

Central Tree Services

Pre-planning Tree Health and Condition Report

Douglas Shire Council

Warner Street Upgrade, Port Douglas

RFQ 2018 - 065

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1.0 Aim

The aim of this assessment was to establish the current health and condition of specifically identified street trees as located along Warner Street (between Owen Street and Grant Street), Port Douglas. Once initially inspected, the trees were then assessed for their suitability for retention alongside any future site upgrades.

An assessment was requested in advance of the proposed Warner Street Upgrade project (DSC Tenders: RFQ 2018 – 065). The upgrade works are expected to include:

- Roadway
- Streetscape
- Street lighting
- Landscaping
- Shared pathways
- Cycle lanes
- Residential and Commercial parking
- Residential and Commercial crossovers
- Drainage upgrades

2.0 Site Overview

The assessed trees (Warner Street, between Owen Street and Grant Street) form an avenue of Rosewoods, planted in close proximity to the roadside and street-side parking.

As an avenue of trees they currently provide a reasonable level of amenity to site users, providing shade and a formal structure to the landscape within the immediate locality.

3.0 Species Overview

Rosewood (*Pterocarpus indicus*) is a fast growing, deciduous tree (up to 30m height) native to South East Asia and commonly planted throughout the tropics as an ornamental / amenity tree.

Depending on the location, level of formative pruning and cultivar, the tree will typically develop into a spreading habit, often multi-stemmed, with foliage in the upper crown taking on a weeping form.

The lower trunk is usually buttressed, and the tree is known to develop extensive prominent surface roots, often beyond the crown's drip line.

Maintenance requirements for this species in the urban environment would include (but not be restricted to):

- Formative pruning from establishment in order to ensure a structurally sound form and enable a long Safe Useful Life Expectancy (SULE).
- Maintenance of a sufficiently large garden bed surrounding the tree, to allow for accommodation of roots (particularly surface roots) without impact upon any adjacent infrastructure.
- Periodic crown lifting for general asset and amenity clearances.
- Periodic removal of significant deadwood (recommended 6 monthly).
- Periodic crown thinning depending on the tree's vigour and/or proximity of adjacent trees.

Rosewoods currently have few pest and disease problems in North Queensland, although an aggressive form of *Fusarium* wilt has become widespread interstate (pre-dominantly within the NT).

4.0 Summary of current health and condition

As an avenue of mostly mature trees, the assessed trees are a significant landscape feature, forming the main focus of current landscaping along Warner Street.



Image 1 – Avenue of Rosewoods along Warner Street

Although individual trees may have poor form and/or rectifiable defects, as an extended group, the overall level of amenity is generally high. In addition to this visual amenity, the trees also currently provide valuable shade and cooling effects during the warmer months.

The trees have established well in a heavily restrictive environment – the majority of trees along the assessed area (66 in total) have been planted in immediate proximity to the roadside and/or street-side parking. Species characteristics, notably shallow rooting with prominent surface roots, mean that Rosewoods, if to be planted as a street tree, should ideally be surrounded by a garden bed of suitable proportions. This is to ensure that roots (at maturity) can be accommodated without any impact upon adjacent infrastructure.

Few of the trees along Warner Street have been planted with an allowance for root development in proximity to the trees. In the longer term this will eventually lead to a progressive decrease in tree vigour along with a heightened potential for pathogen

establishment, unless rectified by re-engineering the current surrounds in favour of longer term tree protection.

As a result of the above, an initial site inspection confirmed the following issues:

- Significant damage to paved areas throughout Warner Street. Surface roots have caused tarmac to be lifted both within parking areas and the main roadway.
- Surface roots impacting upon driveway and walkway access.
- Surface roots growing in immediate proximity to services access.
- Combined, the above points raise issues over safety and infrastructure reliability.



Image 2 – Impact of surface roots on parking and roadway



Image 3 – Typical surface roots at Warner Street

If the trees are to be retained in the longer term, a plan must be put in place to allow for surface root protection and possible restriction of further growth (where feasible). A number of trees located at the junction of Warner and Grant streets are a good example of what would ordinarily be expected for Rosewoods in such a location – these trees are currently surrounded by reasonably-sized garden beds which have allowed for the accommodation of most roots up to maturity.

With the exception of points already highlighted above, no other serious defects were identified during the initial site inspection. It is expected that routine maintenance such as crown lifting and the removal of deadwood, would be completed on a revisit cycle dependant on six-monthly assessments. The current extent of deadwood could be reduced in the future by modest crown thinning – this removes excess growth in the mid-lower crown therefore reducing the amount of deadwood development.

If contractors are to be engaged for remedial work, they should be fully qualified and experienced, being able to demonstrate a comprehensive OHS policy specific to tree work, with relevant insurances in place.

It is anticipated that any remedial work is in accordance with AS4373 – 2009 “Pruning of Amenity Trees”.

5.0 Guidelines for tree protection areas in relation to construction / root removal

Where trees are to be retained alongside construction activity it is crucially important that protected areas are established around each tree or group of trees. The identification of areas to be protected should form a key component of any pre-planning exercise

The Warner Street Upgrade is expected to include extensive civil works in close proximity to the assessed trees. As such, if trees are to be retained, Tree Protection Zones (TPZ) and Structural Root Zones (SRZ) should be established in advance of any excavation, trenching or similar works.

A total of 66 Rosewood trees are planted along Warner Street between Owen Street and Grant Street. The assessed Trees' DBH varied between 17cm and 112cm (approximately).

With specific reference to Warner Street, the following indicative protected area guidelines have been calculated as per recommendations set out in AS4970 – 2009 "Protection of trees on development sites":

Species	DBH (cm)	TPZ (m)	TPZ (m) less 10%	SRZ (m)
Rosewood <i>Pterocarpus indicus</i>	17	2.0	1.8	1.5
Rosewood <i>Pterocarpus indicus</i>	112	13.4	12.1	3.5

The Tree Protection Zone (TPZ) is the area where excavation activity needs to be restricted, but this can be reduced by up to 10% (in varying proportions) provided that other areas are extended and consideration is given to factors such as tree lean and current distribution of rootplate (particularly in an urban street tree environment). It is possible that work can proceed within these limitations following consultation with an Arborist, however the final distance must still remain outside the Structural Root Zone.

In general, a TPZ should not be less than 2m or greater than 15m (unless crown protection is required).

The protected area (TPZ) should aim to remain free from any new compaction via site traffic and/or storage of materials. Consideration should also be given to the potential for ingress of debris/run-off from construction activity which may be of detriment to the tree.

As such, it may be appropriate to install site-fencing along the protected area boundaries in order to ensure sufficient compliance.

The Structural Root Zone (SRZ) is the area required for tree stability, and should not be subjected to any disturbance during construction / any excavation activity.

It is therefore crucial that the SRZ distances in the table above, are applied during any construction activity. If it is deemed necessary to breach these distances, then plans must be re-considered if the trees are to be retained. If no other alternatives are available, then the tree would have to be removed since a breach of the SRZ would constitute a long-term liability in terms of the tree's health and overall stability.

Variation to guidelines as set out in AS4970-2009

In certain cases, well-established trees in the urban environment, and particularly in proximity to roadways, can develop a heavily asymmetrical rootplate – that is, the majority of roots develop laterally and away from the roadway due to the compacted nature of the roadway surface, often further influenced by pre-planting preparation.

Where that is the case, it may be possible for excavation to take place closer than as normally recommended in AS4970-2009, however care must be taken to avoid damage to any structural roots if identified.

In the case of Warner Street, it is not thought that this would apply – the vast majority of trees clearly have extensive surface and structural roots present throughout the area where construction is likely to occur.

6.0 Recommendations and Conclusions

The future management of Rosewood trees along Warner Street will ultimately depend on the final specifications of the upgrade works.

Given the nature of the proposed works and the current health and condition of the assessed trees, it is clear that the majority of trees would be unsuitable for longer term retention alongside construction activity, should this occur, as summarised below:

- The majority of trees have extensive surface and structural roots throughout the proposed areas to be upgraded.
- The trees have been planted with minimal preparation for long-term root development in proximity to urban infrastructure. As such, root development has taken place in all directions and cannot feasibly be rectified in order to allow retention of the trees following any construction activity.
- Remedial options such as crown reduction or root barrier installation would be unsuitable given the points already raised above.

Despite the above, several trees were assessed as being potentially suitable for retention alongside works, depending on final specifications and compatibility with future landscaping expectations. A total of 6 trees located within garden beds at the junction of Grant and Warner Streets are good examples of this. If to be retained, these trees would need a long-term management plan put in place to ensure their continued suitability for retention.

If it is decided that trees are to be removed as a requirement of proposed upgrades, then planning should be put in place to allow for replacement with more suitable species upon the completion of construction. Factors to consider in this process would include:

- Species suitability for the location, considering growth characteristics and final crown dimensions at this location.
- Appropriate preparation of the area to be planted.
- Allowance for a sufficient area within which roots can develop up to maturity and without any impact upon adjacent infrastructure.
- Installation of root barriers and root anchors where appropriate.

- Implementation of long term management plans (such as pruning, nutrition and routine inspection) to ensure that the above outcomes are achieved.

It would be expected that, should the above factors be put in place, replacement trees would provide a greater degree of amenity in the longer term, without an impact upon adjacent infrastructure and with a reduced total cost in terms of overall remedial maintenance requirements.

Appendix 1: Index of Arboricultural terms used

The following terms are widely used in tree assessment (*as adapted from "Principles of tree hazard assessment and management" - Lonsdale, D. 1999*):

Arboriculture – the culture and management of trees as groups and individuals, primarily for amenity and other non-forestry purposes.

Assessment – in relation to tree hazards, the process of estimating the risk that a tree or group of trees poses to persons or property.

Bifurcated – having two co-dominant stems (forked).

Branch collar – a swelling at the base of a branch.

Crown – the main foliage-bearing portion of a tree.

Crown reduction - the overall reduction of both the height and spread of a crown. The extent of reduction is dependant on tree species, tree health and site requirements.

Crown thinning – the reduction of the volume of a crown without changing the overall height and spread. Often referred to as reducing the “sail area”. The extent of thinning is dependant on tree species, tree health and site requirements.

DBH (Diameter at breast height) – a measure of tree size used for purposes of identification and future growth analysis. DBH is also used to calculate SRZ and TPZ during pre-planning of construction in proximity to trees.

Decline – a deterioration of a tree’s general condition and vigour.

Defect – in relation to tree hazards, any feature of a tree which detracts from the uniform distribution of stress.

Dieback – the death of part of a tree, often progressive.

Epicormic growth – growth arising on mature stems, often following previous pruning or injury.

Failure – in relation to tree hazards, a partial or total fracture of wood or loss of cohesion between tree and soil

Included union – branch union where there is bark to bark contact which results in a structural weakness.

Leader – the dominant stem

Lopping – removal of branches, now generally applied to heavy or excessive trimming.

Phototropic lean – lean due to a tree’s growth towards available light.

Structural Root Zone (SRZ) - the Structural Root Zone (SRZ) is the area required for tree stability, and should not be subjected to any disturbance during construction / any excavation activity. Refer to AS4970 – 2009.

Tree Protection Zone (TPZ) – the area surrounding a tree which should be protected during any construction activity. Refer to AS4970 – 2009.

Topping – the removal of all or a large portion of a tree’s canopy.

Trifurcated – having three co-dominant stems

VTA – Visual Tree Assessment. A term used to encompass the range of techniques which an Arborist uses during ground based tree assessment.

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