

PCU55391

Submission on the proposed NorthConnex Tunnel

Attn: Director Infrastructure Projects
Department of Planning and Environment
Application No SSI 13_6136
Major Projects Assessment
GPO Box 39
Sydney NSW 2001

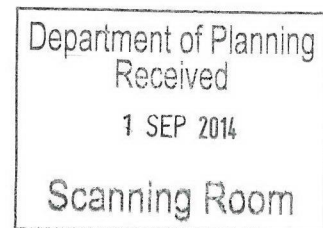
Submitted by:

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5 Loch Maree Ave
Thornleigh

NSW 2120

Appendix 1. Assessment of Trees on 2 Trelawney St



Section 1: Operation of Tunnel

We believe that in general the NorthConnex tunnel will have positive effects on the traffic and hence local residents adjoining Pennant Hills Rd. However we believe that there are a number of aspects which have either not been taken into consideration or not clearly specified.

1. The proposal is to induce or force all commercial vehicles which do not have a legitimate reason to travel on Pennant Hills Rd to use the tunnel. This will presumably be done by using automatic number recognition systems to identify vehicles at each end of the tunnel. While it can be expected that, for the largest trucks, use of the tunnel will be economically attractive in terms of fuel and time savings, however for smaller trucks there will be an incentive to avoid the camera gantries at one or other end by taking alternative side roads.

For example, coming south by exiting onto the Pacific Highway and then Fox Valley Rd and Comenarra Parkway to rejoining Pennant Hills Rd at Thornleigh. Alternatively they could exit onto Pennant Hills Rd then turn right onto Normanhurst Rd and then onto Milson Pde and Sefton Rd, rejoining Pennant Hills Rd via Dartford Rd, Duffy Ave or Yarrara Rd.

This additional traffic could cause a considerable increase in local traffic with a consequential impact on local residents.

This potential for increased local traffic as a result of avoidance of tunnel tolls needs to be addressed before the tunnel is operational, perhaps by additional cameras or restrictions on turns allowed or weight limit signs and policing. NorthConnex should also consider placing the camera gantry on the existing footbridge over Pennant Hills Rd at Loretto rather than at Kenley Park. This would reduce options for trucks attempting to avoid tolls and be much cheaper.

2. The Trelawney St and Wilson Rd facilities are intended as emergency exhaust points and for the provision of additional airflow in the tunnel during peak periods. Initially the tunnel will have 2 operational lanes in each direction with a third lane being used for emergencies. Presumably the intention is that the third lane could be converted to general use if traffic flows increase to sufficient volume.

In this case it is not clear that existing ventilation will be sufficient and that the Wilson Rd and Trelawney St sites would be used as additional vent stacks.

It needs to be made part of agreed operating parameters that these sites will never be used as vent stacks during non emergency operation.

3. Re-vegetating site

Current plans show, on completion a significant area will be landscaped and re-vegetated. This is excellent as it will provide screening from the site and well as noise reduction from Pennant Hills Rd.

Re-vegetation must be done with a range of plants native to the region and should include a range of large trees (eg e. saligna, e. pilularis and syncarpia glomulifera) as well as intermediate understorey and ground cover.

It is essential that as part of the landscaping plan a long term maintenance plan is put in place to prevent the occupation of the site by noxious weeds, eg privet, lantana, etc.

Section 2. Construction Phase: Trelawney St Facility.

1. Traffic management into and out of the site:

1.1 The exhibited proposal is that trucks will enter the site from Pennant Hills Rd, via Loch Maree Ave and leave directly onto Pennant Hills Rd. Expected traffic would be 1 truck in and 1 truck out in just over a minute.

1.2 Trucks destined to travel north are to turn right into Phyllis Ave, circle a roundabout and then return to make a left hand turn onto Pennant Hills Rd.

To achieve this, large trucks, presumably with a trailer, will have to cross 3 lanes of often very heavy to almost stationary traffic to enter the right hand turn lane. The lights at Phyllis Ave have a right hand turn of 20secs every 2 to 2.5 minutes.

With the existing traffic on Pennant Hills Rd and the timing of the lights it will not be possible to achieve the anticipated rate of truck movements.

1.3 Empty trucks returning from the South will have to turn right from Pennant Hills Rd into Loch Maree Ave. The timing for this right hand turn is again approximately 20secs every 2 to 2.5 minutes.

Even assuming that the junction is clear with the current phasing of the lights it will not be possible to achieve the projected rate of truck movements.

An alternative approach would be for trucks exiting the Trelawney site to head south only and dump their load at sites in the south or south west. On their return heading north on Pennant Hills Rd they collect the next load from the Wilson St site and then head north only on Pennant Hills Rd to dump at a site to the north. On their return heading south they can enter the Trelawney site directly from Pennant Hills Rd.

- 1.4 Given the difficulty that is going to occur in achieving the required rate of truck movements, there may well be incentives for drivers to use alternative routes for access and parking while waiting for site access.

Given that the site will operate 24/7 it is essential that all trucks entering or leaving the site are absolutely prohibited from using Trelawney St, Nelson St and Loch Maree Ave, below the site entrance point, for access, egress or parking.

- 1.5 The site will operate 24/7 with heavy trucks continuously queuing. This will cause considerable noise pollution and disturbance to adjacent houses particularly at night.

To alleviate the noise disturbance an acoustic barrier at least 4m high should be constructed immediately to the east of the designated truck route and stretching from the entry at Loch Maree Ave to the loading area. Noise from trucks queuing must be kept to a minimum.

1.6 There is a bus stop outside 5 Loch Maree Ave which is used as school bus collection and drop off point. Children of all ages use this and many will have to cross the proposed entry into the Trelawney Rd site.

Adequate steps need to be taken that a safe crossing is provided for pedestrians.

2. Parking at Trelawney St Site.

The original proposal was that workers would park at the Pioneer Site, which RMS is taking over, and be ferried by van to the respective workplaces, though it should be noted that the Pioneer site is only 5 minutes walk to the Trelawney St Site.

The current plans show parking for 100 cars along the Eastern boundary of the Trelawney site. This parking will be within 6m of houses immediately adjoining the site, including bedrooms. Given that the site will operate 24/7 this will cause considerable disturbance in these properties and will also require the removal of two significant eucalyptus saligna (see 3. below and attached arborists report)

Additionally the proposed parking area will require the removal of 2 large Blue gums (see section 3 below) and the removal of existing plantings on the Trelawney St Site which otherwise would provide some protection against visual, noise and dust pollution from operations on site.

All parking spaces at the Trelawney St Site should be removed except for a small

number of spaces for short term visitors during normal working hours.

3. Vegetation at the Trelawney St Site.

The assessment which was carried out on behalf of RMS was cursory and incorrect: to quote:

“Table E3: Ancillary facilities – Trelawney Street compound

Description *This site is a developed urban block in Pennant Hills bound by Pennant Hills Rd, Loch Maree Avenue and Trelawney Street, containing a mix of commercial and residential uses. There was no site access and the vegetation was inspected from the roadside. The larger portion of this site is urban native/exotic vegetation in gardens. There were some trees that appeared to be Eucalyptus saligna however this could not be confirmed due to access conditions and they are likely to fall just outside the boundary of this block.*

Fauna species using this area are likely to be urban tolerant species.

Condition *Likely to be Poor. The vegetation at this site is in a highly urbanised context existing primarily in private properties. Access was not available to this site, but it is presumed that the vegetation present would be managed and in poor condition.*

Threatened

species of plant?

No threatened plant species were found at this site.”

In fact the part of the site, currently 2 Trelawney St , Thornleigh, has open access and if trespass was a consideration, no attempt appears to have been made to contact owners, agents or tenants to allow access.

As a result of not properly assessing the site, the report has incorrectly assumed that the eucalyptus saligna, which had been noted, are actually on the site not outside the boundary of the block as stated.

These are major trees and are of an age which pre-dates all adjacent buildings and are likely to be remnants of the original native vegetation. A report by a consultant arborist is appended to this submission which gives full details.

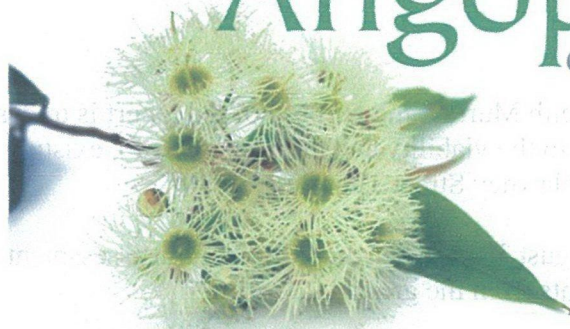
It should be noted that 2 Trelawney St was the subject of an approval by Hornsby Shire Council for subdivision into 2 blocks and that part of the approval was that these 2 trees were significant and had to be retained.

Given the final format of the site and the projected use during tunnel construction there is no reason why these trees should not be retained. The only potential inconvenience is a reduction in car parking spaces which shouldn't be there in any case.

These trees must be retained and protected during all phases of construction and operation of the site.

Angophora

consulting arborist



R 15/12

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Report

2 *Eucalyptus saligna* Sydney Blue Gum

2 Trelawney Street

Thornleigh NSW

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14-08-2014



1.0 Executive Summary

This report has been prepared for Keith Murray, the purpose of the report is to describe findings of an investigation relating to the viability and maintenance of 2 existing *Eucalyptus saligna* Sydney Blue Gum's at 2 Trelawney Street Thornleigh NSW.

Site orientation occurred on 11th August 2014, when an Arboricultural assessment was conducted a Visible Tree Assessments from the ground.

Following assessments of evidence gained during the project, a number of mitigation actions are made.

- 1.Tree 1 and 2
 - a. That both trees be retained
 - b. That the tree protection schedule be implemented
 - c. That both trees have Tree Protection Zones installed as per Australian Standard Protection of Trees on Development sites AS 4970-2009 (see page 25)

F. Jones

Frederick Jones

*Director/Senior Consultant
Angophora Consulting Arborist*

Dip of Horticulture (Arboriculture)
14th August 2014

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Visual Tree Assessments (VTA) was done from the ground. Not all tree defects may be visible from the ground. This VTA did not include diagnostic testing of the trees leaves or trunks. No testing was done of any of the trees root systems.

This is an arboriculture, not an ecological report. If remnant endemic vegetation exists, a "Threatened Species Seven Part Test" by a qualified ecologist may be required.

Arboriculturists cannot detect every condition that could possibly lead to the structural failure of a tree. Living trees are dynamic organisms subject to attack by disease, insects, fungi and other forces of nature.

Arboriculturists cannot guarantee that a tree will be healthy or safe under all circumstances, or for a specified period of time. Any recommended remedial treatments, like any medication, cannot be guaranteed. Trees will always pose some degree of risk. The only option for eliminating all associated risks from trees is the removal of all trees.

4.0 Assumptions:

- Site plans, diagrams, graphs and photographs in this report, intended as visual aids, are not necessarily to scale and should not be construed as engineering or architectural reports or surveys.
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- The inspection is limited to visual examination of accessible components unless otherwise stated.
- Any legal description provided to **Angophora Consulting Arborist** is assured to be correct. Any titles and ownership to any property are assumed to be correct. No responsibility is assumed for matters outside the consultant's control.
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- Information in this report covers only those items that were examined in accordance with the Terms of Reference, and reflects the condition of those items that were examined at the time of the inspection.
- The inspection is limited to visual examination of accessible components unless otherwise stated in the "Methodology" section of this report.
- The trees were assessed using the Visual Tree Assessment (VTA) method. The inspection is limited to a visual examination from the ground without tree dissection or soil excavation. Consent will be sought with the client to carry out any tree dissection or soil excavation if required. All measurements are approximate only. Any opinions or recommendations are the opinions of the assessing Arborist.

5.0 Introduction

This report was prepared by Angophora Consulting Arborist, Frederick Janes, Senior Consulting Arborist, at the request Keith Murray. The purpose of the report is to describe findings of an investigation relating to the viability and maintenance of 2 existing *Eucalyptus saligna* Sydney Blue Gum's at 2 Trelawney Street Thornleigh NSW.

5.1 The Aims of this report are to:

- Evaluate the tree health and condition
- Recommend mitigation options
- Assess impact upon the trees by the proposed works

6.0 Report

6.1 Methodology

On Monday 11th August 2014 site inspections were conducted when the tree was assessed to International Society of Arboricultural (ISA) Tree Risk Assessment Qualifications (TRAQ) when a Basic assessment occurred this is a visible assessment from the ground using a steel probe a percussion test using a rubber mallet was conducted (used to be call VTA) The inspection is limited to a visual examination from the ground without tree dissection or soil excavation for structural defects, health of the tree, the foliage condition, any insect damage visible from the outside, a rubber mallet was also used to sound the trunks detecting for any hollows that may be heard.

Consent will be sought with the client to carry out any tree dissection or soil excavation if required. All measurements are approximate only. Any opinions or recommendations represent the opinions of the assessing Arborist only.

6.2 Location

The trees are located at the rear of 2 Trelawney Street Thornleigh NSW. UBD Sydney and the Blue Mountains Street Directory 2013, Map 153, B, 11

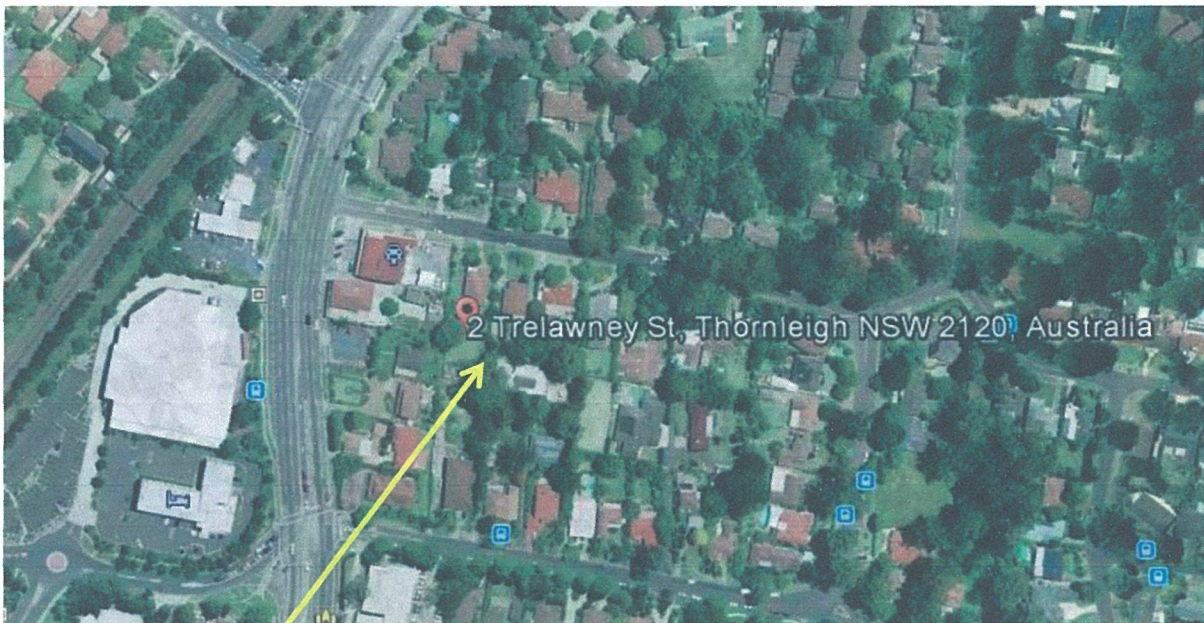


Figure 1 Approximate location of the tree.

6.3 Tree Measurements, Health and Structure

Tree 1 a mature *Eucalyptus saligna* Sydney Blue is a single trunk tree with a Diameter at Breast Height (DBH) of 900mm and with a height of 28 meters and a spread of 16 meters all measurements are approx. only.

The tree has a minor defect along 1 of its branched and some minor deadwood in the canopy

Tree 2 a mature *Eucalyptus saligna* Sydney Blue is a single trunk tree with a Diameter at Breast Height (DBH) of 1020mm and with a height of 28 meters and a spread of 16 meters all measurements are approx. only.

The tree has minor deadwood in the canopy with co dominant trunks separating about 5 meters above ground.

Both trees are visibly structurally sound and in good vigour and health.

Eucalyptus saligna Sydney Blue form part of a threatened forest Blue Gum High Forest

With the age of the trees they are assessed as remnant trees of the Eucalyptus High Forest



Photo 1 Tree 1 and 2



Photo 2 Tree 1 has a minor defect in 1 of its branches



Photo 3 Both trees crown are healthy with no sign of disease or insect damage



Photo 4 Tree 2 Co Dominant junction is visible sound

6.4 Blue Gum High Forest (Extract Hornsby Shire council web site)

This is a moist, tall open forest community, with dominant canopy trees of Sydney Blue Gum *Eucalyptus saligna* and Blackbutt *E. pilularis*. Forest Oak *Allocasuarina torulosa* and Sydney Red Gum *Angophora costata* also occur. Species adapted to moist habitat such as Lillypilly *Acmena smithii*, Sandpaper Fig *Ficus coronata*, Soft Bracken *Calochleana dubia* and Maiden Hair *Adiantum aethiopicum* may also occur.

Only 37 ha of Blue Gum High Forest remains in Hornsby Shire, most of which has been modified or degraded and is critically endangered. Often these areas consist of clumps of trees in urban landscapes in less developed sites such as Council reserves, large backyards, creek lines and schoolyards. These sites are of natural heritage significance as they are remnants of past vegetation. They contain genetic material indigenous to the area and provide habitat for native fauna including threatened species and endangered populations. They also form parts of vegetation corridors and urban habitat links and contribute to the landscape character of the suburb.

Many people would drive along Boundary Rd, Pennant Hills every day and not realise they are passing through a Blue Gum High Forest remnant. (see picture at right)

Local examples

Blue Gum High Forest can be seen in several areas of Hornsby Shire including Epping, Beecroft, Hornsby, Pennant Hills and Thornleigh.

6.5 Tree Protection Zone (TPZ)

Tree Protection Zone (TPZ) Generally the minimum distance from the centre of the tree trunk where protective fencing or barriers are to be installed to create an exclusion zone. The TPZ surrounding a tree aids the tree's ability to cope with disturbances associated with construction works. Tree protection involves minimising root damage that is caused by activities such as construction. Tree protection also reduces the chance of a tree's decline in health or death and the possibly damage to structural stability of the tree from root damage. To limit damage to the tree, protection within a specified distance of the tree's trunk must be maintained throughout the proposed development works. No excavation, stockpiling of building materials or the use of machinery is permitted within the Tree Protection Zone (TPZ). Using the Australian standard Protection of Trees on Development sites AS 4970-2009 (Incorporating Amendment no 1) $TPZ = DBH \times 12$ a TPZ is also based on the age of the tree, young, middle aged or mature, and the tree's vigour.

Structure Root Zone (SRZ) Refers to a radial offset measured from the edge of the trunk. This zone is often the location of the tree's structural support roots. Excavation within this area may seriously destabilize the tree. Fully elevated construction within this area is possible with specific root zone assessment, only when prescribed by a suitably qualified consulting arborist. As per Australian standard Protection of Trees on Development sites AS 4970-2009

Critical Root Zone (CRZ): Refers to a radial offset measured from the edge of the trunk. This zone is often the location of the tree's structural support roots. Excavation within this area may seriously destabilize the tree. Fully elevated construction within this area is possible with specific root zone assessment. CRZ distances are always rounded up to the closest 0.5 metre. The minimum CRZ given will never be less than 1.5 metres for a tree with a stem diameter less than 200mm. Trees with a DBH of greater than 300mm, the CRZ measurement could be achieved on one side of the TPZ by 10%, only when prescribed by a suitably

qualified consulting arborist. As per Australian standard Protection of Trees on Development sites AS 4970-2009.

Tree No	DBH	T.P.Z in meters	S.R.Z in meters	C.R.Z in meters
1	900mm	10.8	3.1661335	7.56
2	1020mm	12.24	3.3370249	8.57

7.0 Summary

The NSW state government with the Australian Government is proposing to construct a new road/tunnel linking M1 Newcastle to Melbourne. 2 Trelawney Street is to be used as a car park for the workers during construction.

Infrastructure in our cities needs to be built to accommodate the growing population and at times the environment the trees need to be removed but as these two trees are remnant and are situated in a temporary parking area every attempt should be made to retain these trees even if the car park is to be re-designed and car spaces are limited the benefits to future generations and to those who use this area such as social, astatically , storm water run-of cooling/shade and as remnant trees of the Eucalyptus High Forest.

8.0 Recommendation

Following assessments of evidence gained during the project, a number of mitigation actions are made.

- 1.Tree 1 and 2
 - d. That both trees be retained
 - e. That the tree protection schedule be implemented
 - f. That both trees have Tree Protection Zones installed as per Australian Standard Protection of Trees on Development sites AS 4970-2009 (see page 27)

9.0 References

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Australian standard Pruning of Amenity trees AS 4373-2007

Brooker M.I.H & Kleinig D.A (1999) Field Guide to Eucalypts Volume 1 South Eastern Australia, Bloomings Books

Australian Standard Protection of Trees on Development sites AS 4970-2009

Hornsby City Council website <http://www.hornsby.nsw.gov.au/>

10.0 Curriculum Vitae

Name Frederick Janes
Company Angophora Consulting Arborist
Position in Company Consulting Arborist
Qualifications Diploma in Horticulture (Arboriculture) Level 5
 (December 2006 Cert no RTF 50203)
 Bachelor of Adult Education (May 2000)
 Certificate IV Training and Assessing (2013)
 Senior First aid Certificate (2011)
 OH&S Induction Training (Green card) Feb 2006
 Chemical Application AQF3 (2010)
 NSW Driver's License Light Rigid (LR) Motor cycle (R)
 Elevated Work Platform (October 2007)
 Tree Risk Assessment Qualifications (ISA TRAQ) June 2014

Memberships Arboriculture Australia
 International Society of Arboriculture

Awards National Medal (1998)
 First clasp (2009)

Areas of expertise Trees on development sites
 Trees appraisals and risk assessments
 Risk and hazard assessment of trees
 Tree reports and surveys
 Tree maintenance schedules
 Planting and pruning education programs
 Community education and project mediation

Experience

- Eleven years extensive experience in the Arboriculture industry, firstly, as the principal of an Arborist company and, more recently, as a Consulting Arborist.
- Preparation of professional Arborist reports and conducting works for a range of public sector agencies, including the University of Western Sydney, Blue Mountains City Council, Nepean Hospital, Integral Energy and the Department of Defence Housing and a number of construction companies.
- Provided Arborist advice and services to private residents throughout NSW.
- In 2009 was invited to Victoria by Sp Austnet Aust and commissioned to assess damaged trees along power lines in the bush-fire damaged areas of Kinglake, Kinglake West, Flowerdale, Marysville and Beechwood. The work included an Audit of all trees within reach of the powerlines and conducting hazard ratings for all these trees.
- Mid 2009 was commissioned by Sp Austnet to conduct secondary assessments of the fire damaged areas of Kinglake, Kinglake West, Flowerdale, Marysville and Beechwood.

- Conducted an audit and tree assessment of Woods Point area where a bush fire had damaged many trees in 2006.
- In 2010 commissioned by Integral Energy to assess pruning standards across Integral Energy distribution network designing and implementing a Pruning Audit form based on the Australian Standard AS 4373 Pruning of amenity trees (2007) to be used by Integral Energy and their stakeholders to assess pruning standards.
- Extensive experience in the use of Picus Sonic Tomograph on trees that after a visible tree assessment indicated that there may be structural defects affecting the stability of the tree. Produced reports providing proof of the structural integrity of the tree for the client, councils and other interest parties.
- Extensive experience with the Land and Environment court of NSW
- 2011 commissioned by Integral Energy as their Vegetation Environments Specialist conducting independent assessments of Environment issues such as Review of Environmental factors and Conservation Risk Assessments including identifying significant flora species, aboriginal heritage items and historic heritage items.
- Developed a 2 days course for their Tree Management Officers in identifying tree structural defects.
- In December 2011 was commissioned to assess trees as part of the continuing investigation by the Environment Protection Authority (EPA) and Holroyd City Council into the cause of the Girraween dieback incident that has affected over 200 residents and Business this project was completed in November 2012.
- Finalist in the 2013 Blue Mountains Business awards
- 2014 Commissioned by many Public and High Schools from Emu Plains to Bathurst and Oberon to carry out trees hazards and risk Audit of their campuses

11.0 Terms and Abbreviations and Definitions

Abbreviation Meaning

APTA - Arboriculturists Preliminary Tree Assessment

AV - Amenity Value

CPZ - Canopy Protection Zone

DBH - Diameter at Breast Height

EP&AA - Act Environmental Planning & Assessment Act (1979)

EV - Environmental Value

g/l - ground level

HV - Heritage Value

LSR - Landscape Significance Rating

RPZ - Root Protection Zone

RV - Retention Value

SRZ - Structural Root Zone

S.U.L.E. Safe useful life expectancy

TMG - Tree Management Guidelines

TBMP - Tree and Bushland Management Provision

TMP - Tree Protection Measures

TPA - Tree Protection Plan

TPZ - Tree Protection Zone

TRV - Tree Retention Zone

UFTM - Urban Forest Technical Meeting

VTA - Visual Tree Assessment

Definitions

Aerial inspection: Where the subject tree is climbed by a professional tree worker or Arborist specifically to inspect and assess the upper stem and crown of the tree for signs or symptoms of defects, disease, etc.

Co-dominant: Refers to stems or branches equal in size and relative importance.

Compression wood: Type of reaction wood produced by conifers on the underside of branches and leaning trunks.

Condition: Refers to the tree's form and growth habit, as modified by its environment (aspect, suppression by other trees, soils) and the state of the scaffold (i.e. trunk and major branches), including structural defects such as cavities, crooked trunks or weak trunk/branch junctions. These are not directly connected with health and it is possible for a tree to be healthy but in poor condition.

Critical Root Zone

(CRZ): Refers to a radial offset measured from the edge of the trunk. This zone is often the location of the tree's structural support roots. Excavation within this area may seriously destabilize the tree. Fully elevated construction within this area is possible with specific root zone

assessment. CRZ distances are always rounded up to the closest 0.5 metre. The minimum CRZ given will never be less than 1.5 metres for a tree with a stem diameter less than 200mm. Trees with a DBH of greater than 300mm, the CRZ measurement could be achieved on one side of the TPZ by 10%, only when prescribed by a suitably qualified consulting arborist. As per Australian standard Protection of Trees on Development sites AS 4970-2009 (Incorporating Amendment no 1')

Dead wood: Refers to any whole limb that no longer contains living tissues (e.g. live leaves and/or bark). Some dead wood is common in a number of tree species.

Decay: Process of degradation of woody tissues by fungi or bacteria through decomposition of cellulose and lignin. There are numerous types of decay that affect different types of tissues, spread at different rates and have different affect on both the tree's health and structural integrity.

Diameter at Breast Height

(DBH): Refers to the tree trunk diameter at breast height (1.4 metres above ground level)

Dieback: Death of growth tips/shoots and partial limbs, generally from tip to base. Die back is often an indicator of stress and tree health.

Epicormic Shoots: Which arise from adventitious or latent buds. These shoots often have a weak point of attachment. They are often a response to stress in the tree. Epicormic growth/shoots are generally a survival mechanism, often indicating the presence of a current or past stress event such as fire, pruning, drought, etc.

Hazard: Refers to anything with the potential to harm health, life or property.

Health: Refers to the tree's vigour as exhibited by the crown density, leaf colour, presence of epicormic shoots, ability to withstand disease invasion, and the degree of dieback.

Included bark: Refers the pattern of development at branch or stem junctions where bark is turned inward rather than pushed out. This fault is located at the point where the stems/branches meet. This is normally a genetic fault and potentially a weak point of attachment as the bark obstructs healthy tissue from joining together to strengthen the joint.

Retention Value: Retention value relates to the combination of the tree condition factors (Form, Health & Structure), and also conveys an amenity value. Amenity relates to the trees biological, functional and aesthetic characteristics within an urban environment. (Hitchmough, 1994)

Scaffold branch/root: A primary structural branch of the crown or primary structural root of the tree.

Suppressed: In crown class, trees which have been overtopped and whose crown development is restricted from above.

Tension wood: Type of reaction wood produced by broad-leaved tree species which forms on the upper side of branches, stems and leaning trunks.

Topping or heading: Refers to a non-acceptable pruning practice that results in the removal of terminal growth leaving a cut stub end. Topping causes serious damage to the tree.

Tree Protection Zone

(TPZ): Generally the minimum distance from the centre of the tree trunk where protective fencing or barriers are to be installed to create an exclusion zone. The TPZ surrounding a tree aids the tree's ability to cope with disturbances associated with construction works. Tree protection involves minimising root damage that is caused by activities such as construction. Tree protection also reduces the chance of a tree's decline in health or death and the possibly damage to structural stability of the tree from root damage. To limit damage to the tree, protection within a specified distance of the tree's trunk must be maintained throughout the proposed development works. No excavation, stockpiling of building materials or the use of machinery is permitted within the Tree Protection Zone (TPZ). Using the Australian standard Protection of Trees on Development sites AS 4970-2009 (Incorporating Amendment no 1') $TPZ = DBH \times 12$ a TPZ is also based on the age of the tree, young, middle aged or mature, and the tree's vigour.

Visual Tree Assessment

(VTA): A procedure of defect analysis developed by Mattheck and Breloer (1994) that uses the growth response and form of trees to detect defects.

The following relates to terms or abbreviations that have been used in this report and provides the reader with a detailed explanation of those terms.

TYPE:

Indigenous (IND) Australian Native (AN) Exotic (E) Environmental Weed (EW)

AGE:

Immature (IM): Juvenile tree

Semi-mature (SM): Tree still growing

Mature (M): Specimen has reached expected size in current situation.

Over-mature/

Senescent (OM): Tree is over mature and in decline.

Dead (D): Tree is dead

FORM:

- Good (G):** Canopy full and symmetrical.
- Fair (F):** Minor asymmetry, or suppression. Considered typical for species in situation.
- Poor (P):** Canopy suppressed, major asymmetry. Stump re-growth.

HEALTH:

- Good (G):** Crown full, with good density. Foliage entire with good colour, minimal or no pathogen damage. Good growth indicators, e.g. extension growth. No or minimal canopy dieback. Good wound-wood development.
- Fair (F):** Tree is exhibiting one or more of the following symptoms; Tree has <30% dead wood, or can have minor canopy dieback; Foliage generally with good colour, some discolouration may be present, minor pathogen damage present. Typical growth indicators, e.g. extension growth, leaf size, canopy density for species in location may be slightly abnormal.
- Poor (P):** Tree has >30% dead wood. Canopy dieback present. Discoloured or distorted leaves, and/or excessive Epicormic growth. Pathogen is present and/or stress symptoms that could lead to or are leading to decline of tree.
- Dead (D):** Tree is dead.

STRUCTURE:

- Good (G):** Good branch attachment and/or no minor structural defects. Trunk and scaffold branches sound or only minor damage. Good trunk and scaffold branch taper. No branch over extension. No damage to structural roots and/or good buttressing present.
No obvious root pests or diseases.
- Fair (F):** Some minor structural defects and/or minor damage to trunk. Bark missing. Cavities could be present. Minimal or no damage to structural roots. Typical structure for species.
- Poor (P):** Major structural defects and/or trunk damaged and/or missing bark. Large cavities, and/or girdling or damaged roots that are problematic.
- Very Poor/
Hazardous (VP):** Tree poses immediate hazard potential that should be rectified as soon as possible.

GENERAL CONDITION:

Describes a tree or group of trees in a broad term of convenient précis that considers all of these Tree Descriptors as mentioned in Tree Assessment Table (Appendix 4).

12.0 Attachments

12.1 Tree Hazard Evaluation form

Angophora ISA Basic Tree Risk Assessment Form

Client: Keith Murray Date: 11-3-14 Time: 10:07

Address/Tree location: 2 Trelawney St Thornleigh Tree no.: 1 Sheet 1 of 1

Tree species: Sydney Blue Gum dbh: 900 Height: 28 Crown spread dia.: 16

Assessor(s): R. J. J. J. Time frame: 1 hr Tools used: Don't rope, shear, etc.

Target Assessment

Target number	Target description	Target zone			Occupancy rate 1 - rare 2 - occasional 3 - frequent 4 - constant	Practical to move target?	Restriction practical?
		Target within drip line	Target within 1 x ht.	Target within 1.5 x ht.			
1	<u>Recent dead</u>						
2							
3							
4							

Site Factors

History of failures: None Topography: Flat ☐ Slope: 0 % Aspect: 0

Site changes: None ☐ Grade change ☐ Site clearing ☐ Changed soil hydrology ☐ Root cuts ☐ Describe: None

Soil conditions: Limited volume ☐ Saturated ☐ Shallow ☐ Compacted ☐ Pavement over roots ☐ Describe: None

Prevailing wind direction: Common weather Strong winds ☐ Ice ☐ Snow ☐ Heavy rain ☐ Describe: None

Tree Health and Species Profile

Vigor: Low ☐ Normal ☐ High ☐ Foliage: None (seasonal) ☐ None (dead) ☐ Normal 90 % Chlorotic: 0 % Necrotic: 0 %

Pests: None Abiotic: None

Species failure profile: Branches ☐ Trunk ☐ Roots ☐ Describe: None

Load Factors

Wind exposure: Protected ☐ Partial ☐ Full ☐ Wind funneling ☐ Relative crown size: Small ☐ Medium ☐ Large ☐

Crown density: Sparse ☐ Normal ☐ Dense ☐ Interior branches: Few ☐ Normal ☐ Dense ☐ Vines/Mistletoe/Moss: None ☐

Recent or planned change in load factors: None

Tree Defects and Conditions Affecting the Likelihood of Failure

— Crown and Branches —

Unbalanced crown ☐ LCR: 70 % Cracks: None Lightning damage ☐

Dead twigs/branches: 10 % overall Max. dia.: None Included bark ☐

Broken/Hangers: None Max. dia.: None Weak attachments ☐ Cavity/Nest hole: 0 % circ.

Over-extended branches ☐ Previous branch failures ☐ Similar branches present ☐

Pruning history

Crown cleaned ☐ Thinned ☐ Raised ☐ Dead/Missing bark ☐ Cankers/Galls/Burls ☐ Sapwood damage/decay ☐

Reduced ☐ Topped ☐ Lion-tailed ☐ Conks ☐ Heartwood decay ☐

Flush cuts ☐ Other: None Response growth: None

Main concern(s): Dead wood, 3-4 m high, 2nd floor level

Load on defect: N/A ☐ Minor ☐ Moderate ☐ Significant ☐

Likelihood of failure: Improbable ☐ Possible ☐ Probable ☐ Imminent ☐

— Trunk —

Dead/Missing bark ☐ Abnormal bark texture/color ☐

Codominant stems ☐ Included bark ☐ Cracks ☐

Sapwood damage/decay ☐ Cankers/Galls/Burls ☐ Sap ooze ☐

Lightning damage ☐ Heartwood decay ☐ Conks/Mushrooms ☐

Cavity/Nest hole: 0 % circ. Depth: None Poor taper ☐

Lean: None Corrected? None

Response growth: None

Main concern(s): None

Load on defect: N/A ☐ Minor ☐ Moderate ☐ Significant ☐

Likelihood of failure: Improbable ☐ Possible ☐ Probable ☐ Imminent ☐

— Roots and Root Collar —

Collar buried/Not visible ☐ Depth: None Stem girdling ☐

Dead ☐ Decay ☐ Conks/Mushrooms ☐

Ooze ☐ Cavity: 0 % circ.

Cracks ☐ Cut/Damaged roots ☐ Distance from trunk: None

Root plate lifting ☐ Soil weakness ☐

Response growth: None

Main concern(s): None

Load on defect: N/A ☐ Minor ☐ Moderate ☐ Significant ☐

Likelihood of failure: Improbable ☐ Possible ☐ Probable ☐ Imminent ☐

Risk Categorization

Condition number	Tree part	Conditions of concern	Part size	Fall distance	Target number	Target protection	Likelihood												Consequences				Risk rating of part (from Matrix 2)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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Matrix 1. Likelihood matrix.

Likelihood of Failure	Likelihood of Impacting Target			
	Very low	Low	Medium	High
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2. Risk rating matrix.

Likelihood of Failure & Impact	Consequences of Failure			
	Negligible	Minor	Significant	Severe
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

Notes, explanations, descriptions

Removal trees

Mitigation options Monitor during construction

Protect T.P.D.

Re-assess after construction

Residual risk

Residual risk

Residual risk

Residual risk

Overall tree risk rating Low ☐ Moderate ☐ High ☐ Extreme ☐

Work priority 1 ☐ 2 ☐ 3 ☐ 4 ☐

Overall residual risk Low ☐ Moderate ☐ High ☐ Extreme ☐

Recommended inspection interval

Data ☐ Final ☐ Preliminary ☐ Advanced assessment needed ☐ No ☐ Yes-Type/Reason

Inspection limitations ☐ None ☐ Visibility ☐ Access ☐ Vines ☐ Root collar buried Describe

Angophora ISA Basic Tree Risk Assessment Form

Client: Keith Murray Date: 11-3-14 Time: 10:11
 Address/Tree location: 2 Trelawney St Thornleigh Tree no: 2 Sheet 1 of 1
 Tree species: Sydney Blue Gum dbh: 2020 Height: 28 Crown spread dia: 16
 Assessor(s): E. J. J. J. Time frame: 2yrs Tools used:

Target Assessment

Target number	Target description	Target zone			Occupancy rate 1 - none 2 - occasional 3 - frequent 4 - constant	Practical to move target?	Restriction practical?
		Target within drip line	Target within 1 x Ht	Target within 1.5 x Ht			
1	<u>Victory Lane</u>						
2							
3							
4							

Site Factors

History of failures: Topography Flat ☒ Slope ☐ % Aspect
 Site changes: None ☒ Grade change ☐ Site clearing ☐ Charged soil hydrology ☐ Root cuts ☐ Describe
 Soil conditions: Limited volume ☐ Saturated ☐ Shallow ☐ Compacted ☐ Pavement over roots ☒ 90 % Describe
 Prevailing wind direction Common weather: Strong winds ☐ Ice ☐ Snow ☐ Heavy rain ☐ Describe

Tree Health and Species Profile

Vigor: Low ☐ Normal ☒ High ☐ Foliage: None (seasonal) ☐ None (dead) ☒ Normal % Chlorotic % Necrotic %
 Pests: Abiotic:
 Species failure profile: Branches ☒ Trunk ☐ Roots ☐ Describe

Load Factors

Wind exposure: Protected ☐ Partial ☒ Full ☐ Wind funneling ☐ Relative crown size: Small ☐ Medium ☒ Large ☐
 Crown density: Sparse ☐ Normal ☒ Dense ☐ Interior branches: Few ☐ Normal ☒ Dense ☐ Vines/Mistletoe/Moss ☐
 Recent or planned change in load factors:

Tree Defects and Conditions Affecting the Likelihood of Failure

— Crown and Branches —

Unbalanced crown ☐ LCR 70 %
 Dead twigs/branches ☒ % overall Max. dia.
 Broken/hangers: Number Max. dia.
 Over-extended branches ☐
 Pruning history: Crown cleaned ☒ Thinned ☐ Raised ☐
 Reduced ☒ Topped ☐ Lion-tailed ☐
 Flush cuts ☐ Other
 Main concern(s): Dead twigs/branches
 Cracks ☐ Lightning damage ☐
 Codominant ☒ Included bark ☐
 Weak attachments ☐ Cavity/Nest hole % circ.
 Previous branch failures ☐ Similar branches present ☐
 Dead/Missing bark ☐ Cankers/Galls/Burls ☐ Sapwood damage/decay ☐
 Conks ☐ Heartwood decay ☐
 Response growth

Load on defect: N/A ☐ Minor ☐ Moderate ☐ Significant ☐
 Likelihood of failure: Improbable ☐ Possible ☐ Probable ☐ Imminent ☐

— Trunk —

Dead/Missing bark ☐ Abnormal bark texture/color ☐
 Codominant stems ☐ Included bark ☐ Cracks ☐
 Sapwood damage/decay ☐ Cankers/Galls/Burls ☐ Sap ooze ☐
 Lightning damage ☐ Heartwood decay ☐ Conks/Mushrooms ☐
 Cavity/Nest hole % circ. Depth Poor taper ☐
 Lean * Corrected?
 Response growth
 Main concern(s):

Load on defect: N/A ☐ Minor ☐ Moderate ☐ Significant ☐
 Likelihood of failure: Improbable ☐ Possible ☐ Probable ☐ Imminent ☐

— Roots and Root Collar —

Collar buried/Not visible ☐ Depth Stem girdling ☐
 Near ☐ Decay ☐ Conks/Mushrooms ☐
 Ooze ☐ Cavity ☐ % circ.
 Cracks ☐ Cut/Damaged roots ☐ Distance from trunk
 Root plate lifting ☐ Soil weakness ☐

Response growth
 Main concern(s):

Load on defect: N/A ☐ Minor ☐ Moderate ☐ Significant ☐
 Likelihood of failure: Improbable ☐ Possible ☐ Probable ☐ Imminent ☐

Risk Categorization

Condition number	Tree part	Conditions of concern	Part size	Fall distance	Target number	Target protection	Likelihood										Consequences				Risk rating of part (from Matrix 2)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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Matrix 1. Likelihood matrix.

Likelihood of Failure	Likelihood of Impacting Target			
	Very low	Low	Medium	High
Imminent	Unlikely	Somewhat likely	Likely	Very likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2. Risk rating matrix.

Likelihood of Failure & Impact	Consequences of Failure			
	Negligible	Minor	Significant	Severe
Very likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

Notes, explanations, descriptions

Removal trees

Mitigation options

Residual risk

Residual risk

Residual risk

Residual risk

Overall tree risk rating Low ☐ Moderate ☐ High ☐ Extreme ☐

Work priority 1 ☐ 2 ☐ 3 ☐ 4 ☐

Overall residual risk Low ☐ Moderate ☐ High ☐ Extreme ☐

Recommended inspection interval

Data ☐ Final ☐ Preliminary Advanced assessment needed ☐ No ☐ Yes-Type/Reason

Inspection limitations ☐ None ☐ Visibility ☐ Access ☐ Vines ☐ Root collar buried Describe

Attachment 4 Front cover NorthConnex Factsheet July 2014


NorthConnex

Building for the future

Project information line: 1800 997 057 (free call)
 Email: enquiries@northconnex.com.au
 NorthConnex is the new name for the M1-M2 project

Factsheet | July 2014
www.northconnex.com.au


Trelawney Street tunnel support facility



NorthConnex will deliver significant benefits to local communities by easing congestion on Pentland Hills Road, putting more than 5,800 trucks a day underground and returning local streets to local communities. It will also boost the state and national economies by providing more reliable journeys and shorter travel times for the movement of freight. If approved, NorthConnex would enable travel from Newcastle (M1) to Melbourne without a single set of traffic lights.

The Trelawney Street tunnel support facility would serve the northern portion of the tunnel. The facility would include an emergency smoke extraction, air intake system and a substation. The site would also serve as temporary construction site and compound.

Temporary facilities – construction compound



NSW

GOVERNMENT

The new state

13.5 Attachment 5 Tree Protection Schedule

Action	Date	Signed
Preparation		
Appoint appropriate Arboricultural expert to oversee tree protection measures as required during the development project.		
Delegate member of site construction team as Tree Protection Representative. (N.B. This person will be responsible for ensuring that the protective fencing is inspected on a daily basis during site establishment and construction.)		
Ensure that Tree Protection Schedule is available, has been read and fully understood, checking any queries with retained Arborist.		
Ensure that Tree Protection Induction Sheets are available to be read and signed by all site contractors.		
Display Tree Protection Plan laminated on Site Office wall.		

Action	Date	Signed
First Phase – site establishment		
Retained Arborist to establish layout of protective fencing for retained and protected tree and mark all trees to be retained.		
Project manager to verify each tree to be retained and marked by the Project Arborist.		

Action	Date	Signed
First Phase – site establishment		
Prune any deadwood and overhanging branches required. <i>This process will be appropriately supervised by the retained Arboriculturalist and according to Australian Standard 4373-1996 Pruning of Amenity Trees and the Work Cover Code of Practice for the Amenity Tree Industry.</i>		
Install composted woodchip mulch to a depth of 120mm in exposed area of TPZ (not garden bed)		
Install specified TPZ fencing around along all trees SRZ and <i>This process will be appropriately supervised by the retained Arboriculturalist.</i>		
Project Arborist to supply and install Tree Protection Area signs and a Prohibited Activities sign near Trees		
Project Arborist to Irrigate, improve soil and check mulch protection levels.		

HOLD POINT – REPORTING STAGE**Initial tree work****Tree Protection Fencing with signs correctly in place****Mulch correctly installed**

The project Arborist should certify the works on completion.

Action	Date	Signed
Site establishment and construction		
Undertake earthworks all outside of TPZ/CRZ		
Undertake earthworks inside tree CRZ/SRZ under supervision of site Arborist		
Project Arborist to irrigate, improve soil, check mulch protection levels and weed if necessary		
If in unlikely event that tree roots are uncovered near the TPZ the Arborist will sever the roots clinically		
Install scaffold board ground protection if needed within or near the TPZ. <i>This process will be appropriately supervised by the retained Arboriculturalist</i>		
Once all of the main construction activities are completed, and scaffold etc. removed, the protective fencing can be removed. This should be carried out by hand. Heavy vehicles or plant should not be allowed within the tree protection zone between the new buildings and the trees. <i>This process will be appropriately supervised by the retained Arboriculturalist</i>		
On the completion of construction, contact retained Arboriculturalist to inspect the Tree Protection Zone.		

REPORTING STAGE: Final certification

The Arborist should assess the condition of the tree and its growing environment, and make recommendations for any necessary remedial actions.

WEEKLY INSPECTION ITEMS

Action	Date	Signed
Check presence and condition of Tree protection fencing, signs, soil moisture, and tree condition		
Ensure that no personnel, fuels, chemicals or other materials are allowed into the Tree Protection Area		
Ensure no access equipment, including scaffolding, is allowed into the Tree Protection Area		
Scaffolding should include appropriate netting and ground boards to prevent debris from falling into the Tree Protection Area		
In the eventuality of a transgression of these conditions, contact the retained Arboriculturalist to establish whether any appropriate remedial action should be taken		