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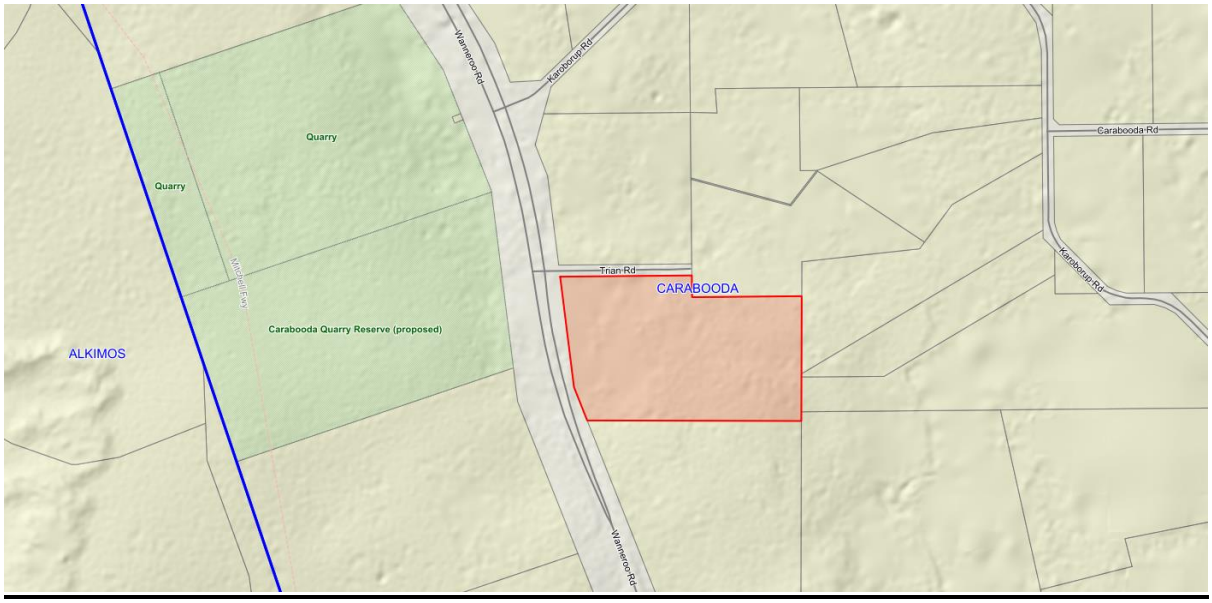
Landscape Vegetation Study for 14 Trian Road Carabooda

Lot 6276 Trian Road, CARABOODA



Site – 14 Trian Road, Carabooda - Aerial photo & Cadastral

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Brief

The Client "Riverstone & the Private landowners (Chapmans)" commissioned eScape landscape architecture to consult, inspect and complete a report to meet council's requirements for a landscape plan & tree survey to be completed as part of the planning approval submissions which forms part of the resubmission to council for the proposed short stay accommodation, marriage pavilion with restaurant and chalet facilities located at the site.

The site located in Carabooda in the City Of Wanneroo, Adjacent Wanneroo road and Trian Road. The block is approx. 94,643m2 or 9.4 Hectares with an existing house, sheds, and established gardens, remnant pasture, pig pen, and sparse to dense existing tree stands currently on the block. Predominantly the trees across the site are flooded gums but with large mature Tuarts and a range of smaller trees typical to the local area, refer to the vegetation study. The client proposes to use the property for a Restaurant, Wedding facilities, 23 first stage x Short Stay Chalets and 3 hotel/motel style short stay apartments with appropriate facilities and parking.

The objective of the survey was to assess the existing native remanent vegetation based on the preliminary works plan and provide a basis for a suitable landscape plan outlining the retention and removal of trees and vegetation. Key to this plan is the orientation and location of the building and the car parking, egress to and from the building, access roads, situated play spaces and facilities, and suitable buffering from adjacent Wanneroo road and adjacent properties. The survey is to establish the trees species, size, condition and location.



Approach

This eScape landscape architecture obtained a preliminary works plan from the client along with a feature survey. We worked with them to re position the built facilities in view of the existing site features, existing levels and the existing trees accurately on the site, along with the proposed carpark locations and proposed building pads. A visual site assessment of the trees was then undertaken to determine the species, size of canopy, health and suitability for retention. A ***Landscape Vegetation Study*** was then completed to help facilitate the ***Landscaping Master Plan*** for submission to council along with the other consultant's reports.

Site - Existing Tree Species

The site has a number of well-established native trees generally in good to fair condition. A small number of dead trees are present marked on the *Landscape Vegetation Study* and some species marked for removal due to their unsuitability on the *Landscape Tree Removal Plan* i.e. Acacia species. The botanical name and common name, condition and notes are referred to in the schedule below and on the tree survey plan.

LANDSCAPE TREE SURVEY

BLOCK	CODE	SPECIES	NOTES - SITE ASSESSMENT
	BANKSIA	CANDLE BANKSIA Banksia attenuata	Generally good condition, requiring clean up and crown lift if required.
	BANKSIA	BULL BANKSIA Banksia grandis	Generally good condition, requiring clean up and crown lift if required.
	SHEOAK	COMMON SHEOAK Allocasuarina fraseriana	Generally good condition, requiring clean up and crown lift and removal of dead wood
	TUART	TUART Eucalyptus gomphocephala	Generally good condition, some marked poor or dead have evidence of die back present, 8 x Large sentinel trees (habitat specimens, x Marked Feature tuart), smaller trees retained for shade in key areas and suitable for shade tree adjacent play spaces
	ACACIA	GOLDEN WREATHED WATTLE Acacia saligna	Good condition,, poisonous species suitable for removal if required.
	MOITCH	Flooded Gum Eucalyptus rudis	Generally good condition, suitable for shade tree adjacent playspaces.
	ILLYARRIE	ILLYARRIE Eucalyptus illyarrie	Good condition, red capped gum small marked for retention.
	OLIVE	OLIVE SPECIES UNKNOWN	Remnant orchard species suitable for retention or transplant to kitchen garden/ chicken coop etc... of for wedding photo opportunities
	GRASS TREE	GRASS TREE Xanthorrhoea preissii	Various small - medium single headed grass trees, suitable for transplant into more suitable areas where removal is required. Suitable for transplant in garden areas away from kids eye level.
	MACRO ZAMIA	MACROZAMIA Macrozamia riedlei	Various small macrozamia sporatically dotted through verge and tree lines. Suitable for transplant in garden areas away from kids eye level.

Tree Health

Good – The tree demonstrates good or exceptional growth for the species. The tree exhibits a full canopy of foliage. Minor pest or diseases problems. Foliage colour, size and density should be typical of a healthy specimen.

Fair - The tree demonstrates adequate growth for the species. The tree exhibits an adequate canopy of foliage. There may be some dead wood present in the crown, some grazing by insects, animals and foliage colour and size atypical for a healthy specimen of that species.

Poor - The tree is not growing to its full capacity, extension growth of the laterals may be minimal. The tree exhibits a thinning or sparse canopy of foliage. Large amounts of dead wood present in the crown, significant grazing by insects indicating the stress of the tree declining.

Very Poor – The tree appears to be in a state of decline and the canopy maybe very thin and sparse. Significant volume of deadwood may be present in the canopy and pest and disease problems causing a severe decline.

Dead – The tree is dead

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Site – Flora & Fauna

Existing:

Candle Banksia *Banksia Attenuata* – Honeyeaters drink the nectar of the flower spikes along with other bird varieties such as Robins, Willie Wagtails and Black-faced Cuckoo-shrikes will pluck insects off the spikes. Summer migrating Bee-eaters will catch feral honeybees. Candle Banksia is known as one of the chief food sources for the Carnaby's Black Cockatoo which will eat both the seeds and larvae from the cones.

Bull Banksia Banksia Menziesii – Honey-eating birds such as Western Spinebill, Red & Little Wattlebirds plus New Holland Honeyeaters will drink the nectar during its long flowering period. Candle Banksia is known as a source for the Carnaby's Black Cockatoo which will eat both the seeds and larvae from the cones, the red capped parrot and moth larvae.

WA Sheoak *Allocasuarina Fraseriana* – The seeds that hang off the thin branchlets are favoured by many birds such as the Red Eared Firetail, Carnaby's Black Cockatoo along with other Parrots including Ring neck Parrot which are plucked from the cones. The understorey of fine needles will provide shelter for ground dwelling lizards and small marsupials such as the native Quenda.

The sap or honey dew which exudes from the branchlets will attract many varieties of beetles, crickets and native cockroaches.

Tuart *Eucalyptus gomphocephala* – The tuart is one of the most valuable trees in the Perth area and each tree helps to form an ecosystem of fauna, attracting birds for feeding roosting and nesting. Birds such as Ring neck parrots, kestrals, sacred kingfishers, Baudins black cockatoo, corellas as well as a huge variety of fungus, and insects live on all parts of the trees.

Moitch *Eucalyptus rudis* – The Flooded gum is one of the most important trees in the metro area, it is quick to recover from disturbed areas. The foliage supports large varieties of leaf miners and aphids and whilst the foliage is quick to rejuvenate in spring the insects provide food for many predatory insects, lacewings, ladybugs, mantises as well as thornbills, silvereyes and western gerygones. The wood is subject to some larger borers such as the long horned beetle.

Grass Tree *Xanthorrhoea Preissii* – Many fauna can be associated with Grass Trees including insects and small lizards that find shelter within the leaves. The flowering spears attract Honeyeating birds such as Red Wattlebird, Brown and Singing Honeyeaters along with bees, wasps and butterflies. Ringneck parrots will feast on these spears when they bear fruit.

Proposed TBC:

Later in the DA – Building Approval Phase

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Landscape – Vegetation Study

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Landscape – LC – 01- Landscape Master Plan

Landscape - LC- 02 – Landscape Sketch Design – Pool Area

TPZ – Tree Protection Zone

As per the Australian Standards AS 4970-2009 *Protection of Trees on Development Sites* the tree protection zone (TPZ) is the principal means of protecting the trees on sites where development is to occur. The TPZ is a combination of the root zone and crown area requiring protection. It is isolated from construction disturbance, so that the trees remain viable.

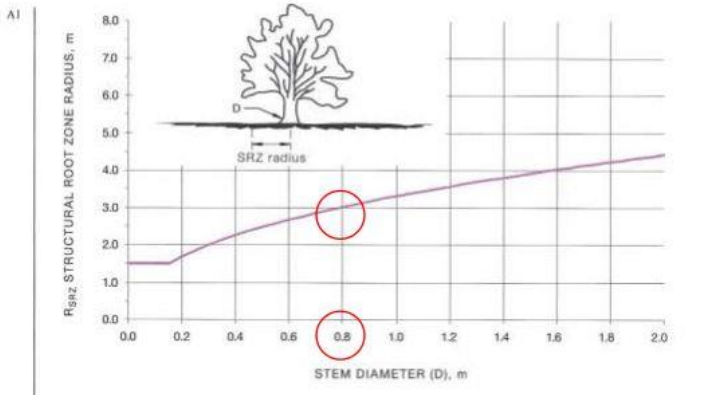
The radius of the TPZ is calculated for each tree by multiplying the (DBH) diameter taken at breast height, DBH x 12. Eg, DBH is 0.5m x 12 = 6m radius (TPZ = 6m measured from centre of the trunk at ground.)

If the proposed encroachment is greater than 10% into the TPZ or SRZ the project landscape architect or suitably qualified arborist must assess the tree to ensure its viability or review the proposed encroachment and suggest alternatives. Refer to the TPZ calculation for AS4970-2009 below fig 02. *An example is shown on the Landscape Tree Removal Plan on the large stands of trees*.

SRZ – Structural Root Zone

This consultant advises that a structural root zone area of a tree is required for tree stability. Using Australian Standards AS 4970-2009 *Protection of Trees on Development sites* the structural root zone area can be calculated when major encroachment into a TPZ is proposed.

If the proposed encroachment is greater than 10% into the TPZ or SRZ the project landscape architect or suitably qualified arborist must assess the tree to ensure its viability or review the proposed encroachment and suggest alternatives. Refer to the SRZ calculation for AS4970-2009 below fig 01.



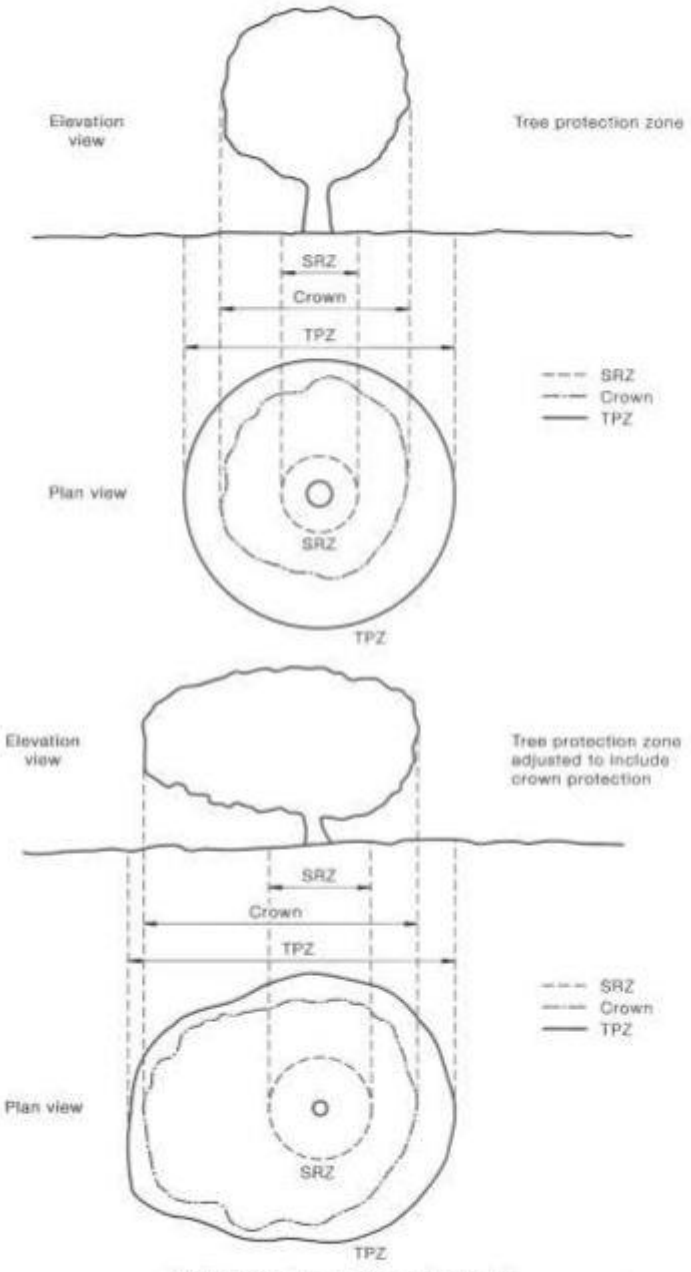
The curve can be expressed by the following formula:

$R_{SRZ} = (D \times 50)^{0.42} \times 0.64$

NOTES:

1 R_{SRZ} is the calculated structural root zone radius (SRZ radius).
2 D is the stem diameter measured immediately above root buttress.
3 The R_{SRZ} for trees less than 0.15 m diameter is 1.5 m.
4 The R_{SRZ} formula and graph do not apply to palms, other monocots, cycads and tree ferns.
5 This does not apply to trees with an asymmetrical root plate.

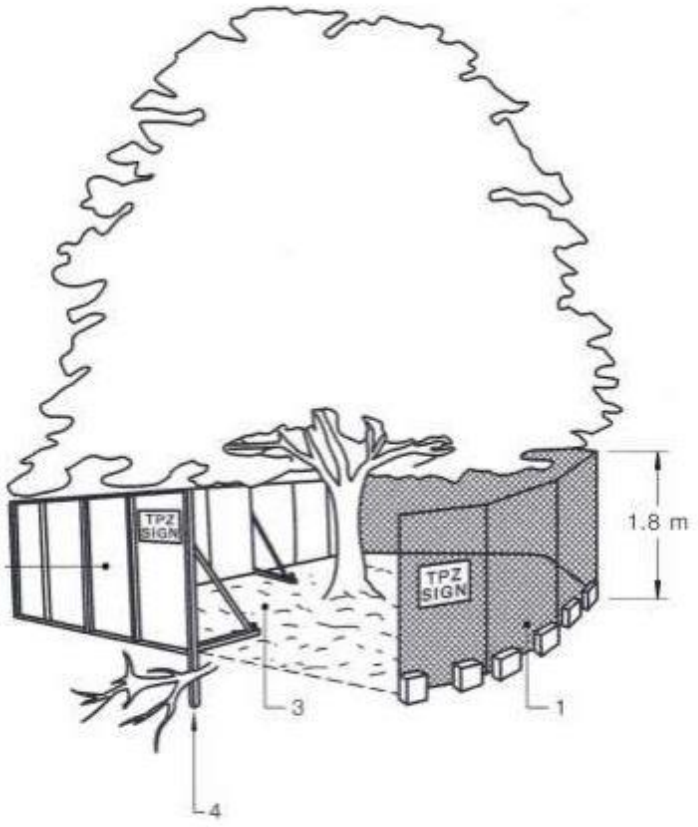
FIGURE 1 STRUCTURAL ROOT ZONE CALCULATION



NOTE: Refer to Clause 3.2 for calculation of TPZ.

FIGURE 2 INDICATIVE TREE PROTECTION ZONE

Example of Tree Protection fencing from AS 4970-2007



LEGEND:

1 Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.

2 Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ.

3 Mulch installation across surface of TPZ (at the discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.

4 Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.

FIGURE 3 PROTECTIVE FENCING FROM AS 4970-2009

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Contractor Specification for Tree protection during development works

- To reduce the effects that a building development can have upon the health of retained trees, suitable forms of protection are required together with the steps necessary to limit deterioration of those species left standing on the development site.

- This consultant confirms that there is clear evidence that mature trees are more sensitive to contractor pressure than young and semi-mature specimens, where the younger trees are able to compensate and adapt to new ground conditions by producing new roots. However, although younger trees can exhibit a remarkable tolerance to the adverse effects of building operations and site alterations, this is conditional upon the location and extent of works carried out within the root zone of the tree and therefore the extent of primary root removal.

- As with predominantly most trees they store vast amounts of carbohydrate in their root system, subsequently when major roots are severed the tree is unable to replenish its depleted energy levels, which gradually results in the decline of the canopy and often the death of the tree, with such symptoms often not evident until some years later. Therefore there must be clear recommendations to alleviate detrimental tree damage from the commencement through to the completion of the development, with the recommendations enforced and clearly understood by all contractor staff.

- All trees identified for retention shall be clearly marked and a Tree Protection Zone (TPZ) confirmed prior to the commencement of the development. As per Australian Standard AS 4970-2009 Protection of trees on development sites. The tree protection zone is the principal means of protecting trees on development sites. The TPZ is a combination of the root area and crown area requiring protection. It is an area isolated from construction disturbance, so that the tree remains viable.

- All heavy machinery shall keep outside the tree protection zone, with any roots damaged or torn roots with a diameter of 30mm or more cleanly severed to initiate occlusion and the contractor is to inform the works supervisor of the damage.

- No root pruning shall be carried out to construct boundary walls or to lay services closer than 1.5m from the base of the tree, with the encroaching roots bridged or under-bored for a distance of 1.5m each side of the trunk, with sufficient distance allowed when bridging for the roots to expand.

- Proposed excavations 1.5m to 2.5m away from the base of the trunk with the exposed roots having a diameter less than 30mm diameter shall be cleanly severed to initiate occlusion. **Roots above 30mm diameter are not to be cut without authorisation from a qualified Arborist.**

- No building materials are to be stored or disposed of within the tree protection zone, with provisions implemented so that building chemicals do not come into contact with the root rhizosphere or the roots themselves.

- Excavated soil shall not be stored or built up around the trunk of the tree. **Soil levels will not be changed around the base of trees, either raised or lowered.**

- The laying of surface material (Paving or Asphalt Paths & Roadways) within the root plate spread of the tree shall take into consideration the cultural requirements of the tree,

particularly in relation to moisture and oxygen levels, with the retention of a suitable open surface area.

- Any compaction within the root plate zone of the protected tree to lay paving shall be carried out using a plate compactor only.

- Supplementary watering to all retained trees will be required over summer months where works are occurring and due to the disturbance of soil and opening up of the site. Watering the trees is required to minimise stress on the trees while recommended to water deeply a minimum of once per week for a total of 1000 litres per tree for mature trees and 600 litres for trees less than 8m in height. It is recommended that the water truck or temporary watering system, have a wetting agent in the tank to assist to get the water through to sandy layer to the trees root system.

- Established trees of good vigour and structure represent an asset to any development site. Trees are living organisms that require certain environmental conditions in order to maintain their value as an asset. Damage must be avoided or minimized during the development process and procedures to ensure the protection of trees must be in place at all stages.

Summary

This consultant's inspection included approx. 378 trees within the project's site boundaries and verges and revealed that they are generally in good/fair condition, with 2-3 Tuarts effected by dieback and in poor to dead condition.

The Tree audit identified out of the 378 specimens;

335 x Trees were native and endemic to the area.
22 x Tuarts with 8 x specimen trees over 22m high and having significant importance to the local ecology.
Over 300 x Flooded gums with some groves providing valuable shading, photography opportunities and ecological significance to the site.
43 x Fruiting trees and exotics, some suitable for transplanting.
Over 300 x Native tree species were marked for retention being in suitable location with the revised layout once the final levels are developed the vast majority of these will be retained.
86 x approx Native understorey feature transplants were identified for re transplant on the site. The vast majority of these are Grass trees but also some mature olive trees are marked for transplant onsite.

Therefore a total of 90% Native tree species were retained to provide visual amenity, shade and structure to the facility across the site. The trees are a major reason that this site was identified for this land use and with an ecologically sensitive design approach will remain to maintain this feature.

Where trees are being retained it is crucial that designers, contractors and sub-contractors are advised of the potential damage to roots and lower branches from building infrastructure in close proximity to trees. Machinery and vehicles can damage lower canopies, compact and damage tree roots, stock piling of building materials, sand, spoil etc. around trees within TPZ is prohibited. It is recommended that contractors and sub-contractors are notified that works within the TPZ (or canopy drip line) may affect the trees health and if roots over 50mm require pruning they notify a suitable qualified landscape architect or arborist.

It is recommended that all works which are to be carried out within driplines of trees are hand dug using shovels to avoid damage to shallow roots, and common sense relocation of service onsite with appreciation of the trees health taken. All machinery is to be limited inside the TPZ radius and a spotter used if unavoidable.

It is recommended that the following occurs;

- *Tree Protection Fencing is erected around each tree or groups of trees to prevent damage to canopies and root zones AS 4970-2007. Refer to Fig. 3.*
- *Soil levels around the trees out to the TPZ are not raised or lowered.*
- *Roads & pedestrian paths are installed slightly above natural grade where possible to reduce potential root disturbance.*
- *Irrigation, Power, Water mainlines, Comms are to be hand dug within the TPZ.*

- *Banksia's where practicable to fall into non irrigated areas to avoid future issues associated with this species in reticulated zones.*

Watering trees is required where site works disturbance has occurred in summer to minimise stress to the trees.

The retained trees are recommended to have dead wood and crossing limbs removed and selectively pruned to avoid the level of risk the trees pose to people and property. It is advised that all remedial tree surgery works be carried out by a competent arborist to the relevant Australian Standards – Pruning of amenity trees 4373-2007. The future management, maintenance and condition of the trees have a considerable bearing on their location, safety to persons/users and property being the main priority. Therefore each tree is recommended for annual inspection to assess the level of risk to the public/users is deemed acceptable.

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