA) assesses potential environmental impacts due to a change of methodology from open trenching to Horizontal Directional Drilling (HDD) and the removal of trees to connect the HDD line to the maintenance hole at 134 Lawrence Hargrave Drive, Austinmer. The REF was prepared under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), with Sydney Water both the proponent and determining authority.

The Sydney Water Project Manager is accountable for ensuring the proposal is carried out as described in this REFA and the approved REF. Additional environmental impact assessment may be required if the scope of work or work methods described in this REFA change significantly following determination.

Certification

I certify that I have reviewed and endorsed this REFA and, to the best of my knowledge, it is in accordance with the EP&A Act and the Environmental Planning and Assessment Regulation 2021 (EP&A Regulation). The proposal has been considered against matters listed in section 171 (Appendix A) and the guidelines approved under section 170 of the EP&A Regulation. The information it contains is neither false nor misleading.

Prepared by:	Reviewed and endorsed by:	Endorsed by:
 Ashima Monsy Environmental Advisor D4C Date: 07/04/2026	 John Eames Snr Env Scientist Sydney Water Date: 08/04/2026	 Anahita Mukherjee Snr Project Manager Sydney Water Date: 08/04/2026

Decision Statement

The main potential additional construction environmental impacts of the proposal change include impacts to flora and visual amenity. No operation impacts are anticipated. The proposal will not be carried out in a declared area of outstanding biodiversity value and not likely to significantly affect threatened species, populations or ecological communities, or their habitats. Therefore, a Species Impact Statement (SIS) and/or Biodiversity Development Assessment Report (BDAR) is not required.



Given the nature, scale and extent of impacts and implementation of the mitigation measures outlined in this REF, the proposal is unlikely to have a significant impact on the environment. Therefore, we do not require an Environmental Impact Statement (EIS) and the proposal may proceed.

Determined by:



Elissa Howie, A/Senior Manager
Environment & Heritage, Sydney Water
Date: 10 April 2026

1. Proposal description

Table 1-1 Proposal need, objectives and consideration of alternatives

Aspect	Relevance to proposal
Approved REF	Wastewater Main Renewal - Slade Park, Austinmer (September 2024) and Addendum Wastewater Main Renewal - Slade Park, Austinmer (June 2025).
Proposal need and objectives	<p>Due to spatial constraints along the road and access prohibited in adjacent residences HDD is the required method for connection to the maintenance hole located at 134 Lawrence Hargrave Drive, Austinmer.</p> <p>There is an opportunity to reduce construction impacts by changing construction methodology in some locations.</p>
Proposal change description and methodology	<p>The wastewater main and property pipework connections to 134, 147, 149, 151, 151A, 153 and 155 Lawrence Hargrave Drive will be constructed primarily by HDD instead of open trenching. This will require entry and exit pits of approximately 1m x 1m x 1.2m at the start and end of each HDD alignment. Small sections of open trenching are still required where the property connections join the wastewater main.</p> <p>No tree removal was assessed in the original REF or Addendum, however the connection to the maintenance hole at 134 Lawrence Hargrave Drive requires the removal of (3) planted trees on the grass verge outside the fence line of the property.</p> <p>Figure 1-1 shows the location of the project change. Figure 1-2 shows the trees to be removed.</p>
Justification for proposal change	<p>HDD has replaced trenched methodology for property pipework and wastewater main to reduce impacts from excavation and associated restoration.</p> <p>Tree removal is required for a trenched connection from the HDD pit to the maintenance hole as alternative excavation options are not suitable.</p>
Location and land ownership	Maintenance hole connection work within 134 Lawrence Hargrave Drive (Lot 32 DP1177650) and grass verge outside the fence line, managed by Wollongong City Council. The other private properties listed above are also described in the Addendum (June 2025).



Figure1-1 Location of proposal change (for key environmental constraints see Addendum (June 2025)).

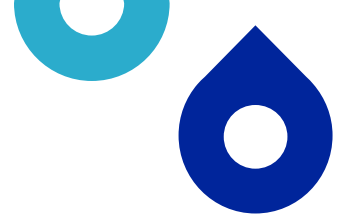
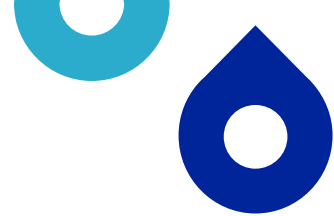


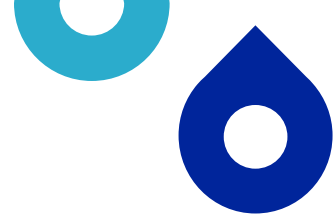
Figure1-2 Trees to be removed



2. Consultation

Additional consultation matters above those already assessed in the approved REF are detailed below.

Since the determination of the REF and change in design, consultation with the affected landowners has commenced. Consultation with the resident (134 Lawrence Hargrave Drive) was undertaken regarding the tree removal and will continue throughout construction when accessing properties. Council will also be consulted regarding prior to the tree removal works.



3. Legislative requirements

No additional legislative requirements above those already assessed in the approved REF are required.



4. Environmental assessment

The environmental impacts checklist (SWEMS0019.01) was considered for the proposal change. Table 4-1 includes only the potentially impacted/ changed aspects and Table 4-2 lists additional mitigation measures.

Table 4-1 review of environmental aspects

Aspect	Potential additional impacts
Topography and soils	<p>Use of HDD over trenching methodology requires less excavation and associated restoration. Any impacts of methodology change are likely to have no net additional environmental impact over that assessed in the Addendum.</p> <p>Mitigation measures in the approved REF and Addendum are sufficient to manage impacts.</p>
Flora and fauna	<p>Tree removal is required at the fence line of 134 Lawrence Hargrave Drive to connect from the HDD line to the maintenance hole located within the property.</p> <p>The trees have been identified in the Arborist report (Appendix C) as <i>Cupaniopsis anacardioides</i> (Carrotwood). The trees are native to NSW however, these specimens have been planted by the adjacent resident. They are not endangered and do not form part of a Threatened Ecological Community.</p> <p>The Arborist report states that works will directly conflict with the trees, so removal is required for the proposed work and there is no alternative that allows the trees to be retained.</p> <p>Offsetting will be undertaken in line with the Sydney Water Biodiversity Offset Guideline (2025) with suitable trees replanted at the removal location.</p> <p>Mitigation measures in the approved REF, Addendum and those in table 4-2 below are sufficient to manage impacts.</p>
Social and visual	<p>Whilst removal of the planted trees will impact the streetscape in the short term, the site will be restored and appropriate planting undertaken to mitigate this impact.</p> <p>The change to HDD methodology will minimise above ground impacts on private properties and reduce the duration of works.</p> <p>Mitigation measures in the approved REF and Addendum are sufficient to manage impacts.</p>

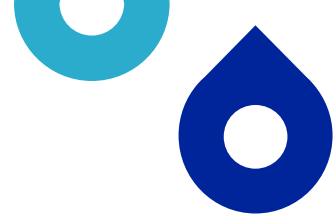


Table 4-2 Mitigation measures

Mitigation measures

Provided it is essential for delivering the project, Sydney Water's Project Manager can approve the following vegetation removal and tree trimming, without additional environmental assessment (but only after consultation with the Environmental and Community Representatives and affected landowners). Sydney Water considers vegetation removal in these circumstances has minimal environmental impact.

Any minor:

- vegetation trimming or
- removal of exotic vegetation or
- removal of planted native vegetation

where the vegetation is not a threatened species (including a characteristic species of a threatened community or population), heritage listed, in declared critical habitat or in a declared area of outstanding biodiversity value.

- Any removal of remnant vegetation where there is no net change to environmental impact (e.g. a different area of vegetation is removed but the total area is the same or less than assessed in the EIA).

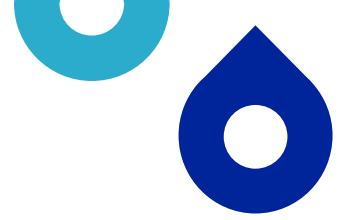
Written explanation of the application of this clause (including justification of the need for trimming or removal and any proposed revegetation) should be provided when seeking Project Manager approval. Any impacts to native vegetation and trees must be offset in accordance with the Biodiversity Offset Guideline (SWEMS0019.13).

Tree removal is to be conducted by an appropriately qualified arborist.

Minimise vegetation clearance and disturbance and where possible, limit clearing to trimming rather than the removal of whole plants.

Protect trees to be conserved within proximity to the work zone. This is to be done in accordance with the requirements of Australian Standard 4970-2009 for the Protection of Trees on Development Sites. Do not damage tree roots unless absolutely necessary and engage a qualified arborist where roots >50mm are impacted within the Tree Protection Zone.

Offset residual impacts to native vegetation and trees in accordance with the Biodiversity Offset Guideline (SWEMS0019.13). Offsets will be as follows: 3x Native Planted trees.

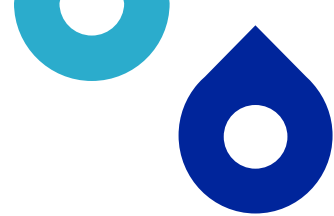


5. Conclusion

Sydney Water has prepared this REFA to assess the potential environmental impacts of Wastewater Main Renewal - Slade Park, Austinmer. The proposal is required to provide wastewater services to residents affected by the Slade Park landslip in 2021, with the minor changes proposed to address access issues and minimise construction impacts.

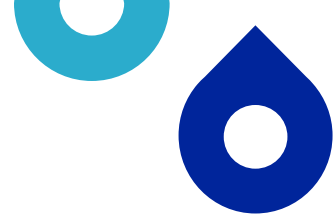
The main potential additional construction environmental impacts of the proposal change include impacts to flora and visual amenity. No operation impacts are anticipated. Given the nature, scale and extent of impacts and implementation of the mitigation measures outlined in this Addendum 2, the first Addendum and the approved REF, the proposal is unlikely to have a significant impact on the environment. Therefore, an environmental impact statement is not required under Division 5.1 of the EP&A Act.

The proposal will not result in the degradation of the quality of the environment and will not pose a risk to the safety of the environment.



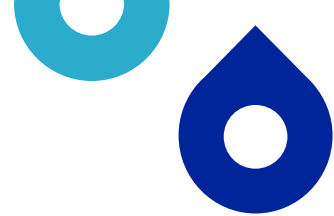
Appendix A – Section 171 checklist

There are no requirements in addition to those considered in the approved REF.



Appendix B – Consideration of Ecologically Sustainable Development

There are no ESD consideration in addition to those covered in the approved REF or REF addendum.



Appendix C – Arborist Report

SWXXX XX/XX [Insert a publication number if publicly displayed/published]

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Arboricultural Impact Assessment

**134 Lawrence Hargrave Dr Austinmer
NSW2515**

Prepared for [REDACTED] – City Coast Service

Inspection Date: March 31, 2026

TreeSpec Qualified Arborist Pty Ltd.

Email: info@tsqa.com.au

Website: www.tsqa.com.au

Phone number: 0404 609 655

ABN: 296 2103 2933



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INTRODUCTION

(i) **Scope**

The Arboricultural Impact Assessment (AIA) identifies trees that may be impacted by construction activities such as excavation, demolition, or building work. It evaluates whether these trees can be retained, need protective measures, or must be removed. For trees that are to be retained, the assessment outlines protection strategies, including the establishment of Tree Protection Zones (TPZs) and techniques to safeguard the root systems. Additionally, the report recommends construction methods that minimize root disturbance where applicable. A visual tree assessment is conducted to assess the condition of the trees, and the likely impacts on those that are to be retained are carefully considered.

This AIA has been prepared in accordance with Australian Standards – AS 4970 – 2025, Protection of Tree on Development Sites and in relation to the viability of the retention of trees in a proposed development at 134 Lawrence Hargrave Dr Austinmer NSW2515.

(iii) **Method**

Visual Tree Assessment

The subject trees were assessed following Stage One Visual Tree Assessment (VTA), as outlined by Mattheck and Breloer (1994), in alignment with modern arboricultural practices. Also, the impact Assessment was undertaken in accordance with Australian Standards – AS 4970 – 2025, Protection of Tree on Development Sites and other relevant standards (e.g., AS4373-2007: Pruning of Amenity Trees).

Trunk diameters were measured with a diameter tape, and the canopy spread was either estimated or paced, with the longest span being recorded. Tree heights were generally estimated. Digital photographs were taken, and no enhancements were made to any images used in the report. Trees on adjacent properties or in restricted areas were not fully inspected, meaning any defects or abnormalities in those trees may not have been documented.

The assessment did not include soil testing, root inspection, aerial inspection, or other investigative methods. Tree identification was conducted using the prominent taxonomic characteristics observable from the ground during the inspection.

During the assessment the following information was collected or identified:

- Tree species – botanical and common name.
- Health and vigour; using foliage size, colour, extension growth, presence of disease or pest infestation, canopy density, presence of deadwood, dieback and epicormic growth as indicators.
- Condition using visible evidence of structural defects, instability, evidence of previous pruning and physical damage as indicators.
- Suitability of the tree to the site and its existing location, in consideration of damage or potential damage to services or structures, available space for future development and nuisance issues.

The Australian Standard AS 4970-2025, Protection of Trees on Development Sites, provides a framework for establishing minimum distances between the center of tree trunks and development activities for trees intended to be retained. These distances serve as a general benchmark for tree protection during construction. However, the standard permits these recommended clearances to be adjusted—either increased or decreased—depending on specific site conditions and tree-related factors that may mitigate or intensify the effects of development.

Adjustments to these clearances are informed by a range of considerations, including but not limited to:

- Species tolerance: The ability of individual tree species to withstand disturbances.
- Geological conditions: Features such as soil barriers, floating rocks, or proximity to bedrock.
- Topography: Elements like slopes and drainage patterns that affect tree stability and health.
- Soil characteristics: Properties including depth, drainage capacity, fertility, and structure.
- Microclimate: Local conditions influenced by landforms or exposure to prevailing winds.
- Engineering techniques: Methods to reduce tree impact, such as structural soil or lateral boring.
- Construction practices: Approaches like pier and beam foundations, bridge footings, or suspended slabs that minimize harm to trees.
- Arboricultural measures: Techniques such as exploratory trenching to map root systems.
- Physical constraints: Pre-existing environmental modifications and their impacts on trees, including property boundaries, road reserves, past excavations, soil level changes from cutting or filling, nearby landscaping, or altered drainage systems.
- In line with AS 4970-2009, these factors ensure that tree protection measures are customized to the unique circumstances of each development site, balancing construction needs with the preservation of significant trees.

Protection Zones

Tree Protection Zone (TPZ): It refers specifically to the practical, on-site protected area during construction (e.g., the fenced/ground-protected zone shown on Tree Protection Plans). Derived from the NRZ after accounting for site-specific factors (e.g., existing structures, soil conditions), encroachment assessments and Results of root investigations. TPZ focuses on above-ground protections (fencing, ground covering, no-go zones) to safeguard the tree holistically.

The Tree Protection Zone (TPZ) is fundamental for safeguarding trees on development sites. It encompasses both the root and crown spread, creating a protected space free from construction disturbances to preserve the tree's health and viability

Notional Root Zone (NRZ): It is a conceptual area used in arboriculture to estimate the likely extent and distribution of a tree's root system for planning and protection purposes. It represents the zone within which the majority of a tree's structural and feeder roots are expected to occur, based on the tree's size and species characteristics. The NRZ is typically calculated using a standardised formula derived from the tree's trunk diameter (measured at 1.4 m above ground level), as outlined in AS 4970 – Protection of Trees on Development Sites. It is expressed as a radius extending from the centre of the trunk. Importantly, the NRZ is a theoretical construct, not an exact reflection of actual root distribution and used to guide tree protection measures and impact assessment during development. May be adjusted based on site conditions, such as soil type, existing disturbances, or physical constraints.

Structural Root Zone (SRZ): The Structural Root Zone (SRZ) is the area for tree stability. A larger area is required to maintain a viable tree. The SRZ only needs to be calculated when a major encroachment into a TPZ is proposed. Root investigation may provide more information on the extent of these roots.

The radius of the SRZ is calculated for each tree by formula $(D \times 50) 0.42 \times 0.64$.

An SRZ should not be less than 1.5 metres.

The Australian Standard AS 4970-2009, Protection of Trees on Development Sites, provides guidance for managing such encroachments without requiring extensive tree management or protection measures. Encroachments are classified as follows:

- **Minor encroachment:** If the proposed encroachment is less than 10% of the NRZ and remains outside the Structural Root Zone (SRZ), detailed root investigations are generally not required. However, the area affected by this encroachment must be offset by an equivalent area contiguous with the NRZ.
- **Moderate encroachment:** A moderate encroachment is defined as one that affects more than 10% but less than or equal to 20% of the NRZ area and is located outside the SRZ. In such cases, an arborist must be engaged to assess the likely impacts and undertake any necessary investigations to determine the tree's ability to remain viable. These investigations may involve suitable design modifications or construction controls as part of a Tree Protection Plan (TPP) and Tree Protection Specification (TPS). As with minor encroachments, the area of soil and volume lost to the encroachment should be compensated by incorporating an equivalent area into the TPZ, unless the project arborist demonstrates otherwise.
- **Major encroachment:** If the proposed encroachment exceeds 20% of the NRZ, it is essential to demonstrate that the tree(s) can continue to thrive. The area lost to this encroachment should be compensated for elsewhere, ensuring continuity with the NRZ. Non-destructive root investigations may be necessary for any planned works within this area.

(iii) Site Location



The detail of the subject site is in the following table:

Adress of proposed development site	134 Lawrence Hargrave Dr Austinmer NSW2515	
Land Zoning	R2: Low Density Residential	
	Yes	No
High Biodiversity Values Area	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Heritage Conservation Area	<input type="checkbox"/>	<input checked="" type="checkbox"/>
10/50 Entitlement	<input type="checkbox"/>	<input checked="" type="checkbox"/>

1. TREE SCHEDULE

Tree No	Botanical Name (Common Name)	DBH (mm)	DRF (mm) Diameter above root flare	Height (m)	Canopy (m)	TPZ (m)	SRZ (m)	Health G=Good F=Fair P=Poor D=Dead	Structure G=Good F=Fair P=Poor D=Dead	SULE (Refer to appendix 2)	Retention Value H=High M=Medium L=Low	Development impact	Recommendation	Comments
1	<i>Cupaniopsis anacardioides</i> (Carrotwood)	100	110	3.5	2	2.00	1.50	F	F	4E	Low	100%	Remove	Shrubs
2	<i>Cupaniopsis anacardioides</i> (Carrotwood)	70	100	3.5	2	2.00	1.50	F	F	4E	Low	100%	Remove	Shrubs
3	<i>Cupaniopsis anacardioides</i> (Carrotwood)	150	160	4	2	2.00	1.53	F	F	4E	Low	100%	Remove	Small tree

2. PHOTO RECORDS



Photo 1: Tree 1



Photo 2: Tree 2



Photo 3: Tree 3



Photo 4: Overview

3. IMPACT ASSESSMENT AND RECOMMENDATIONS

Trees with major encroachment or within the footprint

Trees 1-3 are recommended to be removed as they are likely to be impacted upon in a manner that could be detrimental to both stability and health & vigour and as such would be removed to facilitate the development as proposed. They are completely covered by the proposed excavation on the NRZ.

The proposed excavation of a manhole for Sydney Water will be located next to the retaining wall and directly conflict with the existing trees, so removal is required for the proposed work and there is no alternatives in retaining the trees.

4. REFERENCE

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Prepared by John Chan



Consulting Arborist – AQF level 5

Diploma in Horticulture and Landscape Management (Arboriculture)

ISA Certified Arborist

ACKNOWLEDGEMENTS

Disclaimer

This report reflects a visual inspection of the tree conducted from ground level. While we aim to accurately evaluate the tree's health and potential risks, there are limits to what can be identified without additional testing. The consultant is not liable for the tree or any resulting damage. We source information from trusted references, but its accuracy cannot be fully assured. The consultant bears no responsibility for work performed outside the outlined specifications, against Australian Standards, or by unqualified individuals.

If further assessments—such as aerial, drill, or root evaluations—are advised, this report remains preliminary until those are completed, as additional issues may emerge. Tree evaluations rely on visible signs, and not all defects, especially hidden ones, can be detected. Trees naturally carry unpredictable risks, and the consultant cannot foresee every failure or its consequences

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TECHNICAL TERMS

AIA	<i>Arboricultural Impact Assessment</i>
AQF	<i>Australian Qualifications Framework</i>
AS	<i>Australian Standards</i>
DGF	<i>Diameter Above Root Flare</i>
DBH	<i>Diameter at Breast Height</i>
NDE	<i>Non-Destructive Excavation</i>
SRZ	<i>Structural Root Zone</i>
TPP	<i>Tree Protection Plan</i>
TPZ	<i>Tree Protection Zone</i>
VTA	<i>Visual Tree Assessment</i>

LIMITATIONS OF THE ASSESSMENT

- *The tree condition below ground could not be visually inspected during this assessment.*
- *Aerial inspection was not carried out for this assessment.*
- *Trees are biological things and are constantly growing and changing. No tree can be guaranteed 100% safe.*
- *Weather and environmental conditions constantly change. This assessment report is limited to the time the assessment was carried out.*
- *Historic data of previous tree pruning or root pruning is unknown at the time of the assessment.*

5. APPENDIX I – DEFINITION AND TERMINOLOGY

Primary Terms

Tree Protection Zone (TPZ)

A designated area around a tree, encompassing both above- and below-ground elements, intended to safeguard the tree's roots and crown from damage during construction or development activities. The TPZ is calculated using the tree's Diameter at Breast Height (DBH) and restricts access to protect the tree's long-term health and stability.

Structural Root Zone (SRZ)

The critical area surrounding the base of a tree that contains structural roots necessary for stability and anchorage. Typically a subset of the TPZ, the SRZ requires stringent protection, as damage to roots within this zone can compromise the tree's structural integrity.

Diameter at Breast Height (DBH)

A standard measurement of a tree's trunk diameter, taken at 1.4 meters above ground level. DBH serves as the basis for calculating the TPZ and SRZ and is a key metric in assessing tree size and growth.

Related Terms

Root Plate

The soil area encompassing the tree's structural roots, which provide essential support and stability. Closely associated with the SRZ, the root plate is a vital component of the tree's physical foundation.

Drip Line

The outermost perimeter of a tree's canopy, often used as an informal guide to estimate the extent of the root system. While less precise than the TPZ, it aids in visualizing potential root spread.

Canopy Spread

The horizontal reach of a tree's branches, measured from the trunk to the canopy's outer edge. This measurement influences the TPZ size and is evaluated during tree assessments.

Arborist

A qualified professional specializing in the care, management, and assessment of trees. Arborists perform evaluations, recommend protection measures, and ensure adherence to standards like AS 4970-2009.

Tree Assessment

The systematic evaluation of a tree's health, structure, and stability. This process typically includes measuring DBH, inspecting the canopy and roots, and determining retention suitability.

Tree Protection Measures

Practical steps taken to preserve trees during development, such as erecting fencing around the TPZ, installing root barriers, or using ground protection to mitigate soil compaction.

Standard-Specific Terms

AS 4970-2009

The Australian Standard titled Protection of Trees on Development Sites. It outlines methods for calculating TPZ and SRZ, assessing encroachments, and implementing effective tree protection strategies.

Encroachment

Any intrusion into the TPZ or SRZ by construction activities, structures, or disturbances that may harm the tree. Encroachments are categorized as minor or major based on their severity and impact.

Root Investigation

Techniques employed to examine the location and condition of a tree's root system, often required when assessing the effects of significant encroachments on tree viability.

Non-Destructive Root Investigation

Methods like air excavation or ground-penetrating radar used to study root systems without causing damage. These are preferred for evaluating roots within the TPZ or SRZ.

Tree Retention Value

An assessment of a tree's worth, considering factors such as health, structure, ecological contribution, and cultural significance. This guides decisions on whether to retain or remove a tree.

Additional Terms

Root Barrier

A physical or chemical structure installed to prevent tree roots from encroaching into undesirable areas (e.g., pavements or foundations) while maintaining the tree's health.

Soil Compaction

The compression of soil, reducing pore space and impeding root growth and water infiltration. Preventing compaction within the TPZ is essential for tree preservation.

Crown

The upper portion of a tree, including its branches and foliage. The crown's condition and extent are key indicators of overall tree health.

Trunk Flare

The broadened base of a tree where the trunk meets the root system. Protected within the SRZ, this area is crucial for structural stability.

Epicormic Growth

New shoots emerging from dormant buds on a tree's trunk or branches, often in response to stress or injury. This growth can indicate underlying health challenges.

6. APPENDIX 2 – SAFE USEFUL LIFE EXPECTANCY (SULE)

	1 LONG SULE	2 MEDIUM SULE	3 SHORT SULE	4 REMOVALS	5 MOVED OR REPLACED
	Long: appeared to be retainable at the time of assessment for over 40 years with an acceptable degree of risk, assuming reasonable maintenance.	Medium: appeared to be retainable at the time of assessment for 15 to 40 years with an acceptable degree of risk, assuming reasonable maintenance.	Short: appeared to be retainable at the time of assessment for 5 to 15 years with an acceptable degree of risk, assuming reasonable maintenance.	Removal: trees which should be removed within the next 5 years.	Moved or Replaced: Trees which can be readily moved or replaced.
A	Structurally sound trees located in positions that can accommodate future growth.	Trees that may only live between 15 and 40 more years.	Trees that may only live between 5 and 15 more years.	Dead, dying, suppressed or declining trees through disease or inhospitable conditions.	Small trees less than 5 metres (m) in height.
B	Trees that could be made suitable for long-term retention by remedial tree care.	Trees that may live for more than 40 years but would be removed for safety or nuisance reasons.	Trees that may live for more than 15 years but would be removed for safety or nuisance reasons.	Dangerous trees through damage, structural defect, instability or recent toss of adjacent trees.	Young trees less than 15 years old but over 5m in height.
C	Trees of special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to secure their long term retention.	Trees that may live for more than 40 years but should be removed to prevent interference with more suitable individuals or to provide space for new planting.	Trees that may live for more than 15 years but should be removed to prevent interference with more suitable individuals or to provide space for new planting.	Dangerous trees through structural defects including cavities, decay, included bark, wounds or poor form.	Trees that have been regularly pruned to artificially control growth'.
D		Trees that could be made suitable for retention in the medium term by remedial tree care.	Trees that require substantial remedial tree care and are only suitable for retention in the short term.	Damaged trees that are' clearly not safe to retain.	
E				Trees that may live for more than 5 years but should be removed to prevent interference with more suitable individuals or to provide space for new planting.	

7. APPENDIX 3 – LANDSCAPE SIGNIFICANCE RATING

Landscape Significance Rating: The Landscape Significance has been determined by an assessment of the cultural, environmental and aesthetic value of individual trees. This location, amenity, visual prominence, habitat value and species type are also considered when determining the landscape significance of individual trees.

<p>1. Very High</p>	<ul style="list-style-type: none"> -The tree is listed as a Heritage Item within the LEP with a local, state or national significance; -The tree forms part of the curtilage of a Heritage Item and has a known or documented association with the item; -The tree is a Commemorative Planting having been planted by an important historical person(s), or to commemorate an important historical event; -The tree is scheduled as a Threatened Species or is a key indicator species of an Endangered Ecological Community as defined under the Threatened Species Conservation Act 1995 (NSW) of the Environmental Protection and Biodiversity Conservation Act (1999); -The tree is a locally indigenous species, representative of the original vegetation of the area and is known as an important food, shelter, or nesting tree for an endangered or threatened fauna species; or -The tree is a remnant tree, being a tree in existence prior to development of the area; or -The tree has a very large live crown size exceeding 300sqm with 70 to 100 percent foliage cover, is visible against the skyline, exhibits very good form and habitat typical of the species and makes a significant contribution to the amenity and visual character of the area by creating a sense of place or creating a sense of identity; or -The tree is visually prominent in a view from surrounding areas, being a landmark or visible from a considerable distance. -The tree has a strong historical association with a heritage item within or adjacent to the property and/or exemplifies a particular era or style of landscape design associated with the original development of the site; or -The tree is a locally-indigenous species and representative of the original vegetation of the area and the tree is located within a defined Wildlife Corridor or has known wildlife habitat value; -The tree has a very large live crown size exceeding 200sqm, a crown density exceeding 70 percent crown cover, is very good representative of the species in terms of its form and branching habitat or is aesthetically distinctive and makes a positive contribution to the visual character and the amenity of the area.
<p>2. High</p>	<ul style="list-style-type: none"> -The tree has a suspected historical association with a heritage item or landscape supported by anecdotal or visual evidence;

	<ul style="list-style-type: none"> -The tree is a local indigenous species and representative of the original vegetation of the area; or -The tree has a large crown size exceeding 100sqm and is a good representative of the species in terms of its form and branching habitat with minor deviations from the normal (e.g. crown distortion/suppression) with a crown density of at least 70 percent Crown Cover, and -The subject tree is visible form the street and surrounding properties and makes a positive contribution to the visual character and the amenity of the area.
3. Moderate	<ul style="list-style-type: none"> -The tree has a medium live crown size exceeding 40sqm, and -The tree is a fair representative of the species, exhibiting moderate deviations from typical form (e.g. distortion/suppression) with a crown density or more than 50percent crown cover, and -The tree makes a fair contribution to the visual character and amenity of the area, and -The tree is visible from surrounding properties, but is not visually prominent – view may be partially obscured by other vegetation or built forms; or -The tree has known or suspected historical association.
4. Low	<ul style="list-style-type: none"> -The tree has a small live crown size of less that 40sqm and can be replaced within the short term with a new tree planting; or -The tree is a poor representative of the species, showing significant deviations from the typical form and branching habit with a crown density of less than 50 percent crown cover; and -The tree is not visible from the surrounding properties and makes a negligible contribution or has a negative impact on the amenity and visual character of the area.
5. Insignificant	<ul style="list-style-type: none"> -The tree is declared a Priority Weed/ Biosecurity Matter under the Biosecurity Act 2015; or -The tree poses a threat to human life or property.

8. APPENDIX 4 – RETENTION VALUE

The Retention Value has been allocated to individual trees by combining the Useful Life Expectancy and Landscape Significance Rating into the Matrix below to give a Retention Value of High, Medium or Low.

		Landscape significance				
		Very High	High	Medium	Low	Insignificant
Useful Life Expectancy	Long	High	Medium	Low		
	Medium	High	Medium			
	Short	Medium				
	Transient	Low				
	Dead/ Hazard					

High Warrants retention and major design consideration (modification of footings, building alignment etc)

Medium Warrants retention and minor design consideration (effort should be made to retain these trees wherever possible).

Low: These trees should not be considered to be a constraint to design layout. These trees should be removed irrespective of any proposed development.

9. APPENDIX 5 – TREE PROTECTION

TREE PROTECTION

All trees, other than those indicated on the drawings to be removed, shall be protected at all times during construction in accordance with the Australian Standard 4970 - 2009 Protection of Trees on Development Sites.

All works shall be undertaken in accordance with the Tree Protection Plan and the following tree protection specifications, unless otherwise directed by the Principal's representative or the appointed Project Arborist.

PROJECT ARBORIST

A Project Arborist, with minimum AQF Level 5 qualifications, shall be appointed prior to the commencement of any construction activities. The Project Arborist will be responsible for specifying, monitoring and certification of all tree protection measures for any activities proposed around existing trees located within the limit of the construction.

The Contractor shall provide site access to the Project Arborist at all times. The Project Arborist may provide advice on the existing trees, however all communications will be formalised between the Contractor and the Principal's representative.

SITE INDUCTION

The Principal's Representative, Project Arborist, Contractor and any other persons required to work within the Tree Protection Zone (TPZ) of any trees shall attend a site induction meeting before any machinery or materials are brought onto the site and before the commencement of any site works including demolition, earthworks or site clearing.

The Tree Protection Measures, including the location of tree protection fencing, site sheds, stockpile areas, temporary access roads, sediment control devices and any drainage works shall be confirmed during the site induction meeting.

The site induction will highlight the requirements to protect the trees within the site, the type of actions that could lead to potential damage and the penalties imposed by Council for breach of the tree protection measures.

TREE PROTECTION FENCING

Prior to the commencement of any construction activities, install a Tree Protection Fence around individual trees or group of trees at the nominated TPZ distances specified on the Tree Protection Plan. Where TPZ merge together a single fence encompassing a group of trees is suitable. The fencing shall define and restrict entry into the TPZ. The fencing shall conform to the following:

- Fencing shall be a minimum of 1.8m steel galvanised chain wire fencing with lockable gates to AS 1725 and clad with shade cloth to prevent wind-blown debris entering the TPZ;
- The fencing shall be set / fixed into concrete blocks. The fencing must not be secured with posts driven into the ground;
- The area within the TPZ fencing shall be kept free of weeds and grass for the duration of project;
- Mulch shall be installed and maintained to a depth of 75mm for the duration of project
- The TPZ fencing shall be erected by the Contractor and approved by the Project Arborist before any machinery or materials are brought onto the site and before the commencement of any works including demolition.

TREE PROTECTION ZONE SPECIFICATION

The following specification must be adhered to before any site activity occurs within established Protection Zones of trees to be retained.

- All works within nominated Tree Protection Zones must comply with Australian Standard 4970 – 2009 Protection of Trees on Development Sites.
- Tree Protection fencing to be established as outlined in Table 1 prior to the commencement of any construction works and must comply with Australian Standard 4970 – 2009 Protection of Trees on Development Sites, Section 4 - Tree Protection Measures.3. Protection areas are to be clearly marked as Tree Protection Zone - NO GO AREA
- The limits of Tree Protection Zones shall be staked and 1800mm high chain link temporary fencing installed (figure 2 & 3).
- Excavation or other any construction activity must not encroach into an established TPZ of a tree without first consulting the project arborist.
- No roots shall be cut within an established TPZ or SRZ of a tree unless confirmed by a suitably qualified arborist.
- No materials, equipment, spoils, waste water or chemicals of any description may be disposed of or stored within the Tree Protection Zones.
- No parking of vehicles, trailers or machinery is allowed within the Tree Protection Zones.
- If temporary haul or access is required within the nominated TPZ of a tree to be retained a geotextile fabric beneath a layer of mulch approximately 150mm thick or crushed rock below rumble boards shall be created to protect the soil (Figure 4).
- Any electrical cables, gas pipes, sewer pipes or other plumbing services to be routed outside the Tree Protection Zones.
- Trees to be removed that have branches extending into trees of tree to remain must be removed by a qualified arborist and not by demolition or construction contractors. A qualified arborist shall remove the tree in a manner that causes no damage to the trees and understory to remain.

- Trees to be removed from within the Tree Protection Zones shall be removed by a qualified arborist.
- Trees removed within the TPZ of trees to be retained shall be cut near ground level and the stump ground out. Stumps must not be extracted by excavation.
- A consulting arborist should be on site where any excavation works are to be carried out within an established Tree Protection Zone.
- If injury to the tree should occur during construction it should be evaluated as soon as possible so that appropriate treatments can be applied.
- Any roots damaged during construction shall be exposed to sound tissue and cut cleanly with a saw.
- Erosion control devices such as silt fencing shall be installed to prevent siltation and or erosion within the Tree Protection Zones.
- Surface drainage is not to be altered so as to direct water into or out of the Tree Protection Zones.
- Any herbicides placed under paving material must be safe for use around trees and labeled for that use. Any pesticides used on site must be tree safe and not easily transported by water.
- Any pruning work is to be carried out by a qualified arborist working to Australian Standard 4373 –2007 and in accordance with the Code of Practice Amenity Tree Industry August 1998.
- Protection measures are to remain in place until all site work has been completed. Fencing may not be relocated or removed without written permission from the project manager or consulting arborist.

TREE TRUNK PROTECTION

Trunk protection will be required where works have been approved within the TPZ. As a minimum, the trunk protection shall consist of wrapping of trunks with hessian and two-metre lengths of hardwood timber planks (100 x 50mm) spaced at 100-150mm intervals strapped around the trunk and secured with 2mm galvanised wire. The hessian and timber planks must not be fixed to the tree in any fashion or in any instance.

GROUND PROTECTION

Ground protection must be installed within the TPZ in the event that temporary access for machinery is required and has been approved by the Project Arborist. The ground protection is required to prevent root damage and soil compaction from occurring within the TPZ. The ground protection shall include a permeable membrane such as geotextile fabric beneath a 100mm layer of mulch below rumble boards of a suitable thickness to prevent soil compaction and root damage from occurring during the movement of any machinery within the TPZ.

TPZ SIGNAGE

A sign (600mm x 400mm) identifying the name and contact details of the Project Arborist shall be attached to the protective fencing of each TPZ. Below is a sample signage for use:

PROHIBITED ACTIVITIES

The following activities are prohibited within the TPZ;

- Excavation, trenching (unless approved by and under the direct supervision of the Project Arborist)
- Ripping and cultivation
- Mechanical removal of vegetation
- Soil disturbance or movement of natural rock
- Soil changes including placement of fill (unless approved by and under the supervision of the Project Arborist)
- Movement and storage of plant, equipment and vehicles including machinery washing, repairs and refuelling
- Erection of site offices or sheds including portable toilets
- Affixing of signage or hoardings to trees
- Stockpiling, storage and mixing of materials including storage of waste materials, disposal of waste materials and chemicals including paint, solvents, cement slurry, fuel, oil and any other toxic liquids
- Physical damage to canopies, trunk or root systems
- Any activity likely to cause damage to any tree

EXCAVATIONS WITHIN TPZ

Any excavations undertaken within the TPZ which have been approved by the Project Arborist shall be undertaken using non-destructive methods (such as by hand or with an Airspade) to ensure no tree roots greater than 50mm diameter are damaged, pruned or removed. In the event that any roots greater than 50mm diameter are located during excavation, further advice shall be obtained by the Project Arborist before further works continue where the root has been identified. Root pruning must not be undertaken without prior approval from the Project Arborist.

CANOPY AND/OR ROOT PRUNING

Care shall be taken when operating heavy machinery near trees to avoid damage to tree canopies (foliage and branches). The Project Arborist shall be contacted if there is potential conflict between tree canopies and construction activities (including machinery). Any canopy or root pruning required shall be undertaken in accordance with AS 4373-2007 Pruning of Amenity Trees, under the direct supervision of the Project Arborist. Where root pruning is required, roots shall be severed at the face of the excavation by hand using clean, sharp pruning implements. All excavations within the TPZ of any tree/s shall be undertaken under the supervision of the Project Arborist.

TREE ROOT PROTECTION

Temporary root protection, including hessian or similar biodegradable material, shall be installed under the supervision of the Project Arborist to prevent roots from drying out, where roots are exposed during demolition or construction works.

SERVICES

Where trenching works are required for any services / hydraulics / drainage etc. this shall not be undertaken within any TPZ. The Project Arborist shall be contacted if any works are required within the TPZ.

Alternative installation methods for services, such as directional boring/drilling, or redirection of services shall be employed where large woody roots greater than 50mm diameter are encountered during the installation of any services adjacent to the specified TPZ.

TREE DAMAGE

In the event that any tree is damaged during construction, the Project Arborist shall be notified as soon as possible to inspect and provide advice for remedial action that may minimise any adverse impact.

Figure 1: Tree Protection Zone and Structural Root Zone

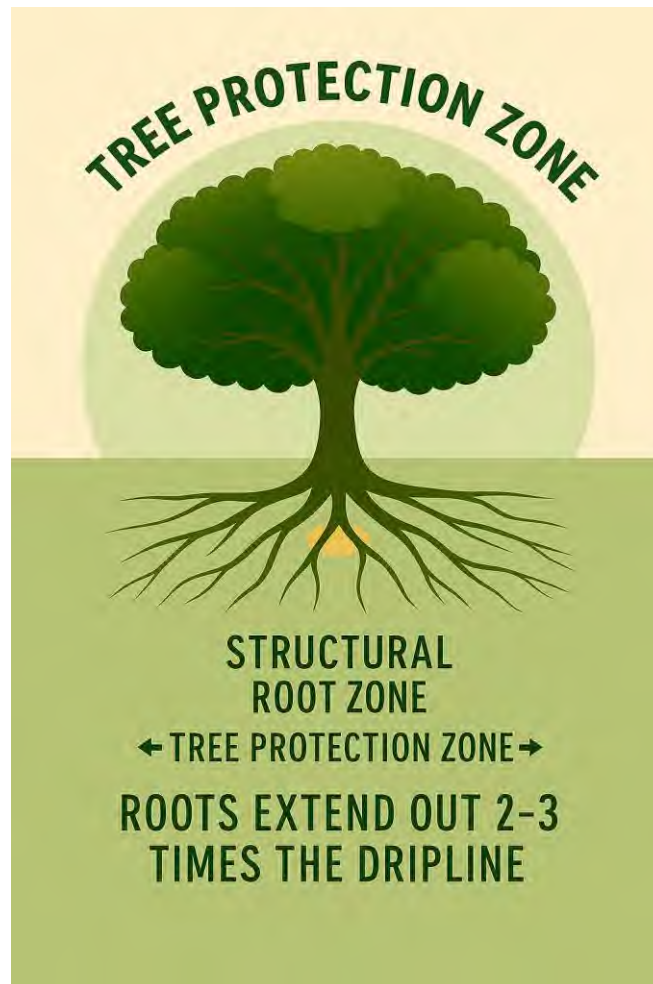


Figure 2: Tree protection zone signage



Figure 3: Tree protection zone encroachment

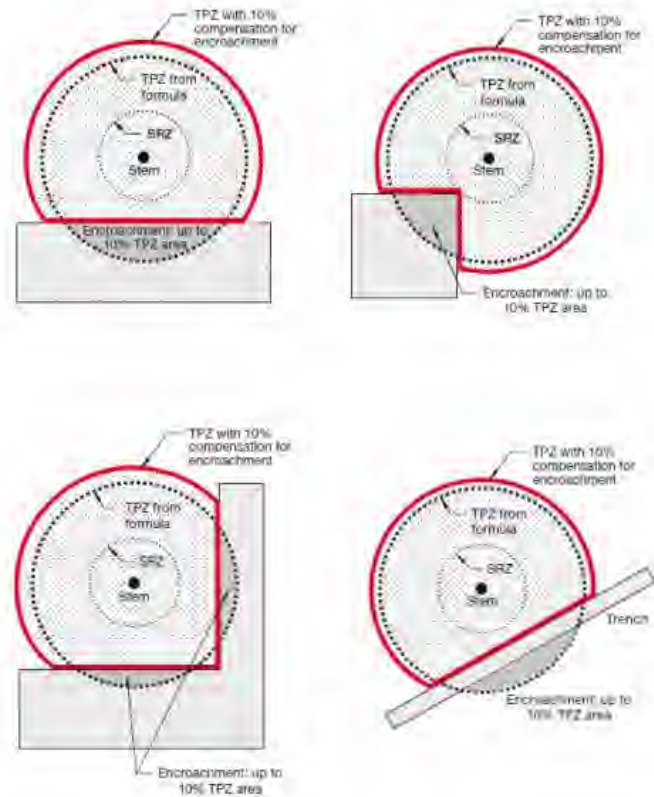


Figure 4: Tree protection fencing

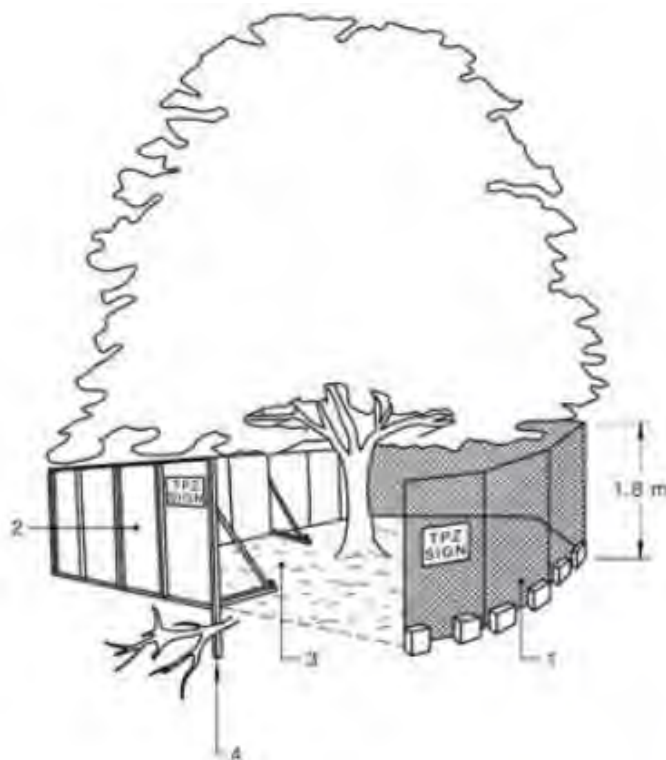


Figure 5: Trunk, branch and ground protection



