TWEED SHIRE COUNCIL

Murwillumbah CBD

STREET TREES

HEALTH ASSESSMENT

REPORT 45 TREES

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Main Report

SYNOPSIS

The following Arborist Report was prepared by, LUKE PAGE Arborist for Tweed Shire Council on the request of Tweed Shire Council, (TSC) New South Wales.

This Health Assessment Report provides information relating to the health of forty five street trees located on Murwillumbah CBD Central Business District Brisbane Street, Wollumbin Street Commercial street and Murwillumbah street.

The forty five Subject Trees are in a linear formation around the CBD which there are ten different species which are all native to Australia. The trees were assessed using a Visual Tree Assessment (VTA) method. Based on a visual examination of the trees, the condition, health and vigour of the trees were determined.

Modification to soil profile, poor to no aeration due to the heavy infrastructure and hardscapes (concrete/Asphalt) has restricted root development and a lack of management over past years. A combination of all these factors may contribute to the decline of the Subject Trees health.

INTRODUCTION

1.1 Project Brief

The Brief is to undertake an assessment of forty five trees for Tweed Shire Council. The subject site is situated in the CBD of Murwillumbah. The report should be read as a preliminary report into the health of forty five trees in total 18 *Syzygium floribundum*(Weeping Lilly Pilly), 1 *Podocarpus elatus* (Plum Pine) 7 *Flindersia brayleyana*(Queensland Maple), 2 *Backhousia citrioodora* (Lemon-scented Myrtle), 1 *Syzygium moorei*(Durobby), 2 *Harpullia pendula* (Tulipwood), 9 *Leiderema pulchella* (Fine-leaved Tuckeroo), *3Syzygium hemilamprum*(Broad-leaf lilly pilly), 1*SyzygiumFrancisii*(Rose Santinash) 1*Syzygium luehmannii* (Riberry)

1.2 Tree Description

Assessed trees 1 – 45 are , 18*Syzygium floribundum* (Weeping Lilly Pilly), 1 *Podocarpus elatus* (Plum Pine) 6 *Flindersia brayleyana* (Queensland Maple), 2 *Backhousia citrioodora* (Lemon-scented Myrtle), 1 *Syzygium moorei*(Durobby), 2 *Harpullia pendula* (Tulipwood), 9 *Leiderema pulchella* (Fine-leaved Tuckeroo), 3*Syzygium hemilamprum*(Broad-leaf lilly pilly) , 1*SyzygiumFrancisii*(Rose Santinash) 1*Syzygium luehmannii* (Riberry).

All trees are native species to Australia. They are widely cultivated and used in parks, avenues, streets, regeneration areas throughout the Far north Coast and Northern Rivers.

Photo- Subject Trees No. 1 through to 45 CBD Murwillumbah

2. BACKGROUND

2.1 General

An ongoing maintenance programme of the pruning of the Subject trees around the CBD of Murwillumbah and over the surrounding roads.

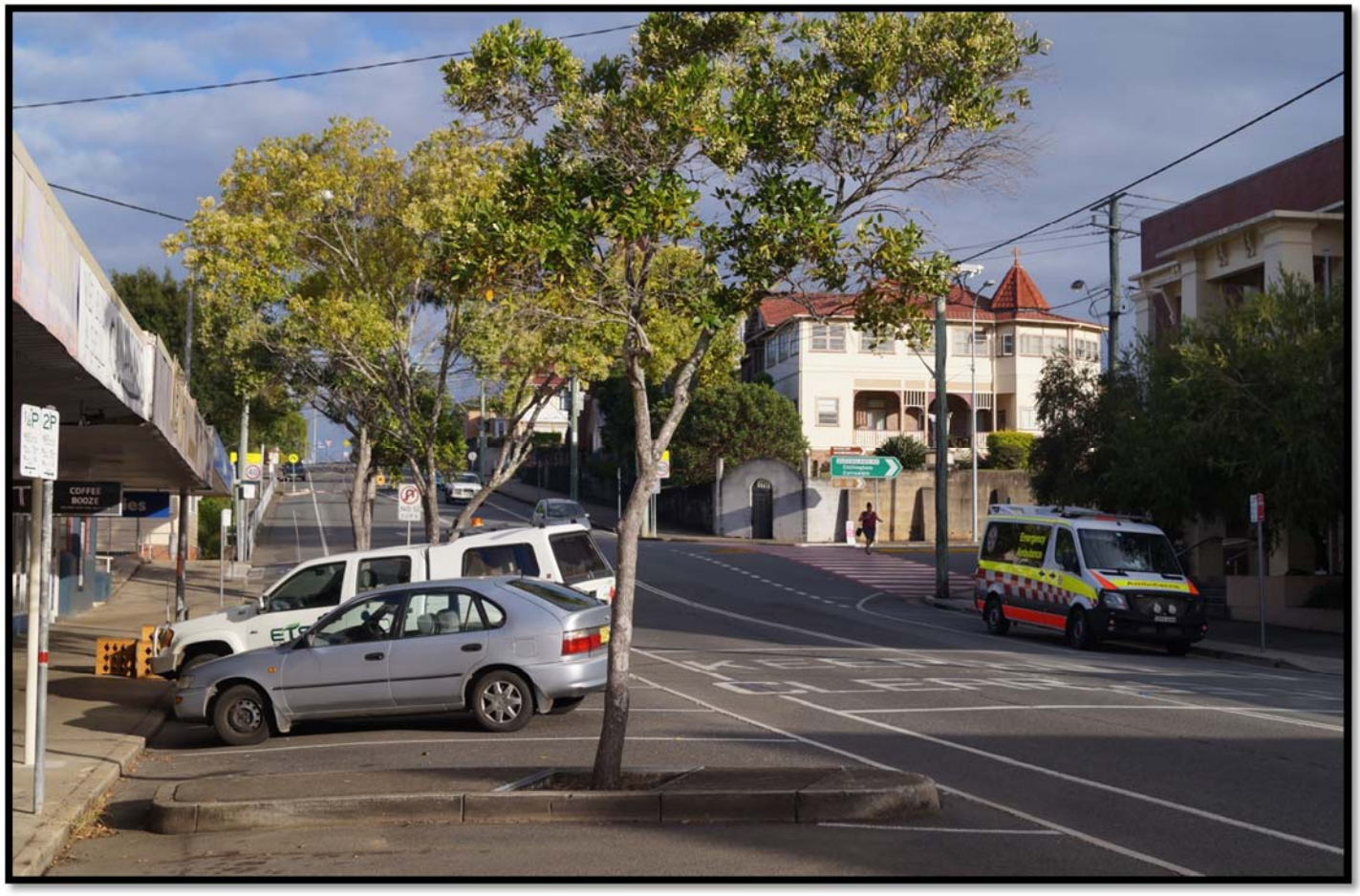
There have been five trees removed around the CBD due to dying or infrastructure damage.

2.2 Subject Site

The subject site is located around the central business district of Murwillumbah, taking in Murwillumbah Street, Wollumbin Street, Brisbane Street and Commercial road.

The Subject Trees 1 to 45 forms a linear formation around the Central Business District as highlighted below.

Tweed Shire regional map



Subject Site& Trees

Subject Site & Trees

2.3 HISTORY

Investigations show that Murwillumbah Street, Brisbane Street, and Commercial Road were all planted in 1997 by Tweed Shire Council making most of the trees around 20 years old. Trees were all advanced stock and were planted for the beatification of the CBD of Murwillumbah.

The soils which consist of heavy compacted wet clay and had strong kerosene smell due to the practices used of old to keep the dust at bay. The trees were planted at a depth of around 1.5m depth and back filled with a garden loam. Root barrier was installed at a depth of 600mm and concreate kerbing and roads were reinstated. The areas around all Subject Trees have poor to no aeration due to the heavy infrastructure and heavy clay soils.

Murwillumbah CBD 1997

Photos- Soil structure through the CBD Murwillumbah 2015

3. METHOD

3.1 Methodology

All relevant data was collected at time of inspection. The trees are numbered for the purpose of this report only.

Identification of the species was carried out on site with collection and labelling of plant samples.

Diameter at Breast Height (DBH) was obtained by measuring the trees circumference using a field tape and then divided by (3.14) to calculate diameter. Circumference was measured at approximatly1300mm above existing ground level. Estimates of height and canopy spread along the major axis also measured with a field tape and ‘tree stick method’.

A 5mm diameter, 900mm long metal probe was used to assess the depth of cavities and hollows throughout the Subject Trees, and to assess soil compaction.

Photos were taken by the author using a digital SLR camera.

3.2 Visual Tree Assessment

The trees were assessed using a Visual Tree Assessment (VTA) method.

Definition-

“The thorough optical check on the condition and health of the tree’ made from the ground ‘this includes external factors that may impact on the health and vigor of the tree.”(Matteck & Breloer 1994).

Explanation-

The tree shows through its configuration what is wrong with it. This understanding is the basis for the visual assessment system known as VTA. (Matteck & Breloer 1994).

4. OBSERVATIONS

4.1 Abiotic Factors

The Subject Trees are around Murwillumbah CBD are located in soils which consists of heavy compacted wet clay soil. Aspect is reasonably open; trees are protected from prevailing winds and elements from surrounding buildings.
The trees were planted in at a depth of around 1.5m depth and back filled with garden loam. Root barrier was installed at a depth of 600mm and concreate kerbing and roads were reinstated. The areas around all Subject Trees have poor to no aeration due to the heavy infrastructure and hardscapes (concrete/Asphalt).

Photos- Soil structure through the CBD Murwillumbah 2015

4.2 Biotic Factors

There are many visual biotic factors observed which are covered in more detail in the Individual Tree Inspection Data Collection Sheets.

- Small to medium deadwood present
- past and recent mechanical damage to trunk and branches
- ‘crown lifting’ of lower canopies
- Tree roots surrounded in hardscapes (concrete/Asphalt) will not be able to absorb water, oxygen or nutrients.
- Evaporation and sunburn due to the temperatures from the hardscape surfaces around the subject trees.
- Topping or crown reduction due to overhead services (Powerlines) which reduces types of species and location of plantings in and around the Central Business District.

Photos- Infrastructure damage throughout the CBD Murwillumbah

Tree No.	Botanical name (Common name)	DBH	Height	Canopy spread (meters)				Condition			Quantified Tree Risk Assessment			
	Location	Meters @1.3m	Meters Approx	N	E	S	W	Age Juvenile Established Mature Over Mature	Vigour Poor Average Good	Structure Poor Average Good	Target Evaluation Structure Pedestrians Vehicles	Impact Potential Size of part most likely to harm	Probability of failure Within next 12 months	Assessed risk Not acceptable >1:10,000
TR01	Syzygium hemilamprum (Broad-leaf lilly pilly)	0.4m	10	5	4	5	5	E	A	A	N/A	N/A	N/A	N/A
		Comments: Tree one does have minor deadwood throughout canopy. Infrastructure is being compromised by this tree. Tree is in average condition.									Tree AZ:			
TR02	Syzygium hemilamprum (Broad-leaf lilly pilly)	0.3m	6	4	5	4	4	E	P	P	N/A	N/A	N/A	N/A
		Comments: Tree two does have minor deadwood throughout canopy. This tree is in a slow decline.									Tree AZ:			
TR03	Syzygium hemilamprum (Broad-leaf lilly pilly)	0.1m	5	2	2	2	2	E	P	P	N/A	N/A	N/A	N/A
		Comments: Tree three does have very small amounts of deadwood throughout. Service line goes above this tree. Tree is in a slow decline.									Tree AZ:			

TR04	Syzygium floribundum (Weeping Lilly Pilly)	0.3m	6	4	5	4	4	E	A	A	N/A	N/A	N/A	N/A
		Comments: Tree four does have minor deadwood throughout. Infrastructure is being compromised by this tree. Tree is in average condition.									**Tree AZ:**			

TR05	Leiderema pulchella (Fine-leavedTuckeroo)	0.1m 0.1m 0.1m	3.5	2	2	2	2	E	P	P	N/A	N/A	N/A	N/A
		Comments: Tree five does have deadwood throughout. This tree is in decline. Tree is in poor condition.									**Tree AZ:**			

TR06	Leiderema pulchella (Fine-leavedTuckeroo)	0.3m	4	3	2	3	3	E	P	P	N/A	N/A	N/A	N/A
		Comments: Tree six does have major deadwood throughout canopy, half of the tree is dead. Tree is reshooting from ground. This tree is in decline and is in poor health.									**Tree AZ:**			

TR07	Leiderema pulchella (Fine-leavedTuckeroo)	0.3m	4	4	3	3	4	E	P	P	N/A	N/A	N/A	N/A
		Comments: Tree seven has minor deadwood throughout canopy									**Tree AZ:**			

TR08	Leiderema pulchella (Fine-leavedTuckeroo)	0.3m	4	3	4	4	3	E	A	A	N/A	N/A	N/A	N/A
		Comments: Tree eight looks good, no deadwood present.									**Tree AZ:**			

TR09	Leiderema pulchella (Fine-leavedTuckeroo)	0.3m 0.2m 0.2m	4	4	3	4	4	E	A	A	N/A	N/A	N/A	N/A
		Comments: Tree nine looks good, no deadwood present. Services present x3 above this tree.									**Tree AZ:**			

TR10	Leiderema pulchella (Fine-leavedTuckeroo)	0.3m	4	4	3	4	4	E	A	A	N/A	N/A	N/A	N/A
		Comments: Tree ten does have minor deadwood throughout. This tree is in decline on the western side. Services present above this tree. Bark and trunk damage present.									**Tree AZ:**			

TR11	Leiderema pulchella (Fine-leavedTuckeroo)	Too small	2.5	1	1	1	1	J	A	A	N/A	N/A	N/A	N/A
		Comments: Tree eleven has been replaced, previous tree was removed. Lower trunk section has been damage by vehicles.									**Tree AZ:**			

TR12	Leiderema pulchella (Fine-leavedTuckeroo)	0.2m 0.1m	3	2	2	2	2	E	A	A	N/A	N/A	N/A	N/A
		Comments: Tree twelve has minor deadwood throughout, trunk has been damaged. This tree is in decline.									**Tree AZ:**			

TR13	Leiderema pulchella (Fine-leavedTuckeroo)	0.1m 0.2m	3	2	3	3	3	E	A	A	N/A	N/A	N/A	N/A
		Comments: Tree thirteen does have minor deadwood throughout. Lower trunk has wound precent. This tree is in decline.									**Tree AZ:**			

TR14	*Backhousia* citrioodora (Lemon-scented Myrtle)	0.1m 0.1m	4	2.5	2.5	2	2	E	A	A	N/A	N/A	N/A	N/A
		Comments: Tree fourteen does have deadwood precent. Tree guards have been replaced around the base.									**Tree AZ:**			

TR15	*Backhousia* citrioodora (Lemon-scented Myrtle)	0.1m 0.1m 0.1m	4	2.5	2	3	3	E	A	A	N/A	N/A	N/A	N/A
		Comments: Tree fifteen does have minor deadwood throughout. Tree guards have been replaced around the base.									**Tree AZ:**			
TR16	Harpullia pendula (Tulipwood)	0.1m	2	1	1	1	1	J	G	G	N/A	N/A	N/A	N/A
		Comments: Tree sixteen has been replaced when new pipeline was replaced.									**Tree AZ:**			
TR17	Flindersia brayleyana (Queensland Maple)	0.3m	9	3	3	3	3	E	P	P	N/A	N/A	N/A	N/A
		Comments: Tree seventeen does have small to medium deadwood precent. Infrastructure is being compromised. Tree is in decline.									**Tree AZ:**			
TR18	Flindersia brayleyana (Queensland Maple)	2.2	19	13	13	10	12	E	G	G	N/A	N/A	N/A	N/A
		Comments: Tree eighteen does have small deadwood precent. Infrastructure is being compromised. Services present on the eastern side of this tree.									**Tree AZ:**			

TR19	Syzygiummoorei (Durobby)	0.4m	9	3	4	3	4	E	A	A	N/A	N/A	N/A	N/A
		Comments: Tree nineteen does have very small amounts off deadwood present. Services present. Epiphyte present.									**Tree AZ:**			

TR20	Flindersia brayleyana (Queensland Maple)	0.5m	11	6	5	5	5	E	A	A	N/A	N/A	N/A	N/A
		Comments: Tree twenty does have very minor deadwood precent Infrastructure is being compromised badly.									**Tree AZ:**			

TR21	Flindersia brayleyana (Queensland Maple)	0.4m	11	4	4	4	4	E	A	A	N/A	N/A	N/A	N/A
		Comments: Tree twenty- one does have minor deadwood. Lower trunk damage present from vehicles. Services x4 and street light present. Infrastructure damage.									**Tree AZ:**			

TR22	Flindersia brayleyana (Queensland Maple)	0.3m	8	3	3	3	3	E	A	A	N/A	N/A	N/A	N/A
		Comments: Tree twenty- two does have minor deadwood. Lower trunk damage present from vehicles. Services x1 present. Infrastructure damage.									**Tree AZ:**			

TR23	Flindersia brayleyana (Queensland Maple)	0.4m	9	4	4	4	4	E	A	A	N/A	N/A	N/A	N/A
		Comments: Tree twenty-three does have minor deadwood. Lower trunk damage present from vehicles. Services x5 and street light present. Infrastructure damage.									**Tree AZ:**			

TR24	Harpullia pendula (Tulipwood)	0.3m	6	3	3	3	3	E	A	A	N/A	N/A	N/A	N/A
		Comments: Tree twenty-four does have minor deadwood present. Trunk damage visible. Over prune due building and signs. Services above.									**Tree AZ:**			

TR25	SyzygiumFrancisii (Rose Santinash)	0.2m	5	3	3	3	3	E	A	P	N/A	N/A	N/A	N/A
		Comments: Tree twenty-five has minor deadwood. Major bark damage due to trucks. Snapped old stubs present.									**Tree AZ:**			

TR26	Syzygium luehmannii (Riberry)	0.2	4	3	3	3	3	E	A	A	N/A	N/A	N/A	N/A
		Comments: Tree twenty-six has minor deadwood. Services above.									**Tree AZ:**			

TR27	Flindersia brayleyana (Queensland Maple)	0.3	9	3	5	3	2	E	P	P	N/A	N/A	N/A	N/A
		Comments: Tree twenty-seven has minor deadwood, this tree has been topped due to services x2 and street light.									**Tree AZ:**			

TR28		0.2m	6	3	3	3	3	E	A	A	N/A	N/A	N/A	N/A

	Podocarpus elatus (Plum Pine)													
		Comments: Tree twenty-eight has been topped due to street light and has been over pruned due to building. Epiphytes present.									**Tree AZ:**			
TR29	Syzygium floribundum (Weeping Lilly Pilly)	0.4m	9	6	7	7	7	E	A	A	N/A	N/A	N/A	N/A
		Comments: Tree twenty-nine has minor deadwood present. Branch tear over road side on trunk. Branches rubbing and touching roof line.									**Tree AZ:**			
TR30	Syzygium floribundum (Weeping Lilly Pilly)	0.1m	3	2	2	2	2	J	G	G	N/A	N/A	N/A	N/A
		Comments: Tree thirty has been replaced recently. Service above.									**Tree AZ:**			
TR31		0.1m	4	2	2	2	2	J	A	A	N/A	N/A	N/A	N/A

	Syzygium floribundum (Weeping Lilly Pilly)													
		Comments: Tree thirty-one has been replaced recently. Service above. Trunk and branch damage, snapped branch on road side.									**Tree AZ:**			
TR32	Syzygium floribundum (Weeping Lilly Pilly)	0.3m	8	2	2	4	4	E	A	A	N/A	N/A	N/A	N/A
		Comments: Tree thirty-two has been topped due to powerlines. Lower trunk and bark damage from vehicles. Services x3 and street light present.									**Tree AZ:**			
TR33	Syzygium floribundum (Weeping Lilly Pilly)	0.1m 0.1m 0.1m	4	2	2	2	1	J	A	P	N/A	N/A	N/A	N/A
		Comments: Tree thirty-three has lower trunk and bark damage due to vehicles. Services above.									**Tree AZ:**			

TR34	Syzygium floribundum (Weeping Lilly Pilly)	0.2m	4	3	3	3	2	E	A	A	N/A	N/A	N/A	N/A
		Comments: Tree thirty-four has been topped due to services above, it has minor deadwood. This tree is in a garden bed with mulch.									**Tree AZ:**			

TR35	Syzygium floribundum (Weeping Lilly Pilly)	0.1m	3	2	2	2	2	J	A	A	N/A	N/A	N/A	N/A
		Comments: Tree thirty- five is a young tree. It's in a garden bed with mulch.									**Tree AZ:**			

TR36	Syzygium floribundum (Weeping Lilly Pilly)	0.2m	8	3	3	3	3	E	A	A	N/A	N/A	N/A	N/A
		Comments: Tree thirty-six is encroaching into services- will be topped soon. This tree is in a garden bed style with mulch.									**Tree AZ:**			

TR37	Syzygium floribundum (Weeping Lilly Pilly)	0.1m 0.2m	4.5	2	2	2	2	E	P	P	N/A	N/A	N/A	N/A
		Comments: Tree thirty-seven has deadwood throughout. The crown and tree is in decline. Does have insect attack.									**Tree AZ:**			

TR38	Syzygium floribundum (Weeping Lilly Pilly)	0.2m	5	3	1	5	3	E	P	P	N/A	N/A	N/A	N/A
		Comments: Tree thirty-eight has minor deadwood throughout. This tree has been over pruned due to services. This tree is in decline.									**Tree AZ:**			

TR39	Syzygium floribundum (Weeping Lilly Pilly)	0.2m	4	3	3	3	3	E	P	P	N/A	N/A	N/A	N/A
		Comments: Tree thirty-nine has minor deadwood throughout. Services precent above.									**Tree AZ:**			

TR40	Syzygium floribundum (Weeping Lilly Pilly)	0.3m	9	5	5	3	1	E	A	P	N/A	N/A	N/A	N/A
		Comments: Tree forty has minor deadwood. Top of the tree has decline and is dead, and has been over pruned due to building.									**Tree AZ:**			

TR41	Syzygium floribundum (Weeping Lilly Pilly)	0.3m	10	1.5	1.5	1.5	1.5	E	P	P	N/A	N/A	N/A	N/A
		Comments: Tree forty-one has several branches which have recently died. Lower trunk damage, with services and street light precent.									**Tree AZ:**			

TR42	Syzygium floribundum (Weeping Lilly Pilly)	0.5m	10	2	3	1.5	1	E	A	A	N/A	N/A	N/A	N/A
		Comments: Tree forty-two has minor deadwood precent and has been over pruned due to street light.									**Tree AZ:**			

TR43		0.4m	9	2	3	3	3	E	A	A	N/A	N/A	N/A	N/A

	Syzygium floribundum (Weeping Lilly Pilly)													
		Comments: Tree forty-three has minor deadwood precent, with old fairy lights precent (not working).									**Tree AZ:**			

TR44	Syzygium floribundum (Weeping Lilly Pilly)	1.7	20	10	14	12	15	E	G	G	N/A	N/A	N/A	N/A
		Comments: Tree forty-four has lower branch scrapping due to vehicles.									**Tree AZ:**			

TR45	Syzygium floribundum (Weeping Lilly Pilly)	0.2m 0.2m	8	2	2	5	1	E	P	P	N/A	N/A	N/A	N/A
		Comments: Tree forty-five has minor to medium deadwood precent, bark cracking due to top of tree declining.									**Tree AZ:**			

5. DISCUSSION and ANALYSIS

Poor Pruning Techniques - The potential impacts of the proposed pruning actives on the health, structure and amenity trees should be considered before any pruning activities are put into place. The tree should not be adversely affected by any pruning techniques and AS 4373 Pruning of Amenity Trees is the minimum standard for any pruning techniques. The intention of this Standard is to reduce the risk of branch failure, pathogens infection and premature tree death.

Roots reduced - Roots are responsible for the uptake of nutrients and water, anchoring and supporting the tree in the ground. The roots depend on the leaves and upper transport system e.g. phloem for food. Most of the roots on most of the tree species grow within the upper meter of the soil. And some tropical species grow for long distances along the soil surface. The severing of roots may place the tree under stress allowing entry of pathogens, including root rotting fungi and may destabilize the tree. The effects of root pruning are not always predictable. Problems with roots are usually not recognized until it is too late. Yet root problems are some of the most serious problems trees have today (Shigo 1986).

Mechanical Damage - This is where roots can be severed, soil is compacted or disturbed and bark can be bruised or scraped. The areas around all Subject Trees have poor to no aeration due to the heavy infrastructure oxygen becomes limited and roots decline or die. All these events can lead to weaker trees and are prone to stress. Subject Trees have had some mechanical damage at one point from trunk, branch and root damage are all present.

Mulching and Soil condition - To benefit the tree it is essential to provide the best possible growing conditions for the tree to grow within its urban environment. The application of well composted organic soils wherever possible. This will also help and prevent:-

- Maintain soil moisture and act as insulation;
- Improve soil structure, aeration and drainage

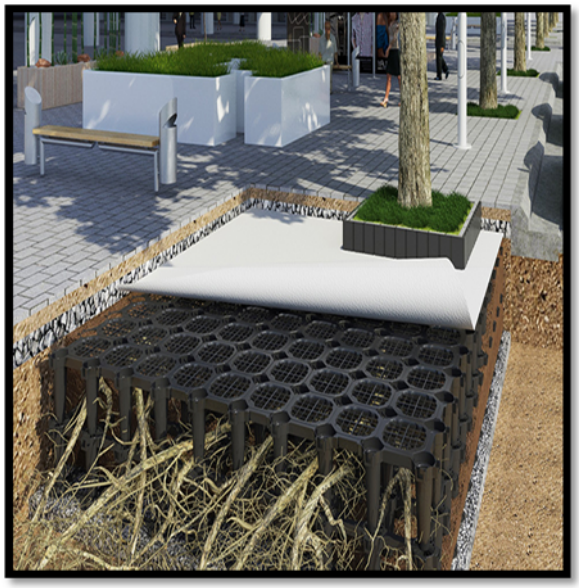
7. RECOMMENDATIONS

On the recommendations which are given below about Subject Trees No. 5, 6, 37 and Subject Tree No. 1, 2, 3, 4, 7-36, 38-45 all subject trees are in slow decline due to the lack of availability of modern urban tree infrastructure. The removal and replacement of any trees in the CBD Central Business District of Murwillumbah needs a change of design, installation of stratacell modules and construction of the surrounds which these assets need for a productive and healthy establishment.

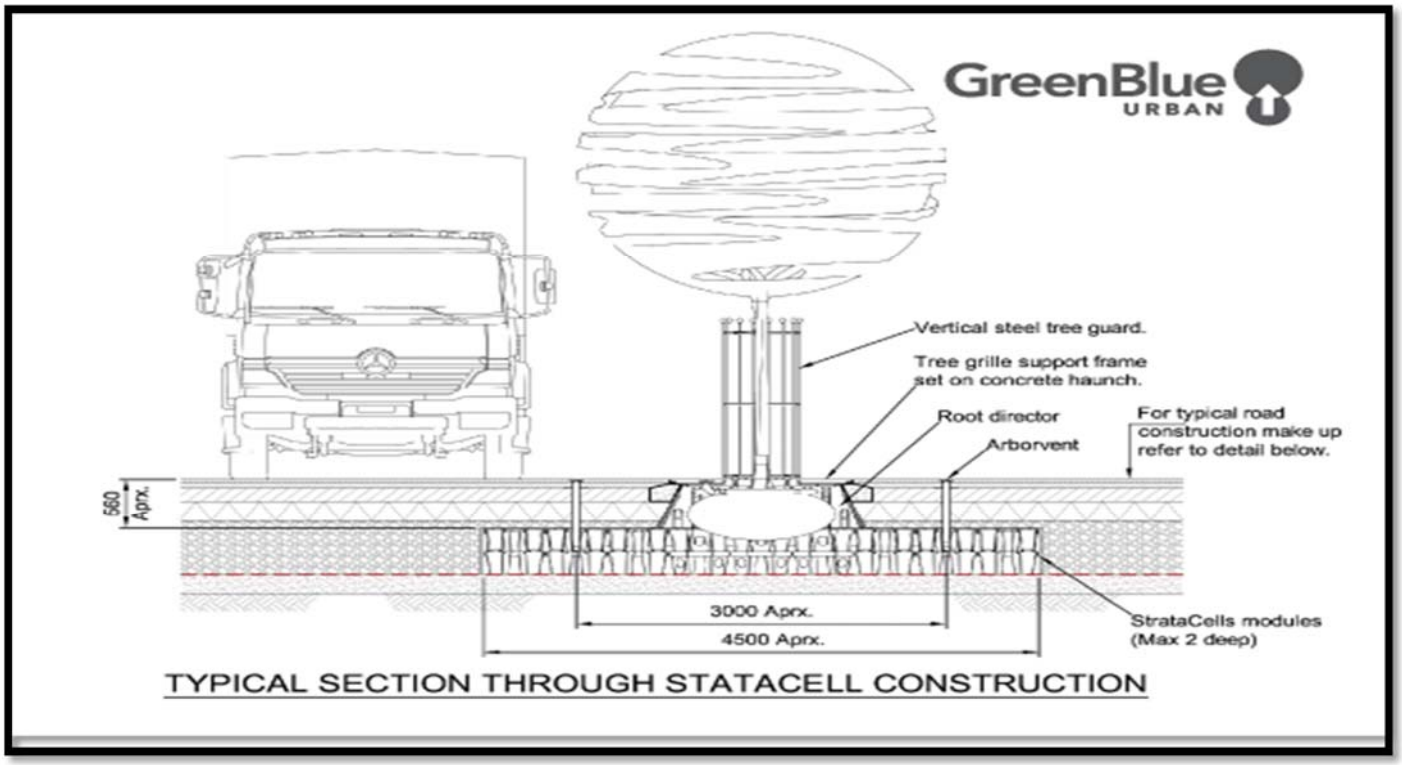
https://www.youtube.com/watch?v=7r9ubObLSFA

Strata vault install

Statacell installation



Statacell installation



Statacell installation

7.1 General

The following recommendations relate to the current health and risk of Subject Trees No. 1 through to Number 45.

7.2 Subject Trees No. 5, 6, 37

Based on my observations and conclusions Subject Trees No. 5, 6 and 37 should be removed as these trees are in decline.
Due to the decline in the Subject Trees it would not be economically viable for the Tweed Shire Council to continue the maintenance and monitoring of these trees.

7.3 Subject Tree No. 1, 2, 3, 4, 7-36, 38-45

Based on my observations and conclusions of Subject Trees No. 1, 2, 3, 4, 7-36, 38-45 exhibits no structural defects that warrant removal at the time of inspection and with sound Arboriculture maintenance can remain an integral part of their environment. I recommend all these trees be monitored and inspected in intervals of six to twelve months for any further decline.

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APPENDIX 1 - GLOSSARY OF TERMS

- **Abiotic-** factors: Temperature, amount of humidity, sun, rocks, dirt, air.
- **Anchorage-** The system whereby a tree is fixed within the soil, involving cohesion between roots and soil and the development of a branched system of roots which withstands wind and gravitational forces transmitted from the aerial parts of the tree.
- **Arboriculture-** The study of trees and other plants.
- **Asymmetrical trees-** Asymmetrical trees have an imbalance within the crown as a result of environment or mechanical factors. EG. Pruning for powerlines, exposure to prevailing winds.
- **Bacteria-** Microscopic single-celled organisms, many species of which break down dead organic matter, and some of which cause diseases in other organisms.
- **Bark-** A term usually applied to all the tissues of a woody plant lying outside the vascular cambium, thus including the phloem, cortex and periderm; occasionally applied only to the periderm or the phellem.
- **Biotic-** factors: plants, animals, or anything that is living that affects something else in the rainforest: trees vines, flowers, monkeys, bugs, tigers, birds. These things can also be dead but once living.
- **Biotic disorders-** Disorder caused by a living agent.
- **Canopy-** The branches and foliage of a tree; (2) often used as a collective term for the crowns of trees in a forest.
- **Carbohydrate supplementation-** Simultaneous vegetative and reproductive growth in adult trees by supplying mineral nutrition. (Sugars)
- **Cavity-** An open wound or hollow within a tree, usually associated with decay.
- **Circa-** Often preceding a date. (Approximately)
- **Compartmentalization-** The confinement of disease, decay or other dysfunction within an anatomically discrete region of plant tissue, due to passive and/or active defences operating at the boundaries of the affected region.
- **Compression-** Compression wood occurs in softwood trees, or conifers. This form of reaction wood forms underneath the pressured area and pushes against the strain that is affecting the tree. It is rich in lignin, which causes it to be very hard and brittle.
- **Crown lifting-** The removal of limbs and small branches to a specified height above ground level.

- **Crown reduction-** Branches specifically pruned to reduce crown height or crown spread by pruning to reduce the length of a branch.

- **DBH (Diameter at breast height)-** Stem diameter measured at a height of 1.5 metres (UK) or the nearest measurable point. Where measurement at a height of 1.5 metres is not possible, another height may be specified can result in the ingress of decay to otherwise sound tissues and climbing operations to access deadwood can cause significant damage to a tree.

- **Decay-**: The progressive softening of wood caused by specialized fungi. The fungus typically enters through wounds in the roots (root rots), main stem or branches (butt and stem rots) and can then extend internally, over a timescale of years or decades, longitudinally. External signs of decay include the presence of fungal fruiting bodies near the affected part, and cavities. Decay confined to heartwood does not affect the life processes of a tree, only its mechanical strength and stability.

- **Detailed tree inspection-** A procedure to describe a tree, including its species identity, maturity, health, dimensions etc., and to identify and evaluate any defects. Some obligation to inspect trees periodically is implied in the duty of care.

- **Endemic-** Having a natural distribution confined to a particular geographic region.

- **Epicormic-** Term describing buds, shoots or flowers borne on the old wood of trees, often applied to shoots arising from dormant buds after injury or fire, as in eucalypts.
- **Epiphyte-** A plant that utilizes another as a host for growth and support without adversely impacting upon that host.

- **Exotic-** A plant introduced from another country or region to a place where it was not indigenous.

- **Failures-** Incipient failure. In wood tissues, a mechanical failure which results only in deformation or cracking, and not in the fall or detachment of the affected part.

- **Failure Root plates-** Shearing of wood fibres leading to failure, (De-lamination = shearing with the grain or Severance = shearing across the grain) cause by high wind events. Tension root shearing or root bending fractures leading to root plate failure.

- **Ferro sols soil-** A type of soil structure.

- **Flush cut-** An incorrect cut that damages or removes the branch collar or branch bark ridge and as result damages stem tissues.

- **Fruiting bodies-** The reproductive structures of fungi, the presence of which may indicate decay in a tree.

- **Fungi-** Basidiomycotina (Basidiomycetes). One of the major taxonomic groups of fungi; their spores are borne on microscopic peg-like structures (basidia), which in many types are in turn borne on or within conspicuous fruit bodies, such as brackets or toadstools. Most of the principal decay fungi in standing trees are Basidiomycetes.

- **Genus-** A taxonomic group of closely related species or a single species without close relatives; closely related genera are grouped into families.

- **Hazard assessment-** A tree assessment to determine the structural integrity, stability, viability or suitability of a tree for its retention.

- **Hazard-** A **hazard** is a situation that poses a level of threat to life, health, property, or environment.

- **Leaning-** The natural lean of a tree. Where the trunk grows or moves away from upright. A leaning tree may maintain a static lean or display an increasingly progressive lean and may become hazardous and prone to failure or collapse. Lean can be categorised as from upright, slightly leaning – 0˚-15˚, moderately leaning – 15˚-30˚, severely leaning – 30˚-45˚ and critically leaning – >45˚.

- **Linear formation-** Relating to or resembling a straight line.

- **Littoral-** On or growing near the seashore.

- **Longitudinal-** cracks along the major axis of trunk sections or major branches.

- **Lopping-** Cutting between branch unions (not to branch collars), or internodes on a young tree, with the final cut leaving a stub.

- **Mortality spiral-** Gradual tree deterioration usually associated with repeated bouts of predation and stress. The tree exhibits increasingly low vigor after each episode until reduce resistance and exhaustion of reserved energy results in its demise and death..

- **Significant (of defects)-** Of any tree defect that does not meet accepted standards of safety, and which therefore requires action to mitigate tree risk.

- **Structural integrity-** The ability of a load-bearing part of a tree or tree part succumbs permanently to superior loading forces resulting in collapse in full or part of trunk, branch, or root.

- **Visual tree inspection-** The visual tree assessment method (V.T.A.) will be used for the inspection of trees. This method is recognized as the most cost effective method for assessing trees. It requires a thorough knowledge and understanding of tree physiology and anatomy, as well as a high level of knowledge in regards to pests and diseases commonly found in a wide range of urban trees. Only qualified arboriculture staff should assess trees in regards to safety, and hazard identification. VTA is based on knowledge of tree physiology and its reaction to stress or damage and is therefore from time to time open to dispute in regards to actual assessment outcomes. VTA does not and cannot accurately determine the extent of internal decay and is based purely on known indicators of weakened structural integrity. This in turns means that without costly and invasive examination of the trees internal structure VTA cannot always detect decay in trees.

- **Wind exposure-** The degree to which a tree or other object is exposed to wind, both in terms of duration and velocity.