



Arboricultural Impact Assessment Report

Kingscliff Mixed Use Development – 4-8 Bells Boulevard, Kingscliff

Prepared for: Bells Boulevard Pty Ltd

State Significant Development Application no. SSD-83069459

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1. Introduction

1.1. Background

Arbor Ecological Pty Ltd was engaged by Bells Boulevard Pty Ltd to undertake an Arboricultural Impact Assessment and prepare an associated report for proposed mixed use development at 4-8 Bells Boulevard Kingscliff, NSW in the Tweed Shire Local Government Area, hereafter referred to as the site. This report is prepared in response to the RTS request dated 9 March 2026 and the Department RFI dated 20 March 2026. See below for specifically how comments have been addressed.

Tree impacts from the proposed development centre on potential tree health, condition and ongoing vitality impacts associated with demolition and construction works, refer to Table 1 and Figure 7.1.

Tweed Shire Council's feedback regarding Development Application SSD-83069459, dated 17 February 2026

Tweed Shire Council's feedback regarding Development Application SSD-83069459	Further information include in this report
8. Vegetation removal A total of 32 trees are located on the site and adjacent public land. The proposal involves removal of 24 trees, with only eight retained, equating to 75% removal, 25% retention, and a 3:1 removal-to-retention ratio. Most trees are tuckeroos, identified as planted rather than remnant native vegetation. There are two trees listed in Table 1 of the Arboricultural Impact Assessment Report that show minimal or no development impact yet are still recommended for removal: • Tree 7 (Norfolk Island pine): Classified as minor encroachment (9.8%) but listed for removal. • Tree 11 (tuckeroo): Classified as no impact yet listed for removal. Council recommends that clarification be sought from the proponent to reconcile these inconsistencies and demonstrate why these trees require removal where there is no expected impact. The ten trees (Tree No. 1-10) are proposed to be removed in the Bells Boulevard road reserve. The nominated street trees currently offer ecological value and contribute to the amenity of the streetscape. There is a lack of photographic evidence, detailed health assessments, and age estimates that justifies the removal of these trees. Council does not support or authorise removal of the road reserve trees and no works are to encroach into the land to the West of the site which is managed by Council. Given its role in the EIS, the Arboricultural Impact Assessment Report is insufficient. An appendix with photos of each tree & age approximations on each matched to ID numbers, is recommended.	Figure 7.1. Shows the encroachment areas which have been used in the assessment guided by and compliant with AS4970. Encroachment percentages found in Table 1 relevant to each tree along with assessment of health and condition, age and photos for each individual tree. Encroachment percentages have changed within this report in relation to minor design developments and as a 1.5-metre buffer has been applied, to all aboveground buildings and excavation areas for belowground construction, to realistically assess probable direct impacts to the trees root systems and canopy involved in construction of the proposal. The Buffer accommodates above ground scaffolding or EWP access and track requirements and buffers for basement layer excavation disturbances. This offset also incorporates the proposed awnings, as illustrated by the red dotted line (7.1 Tree Retention, Removal and Protection Plan). No works are proposed to encroach into the land to the West of the site which is managed by Council.

1.2. Aim

This assessment report aims to gather, analyse and present information on the impact of the proposed development to inform recommendations for tree removal, tree retention, tree pruning, and protection of trees to be retained for ongoing tree vitality.

1.3. Objectives

- To identify trees within the site and adjacent properties with potential to be substantially impacted by the proposal, hereafter referred to as the subject trees.
- To undertake Visual Tree Assessments (VTAs)¹ of subject trees including identification, size dimensions, age class, health and condition.
- To assess the impacts of the proposed development on the subject trees based on Tree Assessment findings and a provided design plan drawing (refer to Figure 1.1) showing the location of the subject trees in relation to the development footprint, and tree TPZs and SRZs.
- To prepare a tree retention, tree removal and tree protection plan drawing and arborist report in accordance with the Australian Standard AS4970 2025 Protection of Trees on Development Sites² as a primary reference and guide for tree protection.
- To provide recommendations in regard to tree removal, tree retention, tree pruning, tree protection and other vegetation management measures.

1.4. Site Description

The subject trees consist mostly of planted trees, largely Tuckeroo (*Cupaniopsis anacardioides*) with four planted Norfolk Island Pines in the road reserve and littoral rainforest species in a council reserve landscape planting adjacent the western boundary, refer to Table 1 (Section 6) and Tree retention, removal and protection plan (Section 7).

The site is mostly level to near level. Sandy soils provide good plant growing conditions for naturally occurring coastal species in the prevailing high rainfall and subtropical climate conditions. Prevailing winds are from the south to northeast and the strongest wind and storm directions vary (BoM 2025)³.

The site is located at 4-8 Bells Boulevard, Kingscliff and is located in the Tweed Shire Local Government Area. An aerial view of the site (outlined in red) is located below:

¹ **Visual Tree Assessment (VTA)** is a standard method for tree inspection from ground level of overall vitality, health, stability and defect symptoms. Inspection may be undertaken with the aid of binoculars, probes and sounding mallet, and includes inspection of the soil conditions around the tree; root flare and roots (where readily accessible); bark, trunk; scaffold limbs; branches; leaves; and tree form. More detailed tree part inspection may be recommended as a result of VTA (Mattheck, C & Breloer, H 1994, The body language of trees, a handbook for failure analysis, TSO Her Majesty's Stationary Office, London, England).

² Standards Australia 2025, AS4970-2025 Protection of trees on development sites, Standards Australia, Sydney.

³ **Australia Government Bureau of Meteorology (BoM)**, 2025, Climate statistics for Australian locations, accessed 21/11/25 www.bom.gov.au/climate

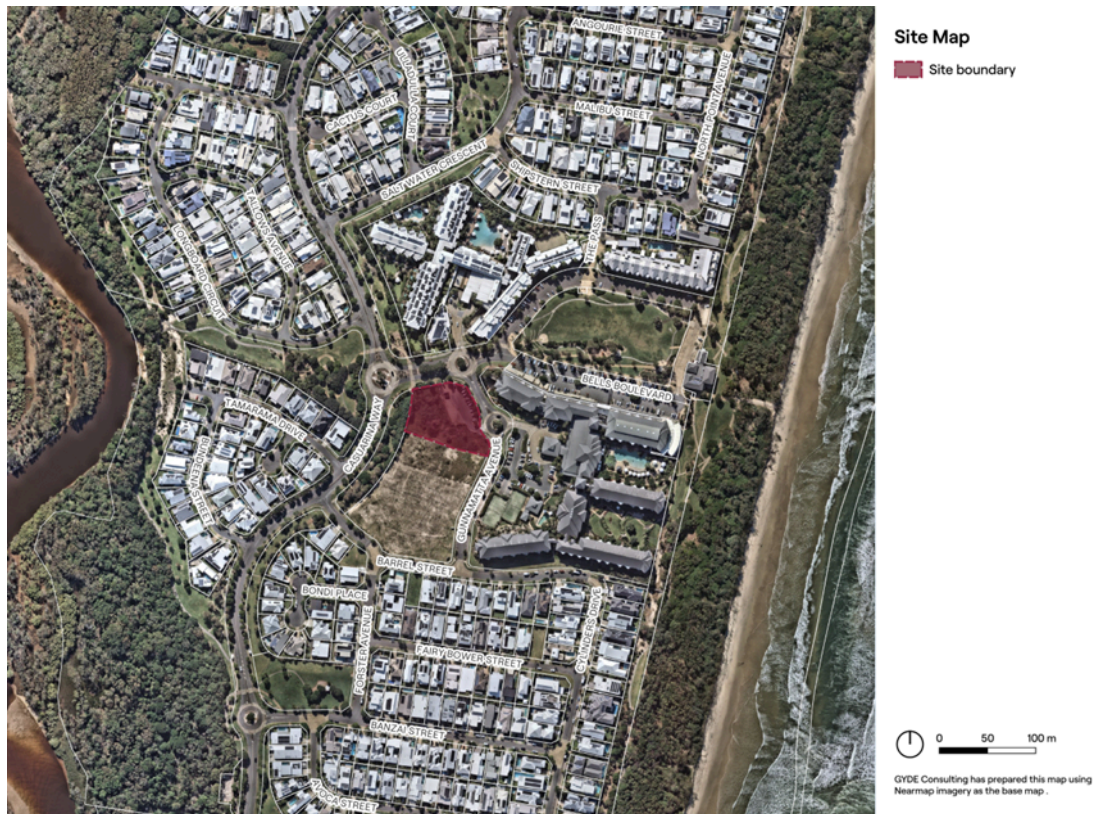


Figure 1: Aerial view of the site, outlined in red (Source: Gyde)

The site has an approximate area of 4,450sqm and is currently vacant of any structures. An informal bitumen sealed carpark containing 27 spaces is located in the north east part of the site, which is enforced by way of a restriction on the existing title of the land.

The site is relatively level around the street frontages, with levels ranging between RL 9.85m at Gunnamatta Avenue to RL 10.39m at the corner of Bells Boulevard and Casuarina Way. The rear of the site has been excavated to the lowest point of RL 7.15m.

The site is located on the gateway to a part of Kingscliff known as 'the Salt Precinct'. This part of the Salt Precinct is centred around the Salt Central Park, which is bordered by two major tourism developments, those being the Peppers and Mantra resorts. Salt Central Park is activated by a retail precinct with shops, cafes and restaurants known as Salt Village.



Figure 2: Site context plan (Source SJB)

1. 5. Project description

The proposed development seeks development consent for a new mixed use building on the site. The proposal will include the following works:

- The proposed development seeks development consent for a new mixed use building on the site. The proposal will include the following works:
- Construction of a five storey mixed use development with ground level retail fronting Bells Boulevard and Gunnamatta Avenue and ground level residential units, with residential units contained on levels 1-4 (inclusive), and rooftop communal open space.
- A total of 71 residential units of which 2 will be affordable housing units. These affordable housing units are to be retained as such for 15 years and managed by a registered Community Housing Provider,
- Excavation for two basement levels of carparking with 193 carparking spaces and associated services,
- Removal of 23 trees on site, and
- Landscaping and a communal open space network with a focus on wellness including a rooftop pool, indoor communal space and ground level outdoor communal open space designed around a central lawn.

2. Assessment Methods

Prior to site assessment, the proposal was discussed with the client and reviews were made of information provided.

Visual Tree Assessments (VTAs) were undertaken in October 2025 by AQF level 5 arborist Annika Hallinan. The subject trees were identified to species level with reference to a previous

Treescience tree survey and inventory⁴ of the site, and additional trees surveyed in areas adjacent to the site.

Measurements were made of tree dimensions, i.e. tree height, crown spread, Diameter at Breast Height (DBH)⁵ and Diameter immediately Above the Root Buttress (DARB)⁶ for calculation of Tree Protection Zones (TPZs)⁷ and Structural Root Zones (SRZs)⁸.

⁴ **Treescience, 2021**, Tree survey and tree inventory, Clifford Street Suffolk Park. September 2021, V1.

⁵ **Diameter at Breast Height (DBH)** refers to the diameter of the trunk at breast height (1.4m above the ground) measured with diameter tape (Matheny, NP & Clark, JR 1994, A Photographic Guide to the Evaluation of Hazard Trees in Urban Areas, 2nd edn., International Society of Arboriculture, Illinois, USA).

⁶ **Diameter Above the Root Buttress (DARB)** is used to calculate the Structural Root Zone (SRZ) of a tree, rounded to the nearest centimetre.

⁷ **Tree Protection Zone (TPZ)** is a restricted area on development sites, usually delineated by protective fencing and signs, for the protection of tree roots and crown. It is installed prior to site establishment and retained intact until completion of the works. It is shown as a radius of the area and calculated using the formula $TPZ = DBH \times 12$ (Standards Australia 2009).

⁸ **Structural Root Zone (SRZ)** is the radius of the area required for tree stability. It only needs to be calculated (using the formula $SRZ \text{ radius} = (D \times 50)^{0.42} \times 0.64$) when major encroachment into a TPZ is proposed. A larger area than the SRZ is required to maintain tree viability (Standards Australia 2009).

Visual Tree Assessments (VTAs) focused on tree health⁹, condition¹⁰, structural defects¹¹, load¹² factors and age class¹³. Trees displaying low vigour¹⁴, weakly formed codominant stems¹⁵, over-extended branches and other structural defects were noted where they were detected.

Tree pruning requirements were estimated for clearance between tree crowns and proposed buildings, particularly for first floor buildings and taking into account trees leans and unbalanced/asymmetric tree crowns. A maximum 20% crown reduction pruning was assumed to maintain tree vitality for mature trees with fair to good health and condition.

Binoculars were used to view upper parts of trees; a fibreglass sounding hammer to assess tree hollowness; and a pointed metal probe to lift bark, examine the extent of any suspected points of decay, and to assess soil conditions. Diameter tape was used to measure DBH and DARB. Tree height was visually estimated and crown spread was visually estimated and averaged.

⁹ Tree Health – Categorised as:

Good: A tree with good health exhibits one or more of the following: Crown full and dense; foliage of good colour and with minimal or no insect or disease damage; typical growth indicators slightly abnormal for species, e.g. extension growth, leaf size and crown foliage density; no or minimal crown die-back; good woundwood and/or response growth development. Associated with high tree vigour.

Fair: A tree with fair health exhibits one or more of the following: Has less than 12% dead wood; has minor crown dieback; foliage mostly with good colour and/or minor to moderate insect or disease damage, minor pathogen damage present; typical growth indicators slightly abnormal for species, e.g. extension growth, leaf size and crown foliage density.

Poor – Very Poor: A tree with poor health exhibits one or more of the following: Has greater than 12% dead wood; significant crown dieback present; foliage discoloured or distorted leaves; excessive epicormic growth; poor woundwood and/or response growth development; substantial wood decay affecting health; signs of strain leading to tree decline. Associated with low tree vigour.

Dead: A tree that is still standing but no longer shows signs of being alive.

¹⁰ **Condition** refers to a tree's structural form or habit and is expressed as:

Good: A tree with good structural form or habit and free from or with only negligible/minor structural defects, e.g. upright or with a slight lean; apparently stable; well tapered stems; full and balanced/symmetrical crown; free from or with only slight signs of pests and structural wood decay; nil or slight crown/branch dieback.

Fair: A tree with moderately good structural form or habit typical of the species and/or minor to moderate structural defects, e.g. slight to moderate lean, over-extended branches or signs of pests and structural wood decay; slight crown/branch dieback or stem cracks; semi-full crown; slightly unbalanced/asymmetrical crown; codominant stems.

Poor: A tree with moderately poor structural form or habit atypical of the species and/or substantial structural defects, e.g. moderate to high lean (uncorrected), crown/branch dieback, stem cracks, wounds, cavities, signs of pests and structural wood decay, epicormic shoot development, over-extended branches or unbalanced/asymmetrical crown; poorly tapered stems; weakly formed codominant stems; deformed stems; roots that are shallow, exposed, twisted or broken.

Very Poor: A tree with substantially poor structural form or habit atypical of the species and/or substantial structural defects and signs of failure of the tree or tree parts, refer to poor condition examples above.

Dead: A tree that is still standing but no longer shows signs of being alive.

¹¹ **Structural defects** are physiological weaknesses, faults or features that detract from tree condition or the uniform distribution of mechanical stress. They may be either naturally occurring e.g. from storm damage, pests, pathogens, wind and gravity forces; or from human activities, e.g. poor planting or pruning practices. Structural defects can include leans; unbalanced/ asymmetric or poorly formed crowns; wounds; cavities; weakly formed codominant stems; included bark; poor structural branch attachments; over-extended branches; poorly tapered stems; crown or branch dieback; stem cracks; roots that are shallow, exposed, twisted or broken; excessive epicormic shoot development and the effects of pests, diseases and poor pruning practices.

¹² **Loads** include dynamic load from wind and static load from gravity acting on a tree. These two loads can interact and are affected by factors including wind exposure, crown size relative to trunk diameter; crown density, abundance of interior branches, vines or mistletoe; and recent of planned changes affecting load (Dunster, JA, Smiley, ET, Matheny, N & Lilly, S, 2013, Tree Risk Assessment Manual, International Society of Arboriculture, Illinois, USA).

¹³ **Age class** categories: (J) Juvenile refers to a young or juvenile, established tree; (SM) Semi-mature refers to a tree between immaturity and full size; (M) Mature refers to a full size tree with capacity for some further growth; (OM) Over-mature refers to a tree in decline; (D) Dead refers to a tree that is still standing but no longer shows signs of being alive.

¹⁴ **Vigour** refers to a tree's capacity to resist strain and continue to grow; overall health, condition and resilience on a qualitative scale from high to low (Wilson P, 2021, A-Z of tree terms: A companion to British arboriculture, 3rd Ed.).

¹⁵ **Codominant stems** are stems that originate at about the same position on a stem and are approximately the same diameter. The structure is defective in various circumstances because the only way trunk xylem can grow around a branch, and form a strong attachment, is for the trunk to be larger in diameter than the branch attachment. Co-dominant stems typically lack overlapping tissue present in a collar and often have narrow angles between stems and included bark between stems which can lead to failure at the point of attachment. Additionally, the weight and leverage of the co-dominant stems increases with age, intensifying the stress on the attachment (Harris RW, Clark JR & Matheny NP, 1999 Arboriculture: Integrated Management of Landscape Trees, Shrubs, and Vines, Prentice Hall, NJ USA).

Where practicable, hand spade exploratory and non-destructive root investigations were undertaken at measured points of encroachment for Major¹⁶ encroachments to assess tree roots likely to be lost to construction.

A plan drawing was provided with all trees surveyed (trees 19-22 have been indicatively located as they were not included in the survey). A 1.5-metre buffer has been applied to all aboveground buildings and excavation areas for belowground construction to NRZ encroachment calculations. The Buffer accommodates above ground scaffolding, EWP access and track requirements and buffer for basement layer excavation disturbances. This offset also extends to proposed awnings, as illustrated by the red dotted line (7.1 Tree Retention, Removal and Protection Plan).

Recommendations were made based on assessment findings in relation to tree removal, tree retention, tree pruning, tree protection and other tree management measures.

3. Impact Assessment Findings

Table 1 provides a tree schedule and findings in relation to Visual Tree Assessments and encroachment details, along with recommendations, observations, comments and plates.

Figure 1 and Table 1 illustrates subject trees recommended to be retained and removed; NPZs and SRZs; encroachment details; and indicative project TPZ fence locations for trees recommended to be retained.

Key assessment findings are as follows:

- A total of 32 trees were assessed on the site and adjacent to the site.
- 23 trees are recommended to be removed for construction due to Major NRZ encroachments from the proposed development

The removal of twenty-three trees is recommended based on the proposal directly impacting >20% of the area of each tree's Notional Root Zone (NRZ) of all 23 trees. The assessment concludes that long-term retention viability in relation to the proposed development is not achievable for these 23 trees subject to the current design.

Norfolk Island Pines *Araucaria heterophylla* (T1, T4, T7, T10)

Retaining these trees is not considered structurally or biologically viable. The root impacts to T1, T4, T7 and T10 are classified as Major from excavation for basement levels, and aboveground built from construction requirements such scaffolding or elevated work platform clearance and associated compacted track and or concrete finished paving. Canopy impacts to these trees have been considered significant irrespective of root impacts. Because the proposed 5-story building stands within 2.5 meters of these trunks, the trees would require one-sided branch removal to clear the structure. This level of impact introduces several critical long-term risks:

¹⁶ **A Major TPZ encroachment** occurs where an encroachment/ incursion is proposed greater than 10% of the TPZ area or within the SRZ (Standards Australia 2009).

- **Permanent Disfigurement and Ongoing Maintenance:** Unlike local hardwood trees, Norfolk Island Pines grow with a strict, symmetrical, wheel-like branch pattern and cannot regrow a normal canopy once major branches are removed. Cutting the branches on the building side will permanently disfigure the trees. In response to this severe stress, the trees are likely to sprout chaotic, vertical shoots from the trunk. These fast-growing shoots may crowd the proposed building facade, creating an ongoing, costly pruning liability.
- **Increased Risk of Storm Failure:** These pines have evolved to survive high winds by using a perfectly balanced canopy to flex and bend evenly. Stripping branches from one side alters their natural physics, potentially turning the remaining canopy into a single-sided "sail". When wind hits the new 5-story building, it can create turbulent downdrafts in the narrow gap. This combination places uneven weight and twisting stress on the trunk, significantly increasing the risk of the trees blowing over or snapping away from the building during a storm.
- **Internal Rot and Decay:** When a Norfolk Island Pine is cut or damaged, it relies on a heavy flood of sap to seal the wound. However, large pruning cuts often exceed the tree's natural ability to defend itself. Because softwoods have a simpler internal defence structure than hardwoods, these large wounds can allow decay to enter the trunk. This rot can slowly hollow out the core of the tree over several decades, creating a long-term structural hazard.
- **Property Damage from Sticky Resin:** The tree's natural defence response creates an immediate conflict with the commercial spaces below. The large pruning wounds are likely to bleed sticky, white resin (sap) for extended periods. This resin will inevitably drip onto the proposed shopfronts, awnings, and footpaths. Once dried and cured by the sun, this substance hardens completely, causing potential permanent cosmetic damage to building finishes and creating a significant cleaning burden.
- Furthermore, the **mature size of Norfolk Island Pines**—which can easily exceed 30 meters in height—is fundamentally incompatible with the restricted space of this narrow street easement and the footprint of the new high-rise.



Plate 1: Projected size of mature Norfolk Island Pine Trees in relation to the proposed built form.

Other significant Subject Trees including road reserve trees (T2, T3, T5, T6, T8, T9): The remaining removals, which include multiple individuals of the common native species Tuckeroo (*Cupaniopsis anacardioides*) planted in a linear form bordering the site, are necessitated by the extent of NRZ encroachment. The construction footprint results in impacts classified as Major (>20% root loss), including several trees with 100% calculated NRZ loss. These encroachments are from excavation for basement levels, and aboveground built from construction requirements such as scaffolding or elevated work platform clearance and associated compacted track and/or concrete finished paving.



Plate 2: Linear planted Tuckeroo (*Cupaniopsis anacardioides*) T12-17

In all cases, the proposed impacts are deemed unmitigable to a level that would ensure safe, vigorous, and sustainable tree retention, necessitating removal to prevent the creation of compromised and high-risk long-term landscape assets.

3.1. Other Findings

- Site access for demolition and construction machinery appears to be able to be routed around Tree Protection Zones so as to not impact trees to be retained.
- The Landscape Design Report and Tree Replacement Strategy prepared by 360 Degrees Landscape Architects proposes the installation of 14 Tuckeroos (*Cupaniopsis anacardioides*) and 3 x *Livistona australis* as compensatory planting.

4. Recommendations

4.1. General Tree Protection Recommendations

Subject trees have been recommended to be retained where it is considered that development impacts can be avoided and mitigated sufficiently such that trees would cope with construction activities and retain vitality. This assessment relies on effective implementation tree protection measures outlined as follows.

Based on the proposed works, the following recommendations are made, refer to Table 1 and Figures 1:

- In line with AS4970 and best practice, a Project Arborist should be engaged to guide implementation of tree protection measures.
- Tree protection should comply with Section 4, Tree Protection Measures, of Australian Standard 4970 – 2025 Protection of trees on development sites unless otherwise noted in this report or recommended by the Project Arborist.
- The Project Arborist should assist with establishment of project TPZ fences.
- TPZ fences should be in place prior to the commencement of all works and before construction machinery and materials are brought onto the site.
- Tree protection fences are to be maintained in good condition during construction works and kept in place until after completion of construction works (including landscaping works) unless otherwise advised by the Project Arborist.
- The Project Arborist should monitor and advise on tree protection for demolition and construction works inside TPZs. This includes concrete pavement removal in TPZs; crown reduction pruning for scaffolding and tree building clearance; all excavation works; and installation of any underground services.
- Mulch (e.g. weathered forest mulch or tea tree mulch) up to 12cm depth and lightweight load-sharing/ weight distribution mats, boards, planks or plates should be used if construction machinery is required to work within or pass through project TPZs.
- Use of scaffolding that requires minimal branch removal or in some instances branches may be tied back temporarily rather than pruned.
- The Project Arborist should be consulted to review new or changed design and construction plans.
- During any excavation works within tree TPZs, tree roots exposed >4cm diameter and coming from the general direction of retained trees should be cleanly cut with a sharp hand saw or chainsaw.
- The role and importance of tree protection measures should be addressed with all construction staff during site inductions and toolbox talks.

The following activities should not be carried out inside TPZs unless in consultation with the Project Arborist:

- Machinery access including excavators, bobcats, etc.

- Washing or disposal of chemicals and liquids including concrete and mortar slurry, solvents, paint, fuel or oil.
- Stockpiling, storage or mixing of sand, gravel or other building materials.
- Refuelling, parking, storing, washing or repairing tools, equipment, machinery or vehicles.
- Soil excavation, trenching, placement of fill, or changes to soil levels.
- Installation of underground services.
- Erection of temporary structures or scaffolding.
- Tree removal or tree pruning.

4.2. Project Tree Protection Zone (TPZ) Fence Specifications

The project Tree Protection Zone (TPZ) is the area dedicated to tree protection. Establishment and maintenance of Project Tree Protection Zones (TPZs) throughout the construction process is important to protect tree roots and crowns; and maintain tree health and condition into the future. Figures 7.1 show the recommended project TPZ fence locations in relation to retained trees and the construction footprint.

Project TPZs are a variation to that of AS4970 (Standards Australia 2025), designed to ensure tree protection under the existing site conditions and construction requirements. The project TPZs may be only partially enclosed by tree protection fences and are considered to be appropriate in this instance to exclude construction impacts.

A copy of the Tree protection plan drawings (i.e. Figure 7.1) and this report should be retained on site with other construction drawings throughout the construction phases for reference as required.

Recommended Project TPZ fence specifications are as follows:

- Minimum flexible plastic barrier mesh TPZ fencing installed at a minimum 1m high, refer to Figure 3. The fencing shall be secure and fastened to prevent unassisted movement. Steel mesh construction exclusion fencing with 1.8m high fence panels (refer to Figure 4) may be used as an alternative or as required.
- A minimum of one TPZ sign every 10m of project TPZ fence should be installed indicating “Tree Protection Zone, No Access” or similar, refer to Figures 5 and 6. Each sign shall be weather resistant; a minimum size of 29.7mm x 420mm; and include the name and contact details of the Project Manager and/or the Project Arborist. The signs shall be visible from the main work areas of the site.



Figure 3. Example project Tree Protection Zone plastic barrier mesh fence

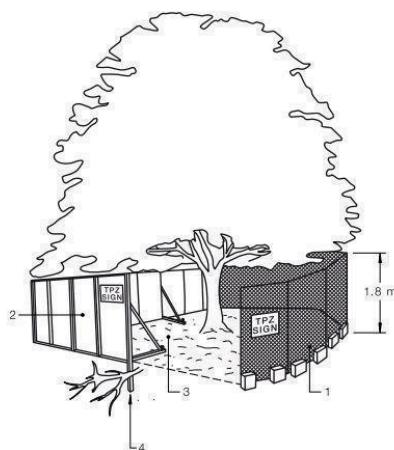


Figure 4. Example Tree Protection Zone steel/ wire mesh fence, Standards Australia (2009)

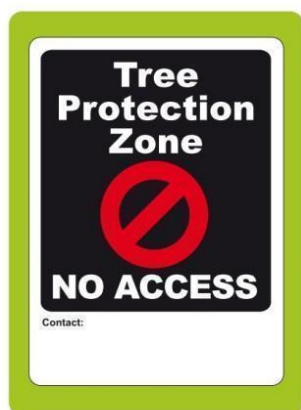


Figure 5. Example Tree Protection Zone sign, Standards Australia (2009)



Figure 6. Example Tree Protection Zone sign

4.3. Other Recommendations

- Any tree pruning should be done in accordance with relevant sections (e.g. Section 5.4, Final Cut) of the Australian Standard AS4373 Pruning of amenity trees, and by a minimum AQF level 3 qualified arborist with appropriate experience.
- The Project Arborist should be notified of significant changes in the health and condition of trees to be retained.
- Where practical, apply mulch (e.g. weathered forest mulch or tea tree mulch) up to 10cm depth within tree drip lines and 50cm clear of tree bases to promote tree health.
- Apply water to saturation point during dry conditions, and mulch up to 10cm depth over exposed roots in TPZs, including following pavement demolition.
- Landholder/s should organise for the Project Arborist to conduct rapid Visual Tree Assessments of site trees, focussing on changes to health and condition and

recommendations, immediately following completion of construction works; annually thereafter and following severe thunderstorms¹⁷.

- Weed removal should avoid impacts to retained vegetation and should be carried out or supervised by appropriately qualified and experienced personnel.
- Any new landscape plantings for the site should consist of non-invasive species selections and endemic native species should be considered.
- Commence a tree health improvement program for all retained trees with the following monthly treatments:
 - o Periodic applications of water to the accessible root zone (outward of 1m from tree base) to soil saturation point during dry periods.
 - o Applications to the accessible root zone (outward of 2m from tree base) of combined dissolved raw sugar (at 70g/ litre water/ m²) and liquid seaweed concentrate, e.g. Seasol (at recommended rate on container – for stressed trees).
 - o Program to be reviewed after 12 months.

There is currently no known requirement to use non-destructive, exploratory excavations including hydraulic excavation with the aid of high-pressure water with an air vacuum (i.e. vacuum excavation) to locate and avoid structural roots.

5. General Assumptions and Limitations

- Information in this report relates only to the trees examined and reflects their condition at the time of inspection.
- Information presented in this report relies on information provided by the client and their representatives.
- No risk¹⁸ assessments were included as part of this tree impact assessment and no recommendations have been made in regard to risk management.
- This assessment was limited to visual examination of accessible items without climbing, coring, dissecting or excavating. No responsibility is assumed for any tree defects that could only have been discovered by performing climbing, coring, dissecting or excavating.
- Arbor Ecological bear no responsibility for the actions and consequences of any party that performs works associated with recommendations or other matters outlined within this report.

¹⁷ **Severe thunderstorms** produce any of the following: Large hail (2cm in diameter or larger); damaging wind gusts (generally wind gusts exceeding 90 km/h); heavy rainfall which may cause flash flooding; and/or Tornadoes (Australian Government Bureau of Meteorology, No Date, Severe Thunderstorm Warning Services, accessed 06/04/13 <http://www.bom.gov.au/catalogue/warnings/>).

¹⁸ **Risk** is a combination of the likelihood of tree failure and impacting a target, and the severity of the consequences (Smiley TE, Matheny N & Lilly S 2011, Tree Risk Assessment, Best Management Practices, International Society of Arboriculture (ISA), Illinois, USA).

6. Table 1: Tree measurements and encroachment details.

Tree Number & Identification	DBH (cm) DARB (cm)	Age Class	NRZ (m) SRZ (m)	Recommendations ²⁰ Nature of any AS4970 NRZ encroachment	Plates
Species	Height & Spread (m)	Health	Encroachment to Tree ¹⁹ (m)	Health & Condition Observations and Comments	
T1 Norfolk island pine <i>Araucaria heterophylla</i> Native endemic forest species	29 31 10 5	Semi-mature Fair Good	3.4 2 2	REMOVE TREE A total encroachment of 36% within the NRZ from 16% for the built basement floor area and 20% for the 1.5m disturbance buffer. Balanced crown	

¹⁹ **Encroachment to tree** refers to the distance from the tree centre to the most substantial root zone incursion/ encroachment as per design drawings. Only included where relevant to the impact assessment.

²⁰ **Recommendations.** Refer to Section 4 of this report for detailed recommendations.

Tree Number & Identification Species Characteristics	DBH (cm) DARB (cm) Height & Spread (m)	Age Class Health Condition	NRZ (m) SRZ (m) Encroachment to Tree ¹⁹ (m)	Recommendations ²⁰ Nature of any AS4970 NRZ encroachment Health & Condition Observations and Comments	Plates
T2 Tuckeroo <i>Cupaniopsis anacardioides</i> Native endemic forest species	16 25 3 3	Semi-mature Good Fair	2 1.8 0	REMOVE TREE A total encroachment of 70% within the NRZ from basement levels, aboveground form and awning/construction 1.5m buffer off facade. Balanced crown, minor surface wounds on lower trunk/buttreass roots. Multi-stemmed at 1.8m.	

Tree Number & Identification Species Characteristics	DBH (cm) DARB (cm) Height & Spread (m)	Age Class Health Condition	NRZ (m) SRZ (m) Encroachment to Tree ¹⁹ (m)	Recommendations ²⁰ Nature of any AS4970 NRZ encroachment Health & Condition Observations and Comments	Plates
T3 Tuckeroo <i>Cupaniopsis anacardioides</i> Native endemic forest species	12 16 13 2.5	Semi-mature Fair Good	2 1.5 0	REMOVE TREE A total encroachment of 73.6% within the NRZ from basement levels, aboveground form and awning/construction 1.5m buffer off facade. Balanced/symmetrical crown, Exposed surface structural roots in SRZ.	

Tree Number & Identification Species Characteristics	DBH (cm) DARB (cm) Height & Spread (m)	Age Class Health Condition	NRZ (m) SRZ (m) Encroachment to Tree ¹⁹ (m)	Recommendations ²⁰ Nature of any AS4970 NRZ encroachment Health & Condition Observations and Comments	Plates
T4 Norfolk island pine <i>Araucaria heterophylla</i> Native endemic forest species	41 49 8 5	Semi-mature Good Good	4 2.4 0.8	REMOVE TREE A total encroachment of 37% within the NRZ from basement levels and significant canopy pruning requirements from aboveground form and awning/construction 1.5m buffer off facade. Balanced symmetrical crown	

Tree Number & Identification Species Characteristics	DBH (cm) DARB (cm) Height & Spread (m)	Age Class Health Condition	NRZ (m) SRZ (m) Encroachment to Tree ¹⁹ (m)	Recommendations ²⁰ Nature of any AS4970 NRZ encroachment Health & Condition Observations and Comments	Plates
T5 Tuckeroo <i>Cupaniopsis anacardioides</i> Native endemic forest species	11 16 3 1.9	Juvenile Fair Fair	2 1.5 0	REMOVE TREE A total encroachment of 62.4% within the NRZ from basement levels, aboveground form and awning/construction 1.5m buffer off facade. Balanced crown, minor surface wounds on lower trunk/buttress roots.	

Tree Number & Identification Species Characteristics	DBH (cm) DARB (cm) Height & Spread (m)	Age Class Health Condition	NRZ (m) SRZ (m) Encroachment to Tree ¹⁹ (m)	Recommendations ²⁰ Nature of any AS4970 NRZ encroachment Health & Condition Observations and Comments	Plates
T6 Tuckeroo <i>Cupaniopsis anacardioides</i> Native endemic forest species	25 35 2 1.5	Semi-mature Fair Fair	2 1.5 0	REMOVE TREE A total encroachment of 68% within the NRZ from basement levels, aboveground form and awning/construction 1.5m buffer off facade. North East; spreading; minor light reaching, minor surface wounds on lower trunk/buttreass roots. Multi-stemmed at 1.8m.	

Tree Number & Identification Species Characteristics	DBH (cm) DARB (cm) Height & Spread (m)	Age Class Health Condition	NRZ (m) SRZ (m) Encroachment to Tree ¹⁹ (m)	Recommendations ²⁰ Nature of any AS4970 NRZ encroachment Health & Condition Observations and Comments	Plates
T7 Norfolk island pine <i>Araucaria heterophylla</i> Native endemic forest species	29 35 7 5	Semi-mature Fair Fair	3.4 2.1 1	REMOVE TREE A total encroachment of 29.7% within the NRZ from basement levels and significant canopy pruning requirements from aboveground form and awning/construction 1.5m buffer off facade. Balanced crown, Moderate crown foliage density, Moderately low Live Crown Ratio (LCR).	

Tree Number & Identification Species Characteristics	DBH (cm) DARB (cm) Height & Spread (m)	Age Class Health Condition	NRZ (m) SRZ (m) Encroachment to Tree ¹⁹ (m)	Recommendations ²⁰ Nature of any AS4970 NRZ encroachment Health & Condition Observations and Comments	Plates
T8 Tuckeroo <i>Cupaniopsis anacardioides</i> Native endemic forest species	13 17 3 3	Semi-mature Good Fair	2 1.6 0	REMOVE TREE A total encroachment of 62.4% within the NRZ from basement levels, aboveground form and awning/construction 1.5m buffer off facade. Balanced crown, minor surface wounds on lower trunk/buttreass roots. Co-dominant stem at 0.4m. Exposed surface structural roots in SRZ	

Tree Number & Identification Species Characteristics	DBH (cm) DARB (cm) Height & Spread (m)	Age Class Health Condition	NRZ (m) SRZ (m) Encroachment to Tree ¹⁹ (m)	Recommendations ²⁰ Nature of any AS4970 NRZ encroachment Health & Condition Observations and Comments	Plates
T9 Tuckeroo <i>Cupaniopsis anacardioides</i> Native endemic forest species	17 14 2.5 2.5	Semi-mature Fair Fair	2.1 1.5 0	REMOVE TREE A total encroachment of 67.9% within the NRZ from basement levels, aboveground form and awning/construction 1.5m buffer off facade. Balanced crown, minor surface wounds on lower trunk/buttress roots. Multi-stemmed at 1.8m.	

Tree Number & Identification Species Characteristics	DBH (cm) DARB (cm) Height & Spread (m)	Age Class Health Condition	NRZ (m) SRZ (m) Encroachment to Tree ¹⁹ (m)	Recommendations ²⁰ Nature of any AS4970 NRZ encroachment Health & Condition Observations and Comments	Plates
T10 Norfolk island pine <i>Araucaria heterophylla</i> Native endemic forest species	39 45 9 7	Semi-mature Fair Fair	4.6 2.3 1.1	REMOVE TREE A total encroachment of 28.5% within the NRZ from basement levels and significant canopy pruning requirements from aboveground form and awning/construction 1.5m buffer off facade. Balanced crown, Moderate crown foliage density, Moderately low Live Crown Ratio (LCR).	

Tree Number & Identification Species Characteristics	DBH (cm) DARB (cm) Height & Spread (m)	Age Class Health Condition	NRZ (m) SRZ (m) Encroachment to Tree ¹⁹ (m)	Recommendations ²⁰ Nature of any AS4970 NRZ encroachment Health & Condition Observations and Comments	Plates
T11 Tuckeroo <i>Cupaniopsis anacardioides</i> Native endemic forest species	31 38 6 5	Semi-mature Good Fair	3.8 12.2 0	REMOVE TREE A total encroachment of 98.3% within the NRZ from basement levels, aboveground form and awning/construction 1.5m buffer off facade. Unbalanced crown, minor trunk lean to the NW. Multi-stemmed at 1.4m.	

Tree Number & Identification Species Characteristics	DBH (cm) DARB (cm) Height & Spread (m)	Age Class Health Condition	NRZ (m) SRZ (m) Encroachment to Tree ¹⁹ (m)	Recommendations ²⁰ Nature of any AS4970 NRZ encroachment Health & Condition Observations and Comments	Plates
T12 Tuckeroo <i>Cupaniopsis anacardioides</i> Native endemic forest species	31 36 5 6	Semi-mature Good Fair	3.8 2.1 0	REMOVE TREE A total encroachment of 85.5% within the NRZ from basement levels, aboveground form and awning/construction 1.5m buffer off facade. Balanced crown. Multi-stemmed at 1m.	

Tree Number & Identification Species Characteristics	DBH (cm) DARB (cm) Height & Spread (m)	Age Class Health Condition	NRZ (m) SRZ (m) Encroachment to Tree ¹⁹ (m)	Recommendations ²⁰ Nature of any AS4970 NRZ encroachment Health & Condition Observations and Comments	Plates
T13 Tuckeroo <i>Cupaniopsis anacardioides</i> Native endemic forest species	21 28 5 5	Semi-mature Good Fair	2.6 1.9 0	REMOVE TREE A total encroachment of 100% within the NRZ from basement levels, aboveground form and awning/construction 1.5m buffer off facade. Balanced crown, minor trunk lean to the NW. Multi-stemmed at 1.4m.	

Tree Number & Identification Species Characteristics	DBH (cm) DARB (cm) Height & Spread (m)	Age Class Health Condition	NRZ (m) SRZ (m) Encroachment to Tree ¹⁹ (m)	Recommendations ²⁰ Nature of any AS4970 NRZ encroachment Health & Condition Observations and Comments	Plates
T14 Tuckeroo <i>Cupaniopsis anacardioides</i> Native endemic forest species	26 30 6 5	Semi-mature Good Fair	3.1 2 0	REMOVE TREE A total encroachment of 87% within the NRZ from basement levels, aboveground form and awning/construction 1.5m buffer off facade. Balanced crown, moderate trunk lean to NW, corrected, minor surface wounds on lower trunk/buttress roots. Multi-stemmed at 1.5m.	

Tree Number & Identification Species Characteristics	DBH (cm) DARB (cm) Height & Spread (m)	Age Class Health Condition	NRZ (m) SRZ (m) Encroachment to Tree ¹⁹ (m)	Recommendations ²⁰ Nature of any AS4970 NRZ encroachment Health & Condition Observations and Comments	Plates
T15 Tuckeroo <i>Cupaniopsis anacardioides</i> Native endemic forest species	20 31 6 4.5	Semi-mature Good Fair	2.4 2 0	REMOVE TREE A total encroachment of 86% within the NRZ from basement levels, aboveground form and awning/construction 1.5m buffer off facade. Balanced crown, minor stem lean corrected, surface wounds on lower trunk/buttreass roots. Multi-stemmed at 1.3m.	

Tree Number & Identification Species Characteristics	DBH (cm) DARB (cm) Height & Spread (m)	Age Class Health Condition	NRZ (m) SRZ (m) Encroachment to Tree ¹⁹ (m)	Recommendations ²⁰ Nature of any AS4970 NRZ encroachment Health & Condition Observations and Comments	Plates
T16 Tuckeroo <i>Cupaniopsis anacardioides</i> Native endemic forest species	34 39 6 7	Semi-mature Good Fair	4.1 2.2 0	REMOVE TREE A total encroachment of 57.5% within the NRZ from basement levels, aboveground form and awning/construction 1.5m buffer off facade. Balanced crown, Multi-stemmed at 1.4m.	

Tree Number & Identification Species Characteristics	DBH (cm) DARB (cm) Height & Spread (m)	Age Class Health Condition	NRZ (m) SRZ (m) Encroachment to Tree ¹⁹ (m)	Recommendations ²⁰ Nature of any AS4970 NRZ encroachment Health & Condition Observations and Comments	Plates
T17 Tuckeroo <i>Cupaniopsis anacardioides</i> Native endemic forest species	25 33 6 7	Semi-mature Good Fair	3 2 0	REMOVE TREE A total encroachment of 60% within the NRZ from basement levels Balanced crown, moderate trunk lean to the NW, exposed surface roots and surface wounds on lower trunk/buttreass roots. Multi-stemmed at 1.2m.	