TREE ASSESSMENT REPORT

REPORT PREPARED BY:

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REPORT PREPARED FOR:

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ATT: MR MARTIN REID
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INTRODUCTION:

- The compilation of this report has been prepared for the exclusive use of the client, as per the details on the covering page, together with the author in ascertaining the condition of the tree resources on the site inspected.

- This report is based on a visual ground inspection of the three trees located on the nature strip adjacent to the properties 481-487 Swift Street, Albury in accordance with the specifications provided and all care and due diligence has been taken to provide an accurate assessment of the trees and their condition. Whilst industry best practice is adhered to in the compilation, all observations and subsequent recommendations relate to the condition of the tree/s at the time of inspection.

- All observations and recommendations are conducted objectively and without prejudice regardless of any proposed developments.

KEY OBJECTIVES:

- Inspect the tree resources as stipulated on the specifications provided,
- Evaluate the trees to determine the impact from future development in proximity to the tree,
- Evaluate the future management requirements,
- Provide recommendations for the scope of works required.

METHODOLOGY:

- On Tuesday March 28, 2023, Wednesday April 5, 2023 and Wednesday May 17, 2023 a visual ground inspection was conducted on the trees located on the nature strip of the properties at 481-487 Swift Street, Albury. Trees one and two were assessed on March 28 and April 5, 2023 and tree three was assessed on May 17, 2023.

- Preliminary discussions centred around the health and structure of the trees and our professional opinion on the management requirements of the trees inspected.

- Observations and photographs were recorded during the inspection. Data collected for the trees includes the genus and species, approximate tree height, canopy width, average dbh and recommended works.

- Due to the trees being located on Council property, no tagging of the trees was undertaken as authority to do so would need to be provided from the Council.

- This report is a Visual Tree Assessment report conducted from the ground only. No canopy inspection requiring either climbing or tower access, was required or performed.

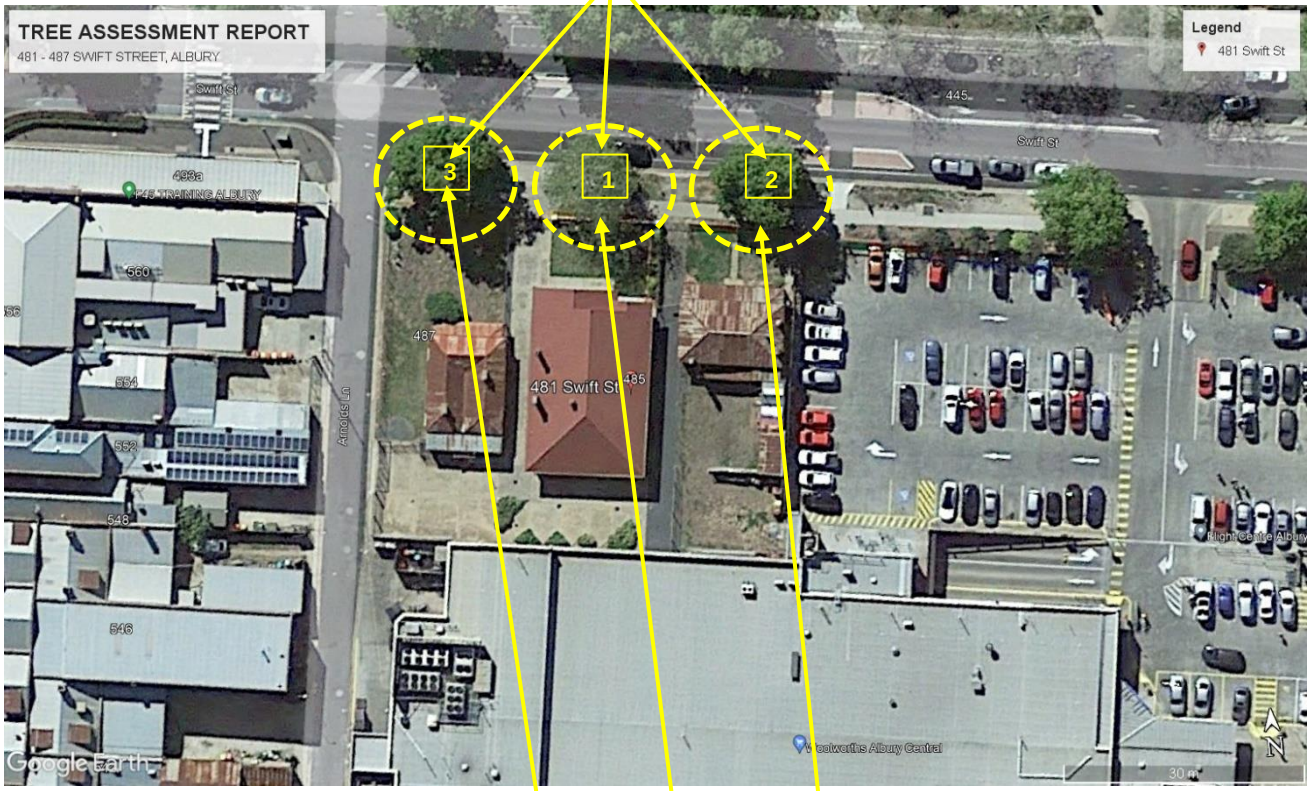
- This report is reflective of the conditions inspected on the above-mentioned date, alterations to the site conditions or surroundings, such as construction or landscaping works, may alter the report findings.

- Tree identification was based on the visual inspection of the tree/s, including buds and fruits (where available) on the dates of inspection. A complete taxonomical identification process was not undertaken and therefore the identification of the trees is a probable identity based on the information available.

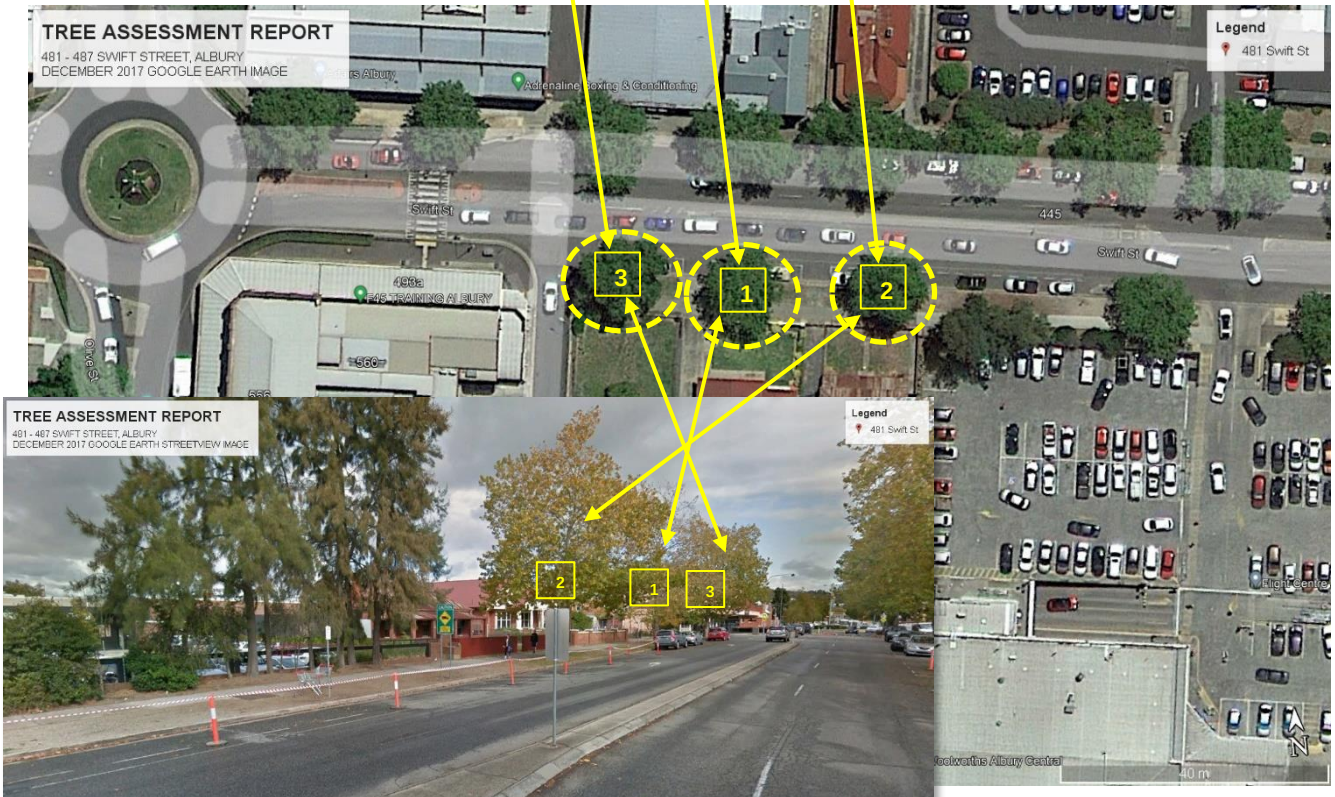
- The tree assessment is applicable for a period of two months from the date of the report.

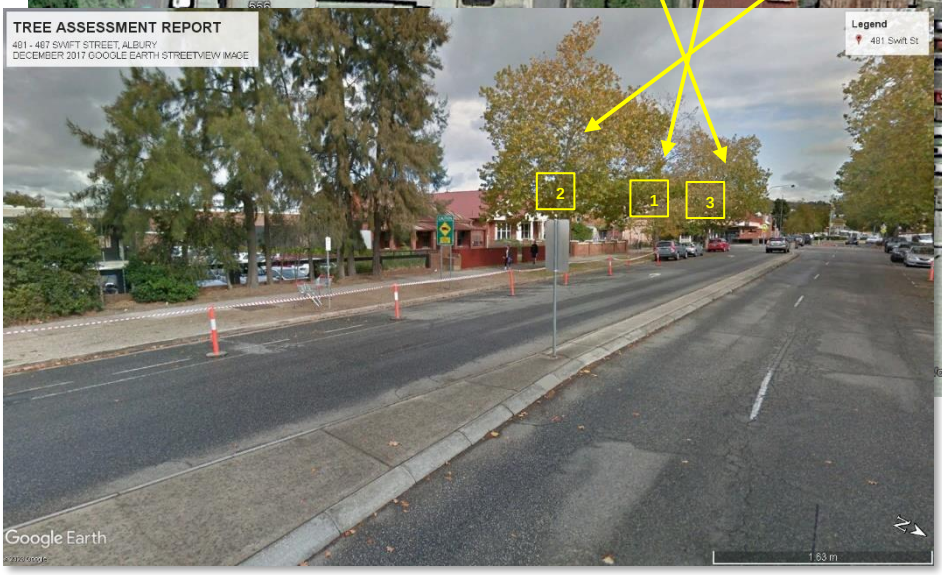
MAP OF 481-487 SWIFT STREET, ALBURY

TREES INSPECTED



Map imagery supplied by Google Earth 2023





Map imagery supplied by Google Earth 2017

TREE ONE:

Botanical Name:	*Platanus acerifolia*
Common Name:	London Plane Tree
Canopy Height:	Approx. 13.8m
Canopy Width:	Approx: 14 metres (East - West) Approx: 17 metres (North - South)
Trunk DBH:	540mm
Tree Structure:	Good
Tree Health:	Acceptable
Tree Age:	Mature
SRZ Calculation:	2.9 metres
TPZ Calculation:	6.5 metres
TPZ Calculation for minor encroachment (10%)	4.5 metres
ULE:	20-40 years
Tree Retention Value:	Third Party Ownership
Tree Origin:	Exotic

TREE TWO:

Botanical Name:	*Platanus acerifolia*
Common Name:	London Plane Tree
Canopy Height:	Approx. 12.3m
Canopy Width:	Approx: 14 metres (East - West) Approx: 17 metres (North - South)
Trunk DBH:	550mm
Tree Structure:	Good
Tree Health:	Acceptable
Tree Age:	Mature
SRZ Calculation:	2.9 metres
TPZ Calculation:	6.6 metres
TPZ Calculation for minor encroachment (10%)	4.5 metres
ULE:	20-40 years
Tree Retention Value:	Third Party Ownership
Tree Origin:	Exotic

TREE THREE:

Botanical Name:	*Platanus acerifolia*
Common Name:	London Plane Tree
Canopy Height:	Approx. 13.9m
Canopy Width:	Approx: 15 metres (East - West) Approx: 16 metres (North - South)
Trunk DBH:	615mm
Tree Structure:	Good
Tree Health:	Acceptable
Tree Age:	Mature
SRZ Calculation:	3 metres
TPZ Calculation:	7.4 metres
TPZ Calculation for minor encroachment (10%)	5.1 metres
ULE:	20-40 years
Tree Retention Value:	Third Party Ownership
Tree Origin:	Exotic

OBSERVATIONS:

The trees inspected are located on the nature strip, tree one adjacent to 485 Swift Street, Albury tree two adjacent to 481 Swift Street, Albury and tree three adjacent to 487 Swift Street, Albury.

For tree one, our inspection has identified:

- A large, single trunked tree,
- The tree is located approximately 4.3 metres from the boundary fence on the Southern side of the tree,
- Good buttressing was noted on the Northern, Southern, Eastern and Western regions of the lower trunk,
- The roadside kerb is approximately 900mm on the Northern side of the trunk,
- The footpath on the Southern side of the tree is approximately 1750mm from the trunk,
- A drain is located on the Western side approximately 2.1 metres from the trunk,
- A concrete driveway on the Western side, between the properties at 485-487 Swift Street, Albury is approximately 5.25 metres from the trunk,
- The gravel driveway on the Eastern side, between the properties at 481-485 Swift Street, Albury is approximately 8 metres from the trunk,
- The structure of the tree was noted as ‘Good’ with no major structural defects noted, good branch attachment, the trunk was noted as sound with no wounds observed, good root buttressing was noted and no evidence of damage to the roots was found during our inspection.
- The health of the tree was noted as ‘Acceptable’ with a good coverage of foliage noted, good overall structure and vigour, no serious structural defects were noted with the trunk, scaffold and lateral branches or branch unions. There was evidence of pest damage with the Sycamore Lace Bug noted, although not noted as a significant infestation.
- The canopy extends approximately seventeen metres in a North-South direction, with our inspection noting the Southern side of the canopy extending approximately eight metres and the Northern canopy extending approximately nine metres,
- The canopy directing East-West is approximately fourteen metres with the Eastern side approximately six metres and the Western side approximately eight metres,
- No soil cracking or heaving was noted around the lower trunk / root plate,
- The SRZ radius of the tree was calculated at 2.9 metres,
- The kerb located on the Northern side encroachment of the TPZ is calculated at 41.2% though the tree would have been planted in situ as a juvenile tree and the root system would have grown to facilitate the concrete kerbing, concerns have been noted of root disturbance between 2017-2019 when there appears to have been upgrades to the Swift Street adjacent to the tree, although no specific information could be located to confirm if any kerb upgrades occurred resulting in root damage,

- The TPZ radius of the tree is calculated at 6.5 metres,

- To meet the acceptable minimum encroachment of 10% of the TPZ, the minimum area where no construction or encroachment of the root zone should occur is calculated as 4.5 metres from the trunk,

- From our review of the specifications provided, a new building with a basement carpark is designated to be installed approximately 4.3 metres from the trunk, this would equate to an encroachment of 11.1%,

- Consideration to the provision of selective pruning practices to the canopy on the Southern side of the canopy has been noted to reduce the risk of damage to the scaffold and lateral branches directing over the proposed construction site.

For tree two, our inspection has identified:

- A large, single trunked tree,
- The tree is located approximately 4.3 metres from the boundary fence on the Southern side of the tree,
- Good buttressing was noted on the Northern and Southern regions of the lower trunk and stronger buttressing was noted on the Western region, no buttressing was noted on the Eastern side which is consistent with the heavy lean noted with the trunk directing North-East,
- The roadside kerb is approximately 870mm on the Northern side of the trunk,
- The footpath on the Southern side of the tree is approximately 1760mm from the trunk,
- A drain is located on the Western side approximately 1.9 metres from the trunk,
- Two service pits were also noted on the Western side of the tree, one approximately 2.8 metres and the other 3.9 metres from the trunk,
- The gravel driveway on the Western side, between the properties at 481-485 Swift Street, Albury is approximately ten metres from the trunk,
- The kerb has been modified to enable access to the footpath, ie. prams, walker aids, wheelchairs, motorised carts, adjacent to the installed barriers to facilitate pedestrians crossing the road on the Eastern side, this kerbing is approximately ten metres from the trunk,
- The trunk was noted with a heavy lean directing North-East with further inspection identifying the tree has a self-correcting lean, likely gravitropism or phototropism,
- The structure of the tree was noted as ‘Good’ with no major structural defects noted, good branch attachment, the trunk was noted as sound with no wounds observed, good root buttressing was noted and no evidence of damage to the roots was found during our inspection.
- The health of the tree was noted as ‘Acceptable’ with a good coverage of foliage noted, good overall structure and vigour, no serious structural defects were noted with the trunk, scaffold and lateral branches or branch unions. There was evidence of pest damage with the Sycamore Lace Bug noted, although not noted as a significant infestation.
- The canopy extends approximately fourteen metres in a North-South direction, with our inspection noting the Southern side of the canopy extending approximately six metres and the Northern canopy extending approximately eight metres,
- The canopy directing East-West is approximately sixteen metres with the Eastern side approximately eight metres and the Western side approximately eight metres,
- No soil cracking or heaving was noted around the lower trunk / root plate,
- The SRZ radius of the tree was calculated at 2.9 metres,

- The kerb, located on the Northern side, encroachment is calculated at 41.3% though the tree would have been planted in situ as a juvenile tree and the root system would have grown to facilitate the concrete kerbing, concerns have been noted of root disturbance between 2017-2019 when there appears to have been upgrades to the Swift Street adjacent to the tree, although no specific information could be located to confirm if any kerb upgrades occurred resulting in root damage,

- The TPZ radius of the tree is calculated at 6.6 metres,

- To meet the acceptable minimum encroachment of 10% of the TPZ, the minimum area where no construction or encroachment of the root zone should occur is calculated as 4.5 metres from the trunk,

- From our review of the specifications provided, a new building with a basement carpark is designated to be installed approximately 4.3 metres from the trunk, this would equate to an encroachment of 8.9%, although from the specifications provided the driveway to the basement carpark has been designated adjacent to tree two,

- Consideration has been given to recommending the alteration of the proposed plans to enable retention of the tree but concerns were noted after taking into account the TPZ radius allowing for a 10% encroachment at 4.5% and the services located between 1.9 – 3.9 metres from the trunk, we cannot identify a suitable alternative location for the basement entrance to be situated.

For tree three, our inspection has identified:

- A large, single trunked tree,
- The tree is located approximately 4.4 metres from the boundary fence on the Southern side of the tree,
- Good buttressing was noted on the Northern, Southern and Western regions of the lower trunk. The Eastern side was noted with a minor region of buttressing at the lower trunk,
- The roadside kerb is approximately 900mm on the Northern side of the trunk,
- The footpath on the Southern side of the tree is approximately 1800mm from the trunk,
- A drain is located on the Eastern side approximately 2.7 metres from the trunk,
- Arnolds Lane is located on the Western side and is approximately 3.8 metres from the trunk with the kerbing curved to facilitate vehicles entering the laneway,
- The driveway on the Eastern side, between the properties at 487-485 Swift Street, Albury is approximately eleven metres from the trunk,
- The trunk was noted with a slight lean directing North,
- The structure of the tree was noted as ‘Good’ with no major structural defects noted, a large co-dominant directing North-East was noted approximately 3.5 metres from the trunk base, good branch attachment, the trunk was noted as sound with no wounds observed, good root buttressing was noted and no evidence of damage to the roots was found during our inspection.
- The health of the tree was noted as ‘Acceptable’, given the tree is defoliating with the Autumn season we consider that, from our previous inspection dates, the tree had a good coverage of foliage, good overall structure and vigour, no serious structural defects were noted with the trunk, scaffold and lateral branches or branch unions. There was evidence of pest damage with the Sycamore Lace Bug noted.
- The canopy extends approximately sixteen metres in a North-South direction, with our inspection noting the Southern side of the canopy extending approximately seven metres and the Northern canopy extending approximately nine metres,
- The canopy directing East-West is approximately fifteen metres with the Eastern side approximately six metres and the Western side approximately nine metres,
- No soil cracking or heaving was noted around the lower trunk / root plate,
- Deadwood was noted on the Eastern side of the lower canopy, in proximity to the large co-dominant noted directing North-East,
- No significant structural issues were noted although a small limb failure on the co-dominant directing North-East was documented,

- Pruning practices have previously been undertaken on the Northern and Western regions of the upper trunk/ lower canopy with occlusion of those wounds noted,

- The SRZ radius of the tree was calculated at 3 metres,

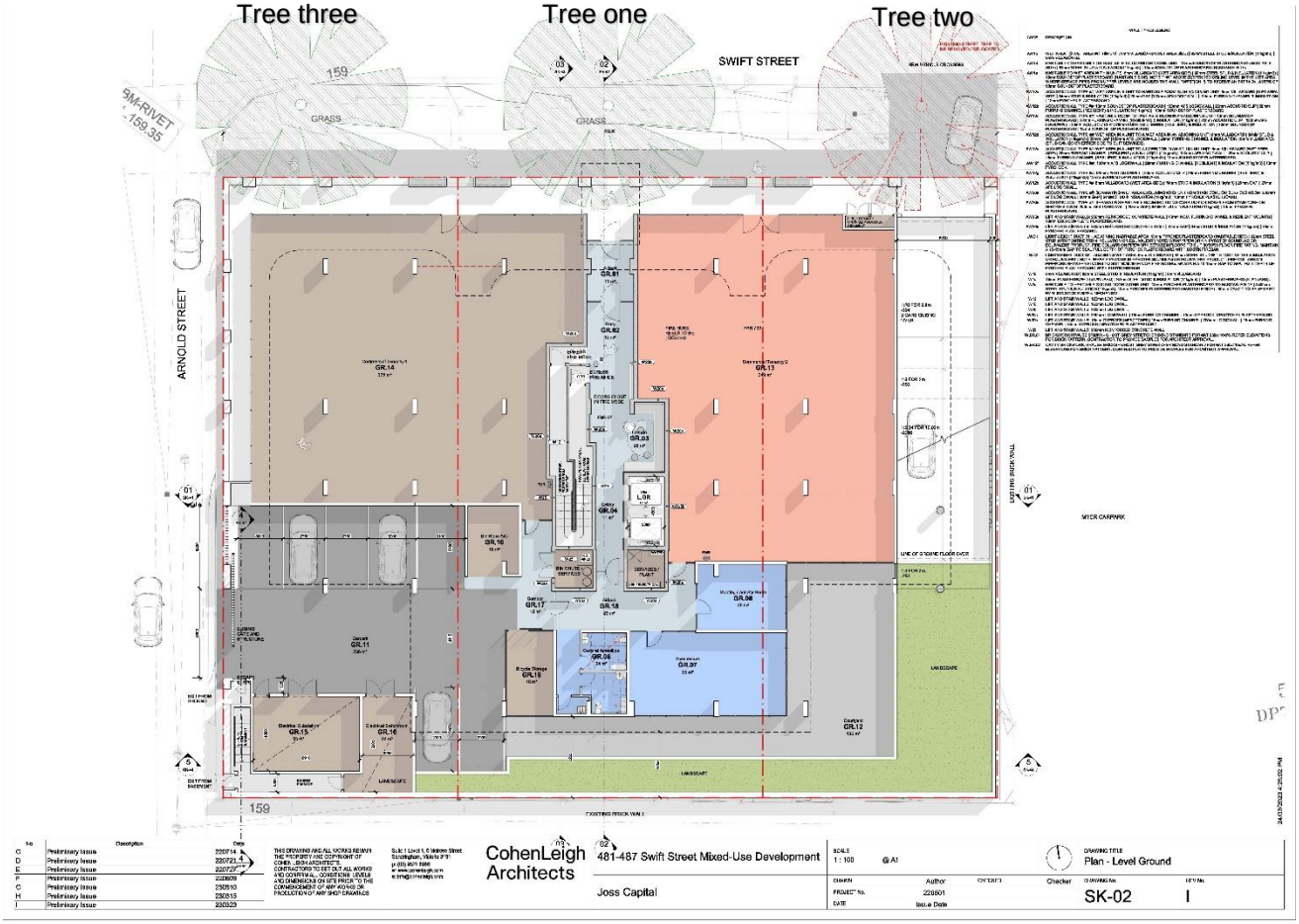
- The kerb, located on the Northern side, encroachment is calculated at 42.3% though the tree would have been planted in situ as a juvenile tree and the root system would have grown to facilitate the concrete kerbing, concerns have been noted of root disturbance between 2017-2019 when there appears to have been upgrades to the Swift Street adjacent to the tree, although no specific information could be located to confirm if any kerb upgrades occurred resulting in root damage,

- The TPZ radius of the tree is calculated at 7.4 metres,

- To meet the acceptable minimum encroachment of 10% of the TPZ, the minimum area where no construction or encroachment of the root zone should occur is calculated as 5.1 metres from the trunk,

- From our review of the specifications provided, a new building with a basement carpark is designated to be installed approximately 4.4 metres from the trunk, this would equate to an encroachment of 14.4% of the TPZ.

Proposed development: 481-487 Swift Street, Albury



RECOMMENDATIONS:

Our inspection of the trees, based on the visual tree assessment undertaken has identified that the following recommendations should be addressed in the foreseeable future:

- Our inspection noted three mature London Plane trees located on the nature strip, approximately 4.3-4.4 metres from the boundary fence for the properties at 481-487 Swift Street, Albury,

- The health of the trees was noted as ‘Acceptable’, the structure of the tree was noted as ‘Good’ with no structural issues noted in our Observations,

- Consideration of the future development of the properties at 481-487 Swift Street, Albury has been discussed and specifications of the proposed development have been reviewed in compiling our report,

- The SRZ calculations are noted as 2.9 - 3 metres and the TPZ calculations are noted as 6.5-7.4 metres from the trunk for both trees,

- From our inspection of the specifications for the proposed building, basement carparking and carpark driveway entrance, we have determined that the proposed development is likely to encroach approximately 11.1% of the TPZ region of tree one and 14.4% encroachment for tree three,

- With respect to tree two, the driveway is located directly adjacent to the tree. Consideration has been given to transplanting the tree, but excavation of the root ball would be difficult given the location of services in proximity to the tree and given the size of the tree, concerns have been noted on the survivability of the tree,

- In addition, we have taken into consideration the risk of structural damage to the canopy and the scope of services required to alleviate the concerns with limb damage or failure, it is our determination that the provision of selective pruning practices predominately to the Southern region of the trunk for tree one will be required prior to the commencement of any construction works, Tree three extends approximately two metres from the fence which would equate to between 1-1.5 metres over the proposed construction, selective pruning to reduce the canopy away from the construction would be recommended if the machinery is likely to impact and cause damage to the canopy,

- Therefore, taking into consideration the concerns noted, the future development in proximity to the trees and the impact to the health and structure of the trees as a result, it is our determination that trees one and three can be retained in their positions and selective pruning will be necessary to minimise the risk of limb damage from the construction processes for tree one, and is a consideration if the construction process and machinery used is likely to impact the canopy and possibly cause damage. Tree two cannot be retained in its present location and transplanting is not considered a feasible option, therefore removal of the tree is considered the only option.

- The selective pruning recommended for trees one and three, and the removal of tree two should be undertaken prior to the commencement of any construction or development works within proximity to the tree,

- It is our consideration that the trees one and three be retained and all efforts to preserve and maintain the health and structure of the trees be undertaken. We would further recommend a review of the health and structural changes of the trees in two years, with the exception being if major storm activity or damage during the construction process results in further structural changes or concerns prior to the two-year review.

- The trees inspected are an invaluable resource providing aesthetic street appeal and shade to vehicles and pedestrians utilising the road and footpath adjacent to the trees. In addition, they are important for management of the 'Urban Heat Island Effect', aiding in reducing temperatures during the Summer months and increasing temperatures in the Winter months. We do not consider that the loss of tree two would have an impact on the fauna and birdlife. The trees are an exotic species, they are not remnant trees therefore no heritage or historical significance investigation was undertaken.

- To compensate for the loss of tree two, we recommend that consideration be given to the replacement planting of one or possibly two new advanced to super-advanced *Platanus acerifolia* trees, referred to as tree four and tree five. One to be located to the Western side of the current location of tree two and to the east of current tree one (new tree four), and another tree to the Eastern side of the current location of tree two in front of Myer carpark (new tree five). From our inspection of the calculations of the area in front of (north of) the proposed building we have determined that a *Platanus acerifolia* (new tree four) could be planted approximately 15 metres to the east of tree one, but no closer than 14 metres, enabling the canopies of trees one and new tree four to develop whereby the outer regions of the branches and foliage may touch but not significantly to result in rubbing wounds on the branches. The canopy of the new tree four would also extend over the driveway requiring pruning to uplift the canopy as the tree grows. To facilitate the planting of the new tree five, the concrete installed over the nature strip opposite the Myer carpark would need to be removed and remediation of the soil prior to the planting of the tree.

CONCLUSION:

Further to our visual tree assessment of the trees identified in the specifications provided and our recommendations detailed above our conclusion includes the following:

PRUNING OR REMOVAL SERVICES:

- A total of three trees were inspected,
- Tree one has been identified as requiring minor selective pruning practices prior to the commencement of any development,
- Tree two has been recommended to be removed prior to the commencement of any development,
- Tree three has been recommended to be retained and selective pruning is recommended if the proposed construction and machinery are likely to impact the canopy and cause any damage to the canopy directing over the boundary of the property at 487 Swift Street, Albury,
- The provision of selective pruning should only be provided by suitably qualified and experienced Arborists with a minimum qualification of Cert. III in Arboriculture, ensuring that they adhere to the Standards as detailed in the Australian Standard AS4373. Failure to do so could result in the rapid decline in either the health and/ or structure of the tree increasing the risk to people and vehicles utilising the proposed road,
- Under no circumstances would ‘lopping’ practices be acceptable in addressing the pruning concerns noted,
- ‘Lopping’ maintenance practices result in subsequent epicormic growth that develops at approximately three to five times faster than standard growth practices,
- Epicormic regrowth can increase the risk of future limb failures,
- Management costs associated with the required maintenance of the trees would be increased due to the additional services required on a yearly basis,
- Lopping’ practices could place the trees under considerable stress and this could result in the deterioration in the trees health or premature death,
- ‘Lopping’ practices do not comply with the Australian Standards (AS4373) regarding the pruning maintenance of trees.

TREE PROTECTION ZONE:

- The construction has the potential to negatively impact on the health and structure of the trees inspected if the construction methods undertaken result in significant damage within the SRZ or TPZ regions of the trees, if the recommendations are adhered to we do not envisage any significant impact to the health and structure of the trees inspected.
- An exclusion zone is typically recommended along the Northern, Southern, Eastern and Western boundaries of the TPZ of trees when construction processes are being undertaken. We would recommend for trees one and three a physical barrier of a temporary chain mesh fence, although taking into consideration the location of the trees and the frequent usage by pedestrians, bicyclists and vehicles this may not be advisable. We would prefer that a fence be installed to restrict access between the footpath and the kerbing to enable pedestrian, bicycle and vehicular traffic to continue utilising the area adjacent to the proposed construction but if consultation with the Council identifies that installing the fence creates an unnecessary hazard we would alternatively request that access to the site be restricted to one or two exits to minimise the impact to trees one and three.
- Given that the footpath is located within the TPZ it may be necessary to restrict access adjacent to the tree along the footpath whilst construction is being performed and an alternative footpath route be considered. This will restrict physical access for pedestrians, equipment or materials within the TPZ region encompassed in the fence.

- The bike lane is also within the TPZ but restricting access to this region is not considered necessary, therefore the boundary fence could be installed to enable usage of the bike lane if it is safe to do so.

- The fence should be fauna friendly with spacing for animals to travel beneath and between the fencing panels as shown below, it should be at a height of 1.8 metres and securely anchored above the surface and should comply with the relevant Australian Standard AS4970-2009 – Protection of Trees on Development Sites. Tree Protection Zone signage should be placed on the fencing, see examples of fencing and signage below. The fence is to prevent any damage or incursion to the SRZ or TPZ regions as well as the canopy of the tree.

- To further minimise the risk of root damage we recommend that where the development is likely to impact any region of the Tree Protection Zone that the roots be exposed with the use of an Air Spade or by hand digging and pruned by an Arborist. All roots requiring removal should be cut by sharp clean implements, large lateral roots can be cut with a chainsaw, smaller roots can be cut with a handsaw and fibrous roots can be cut with sharp secateurs with the final cut being made to undamaged wood,

- All root pruning to be carried out in accordance with the Australian Standard AS 4970-2009 Protection of Trees on Development Sites,
- No materials to be stored or stacked and no toxic materials are to be flushed into the TPZ,
- No vehicles to be driven or parked within the Tree Protection Zone,

Fauna friendly temporary fencing example

Tree Protection Zone signage examples

STRUCTURAL ROOT ZONE:

- No excavation within the SRZ area should be conducted, if any excavation occurs within the SRZ areas detailed above this could result in structural damage to the root plate and could result in the decline or premature death of the tree or whole tree failure,
- No building materials or equipment should be located within the TPZ areas listed above, this area should be barricaded to reduce the risk of structural damage to the tree or root zone due to mechanical impact or soil compaction issues.

- In addition to the concerns identified, we must also consider the potential issues that the trees inspected will develop as they grow. The factors that need to be taken into consideration include:

    - The shade and maintenance requirements,
    - Growth characteristics of the trees in respect to height, growth rate, pest/ disease resilience, water requirements and pruning requirements,
    - Usage of the proposed development, existing road and footpath from residents and visitors to the area,

- Oxygen is a necessary component in the function of tree roots. Accessibility to oxygen and water within the soil substrate is dependent on the integrity of the soil structure surrounding the tree. Compacted soil infers that the spacing between the soil aggregates are small and root development and function is less effective than tree roots that are situated in soils where there are good gas exchange levels and oxygenation within the soil. Oxygen levels typically decrease as the soil depth increases or the soil is heavily compacted.

- Compaction is the result of load or stress forces applied to the soil as well as shear forces. Pedestrian, vehicular traffic or the storage of heavy machinery or materials can limit the ability of water and oxygen to penetrate the soil in close proximity to the roots, most roots are located within 400mm of the soil surface and compaction resulting from the issues noted above can significantly impact the soil to a depth of approximately 150-200mm. The severity of compaction is dependent on the weight of the machinery/ vehicles, the frequency of transport over the soil, the moisture levels within the soil as well as the clay component. Other issues that can impact on soil compaction include stockpiling and handling of soil as well as transport including vibration resulting from frequent transport over the soil.

- Tree roots are typically located within 400mm of the soil surface, they are necessary for anchoring the tree into the landscape as well as the storage, absorption and conduction of water and nutrients. Larger structural woody roots comprise the majority of the roots within the Structural Root Zone providing the anchoring into the landscape. The fibrous roots absorb oxygen, moisture and essential minerals from the surrounding soil typically through a symbiotic relationship with soil borne fungi (Mycorrhizae). Loss of the structural roots and negatively impact the structural integrity of the tree and loss of the fibrous roots, depending on the volume lost, can result in a decline in the health of the trees and can in more severe cases result in premature death of the tree.

- Due to the encroachment of trees one and three exceeding the 10% allowance for minimal encroachment, the provision of a soil treatment would also be a consideration. This treatment is designed to stimulate new root development and provide nutrients for the severed tree roots to access.

- If all of the recommendations previously listed are adhered to, it is our determination that the proposed development should not have a detrimental impact on the health and structure of the trees inspected and that the Likelihood of Failure was considered ‘Unlikely’ and the Likelihood of Failure and Impact was considered to be between ‘Low-Moderate’, referring to the matrix tables on page twenty-one.

- No pruning or removal of the trees without prior approval of the Albury City Council Arborist.

APPENDICES AND REFERENCES:

HEALTH DEFINITIONS:	
Dead/ dying	The tree is no longer viable, it has died. There is no little to no live foliage evident. Little to no live tissue identified beneath the bark. The tree is composed of dead tissue and may be unstable in the ground.
Deteriorating	The health of the tree is deteriorating, the reasons for which can vary between pest/ disease attack, stress, inadequate maintenance performed by inadequate / unskilled service providers. The tree may exhibit such symptoms as: A large percentage of dead / dying limbs > 50% of the canopy. A canopy with little to no foliage present, Possibly a large volume of epicormic regrowth, Poor branch unions, cross over branches, limb shedding and poor branch growth, no seasonal growth evident. Evidence of fungal fruiting bodies and associated decay, Evidence of heavy pest and/ or disease attack, Disturbance of the soil may be evident.
Reasonable	The overall growth of the tree is adequate though the tree may require maintenance to prevent it failing any further. The tree may have evidence of some form of pest/disease attack, stress, areas of dead wood may be present. Overall, the tree may appear in a reasonable state. The tree may exhibit such symptoms as: Little to no seasonal growth evident, Large percentage of deadwood >30% of the canopy, Epicormic growth identifiable >20% of the canopy, Evidence of attack from pest/ disease, Dieback in the canopy may be evident.
Acceptable	The overall appearance of the tree is that it is in good health. The tree may exhibit such symptoms as: A good coverage of foliage throughout the canopy, Good vigour with reasonable seasonal growth throughout the canopy evident, Small percentage of deadwood and epicormic growth <20% of the canopy, The trunk and scaffold branches do not exhibit any serious defects. No evidence of any serious pest/ disease attack and the tree should be relatively ‘stress free’.
Excellent	The health of the tree can be considered ‘excellent’ whereby the tree exhibits good growth, a healthy, full canopy, good resistance to pest/disease attack, good overall structure and vigour. The trunk, scaffold branches, lateral branches and branch unions do not exhibit any serious defects.

STRUCTURE DEFINITIONS:	
EXCELLENT	Excellent branch attachment, no structural defects. Trunk sound. No damage to roots and good root buttressing present.
GOOD	Good branch attachment, no major structural defects. Trunk sound or minor damage. No damage to roots and/ or good buttressing.
FAIR	Some minor structural defects and/ or minor damage to trunk. Bark may be missing and cavities could be present. Minor damage to roots.
POOR	Major structural defects and or trunk damage and or girdling or damaged roots that are problematic.
HAZARDOUS	Trees pose immediate hazard potential that should be rectified as soon as possible.

AGE: Most trees have a stable biomass for the major proportion of their life. The estimation of the age of a tree is divided into five stages based on the knowledge of the expected lifespan of the taxa in situ.	
Sapling	Species to two years.
Juvenile	Juvenile tree between two and five years.
Semi-mature	Tree is still growing.
Mature	The species has reached its expected size and / or has commenced reproduction. (A tree may be classified as mature after it has reached its near stable size or biomass above and below ground and maybe considered mature for >90% of its lifespan)
Senescent	Over mature and / or signs are present of irreversible decline and decreasing biomass.

TREE RETENTION VALUE	
VERY HIGH	The tree health and structure have been assessed as excellent. The tree is either a prominent landscape feature or has historical, cultural or ecological significance. The tree is considered with the appropriate care and management likely to be a long-term viable landscape feature and should be protected from construction impact.
HIGH	The tree health and structure have been assessed as between fair to acceptable but the tree is considered a prominent landscape feature and with the appropriate care and management, the tree is likely to be a medium to long-term viable landscape feature and should be protected from construction impact.
MEDIUM	The tree health and structure have been assessed as fair. The tree is either a moderate landscape feature or has a structural or health defect that with the intervention of an Arborist could facilitate the retention of the tree. The tree could also be a medium to small tree but in good condition. With the appropriate care and management it is likely that the tree will be a medium to long-term viable landscape feature and should be protected from construction impact.
LOW	The tree health and structure have been assessed as poor. The tree is either has little amenity value or is unlikely to be a medium to long-term landscape feature. The tree may be considered a weed species, may be dying or senescent or structurally unsound or it may not be suitable to its present location. The tree may also be a small tree in fair to good condition which can be easily replaced with an advanced tree.
THIRD PARTY OWNERSHIP	The tree may be located outside of the site and owned by a third party being either a residential property or a council owned tree. Third party trees must be retained and protected from any construction impact with the exception being if a mutually acceptable outcome is negotiated with the tree owner and relevant authorities.

TREE ORIGIN	
EXOTIC	The species originates in a country other than Australia.
NATIVE	The species originates within Australia.
INDIGENOUS	The species originates within the local environment.

USEFUL LIFE EXPECTANCY (ULE)	
40+ YEARS	The tree is in excellent condition, taking into account the structure and health assessments. It is considered likely that the tree will continue to develop in excess of 40 years with appropriate management and in normal conditions.
20-40 YEARS	The health and structure of the tree is indicative that the tree is in good condition and with appropriate care and management is expected to remain viable in the landscape for 20-40 years.
10-20 YEARS	The health and structure of the tree is indicative that the tree is in fair condition and with appropriate care and management the tree is expected to remain viable in the landscape for 10-20 years.
5-10YEARS	The tree is either a short-lived species or the health and structure of the tree is suggestive that the tree is in fair condition but likely to require removal and replacement within the next 10 years.
1-5 YEARS	The health and structure of the tree is indicative that the tree is in poor condition, is in decline or has a structural defect that cannot be rectified with selective pruning practices. The tree is anticipated to require removal and replacement within the next five years.
0 YEARS	The tree is senescent or in significant decline and not expected to survive. The tree may also be hazardous and immediate removal may be required.

Likelihood of failure matrix table

Likelihood of Failure	Likelihood of Impact			
	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

Risk rating matrix table

Likelihood of Failure& Impact	Consequences of Impact			
	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

GLOSSARY OF TERMS:

- Aerotropism – Growth direction of a plant or plant part responding to the presence of air.
- Attached broken branch – A live or dead branch that has snapped or fractured damaging its wood, destroying structural integrity at its point of connection, or has been compartmentalised by abscission but remains joined to the tree at this point.
- Basal – Proximal end of the trunk or branch, e.g. trunk wound extending to the ground is a basal wound, or as epicormic shoots arising from a lignotuber.
- Basal rot (also referred to as butt rot or collar rot) – A form of decay in standing trees, which primarily affects the lower trunk, trunk flare or buttress roots and buttress zone but may also extend up the trunk (Lonsdale 1999, p320).
- Bifurcation – the process of the division of roots or branches at one end into two parts.
- Branch shedding collar – A branch collar continuing to develop around the remains of a dead branch.
- Buttress root – A flange of adaptive wood as an upright extension of the first order roots and the trunk adding to the stability of many rainforest taxa, and often all tall trees. The flange tapers up the trunk and out along the first order root where it may extend several metres from the trunk. It may extend to branches and branch collars on trees with short trunks.
- Basal swelling – Uncharacteristic bulging stem growth at the base of the trunk due to altered stress in this region, often associated with decay (Lonsdale 1999, p311).
- Canopy - the highest level of branches and foliage in a forest, formed by the crowns of the trees.
- Cavity – A usually shallow void often localised initiated by a wound and subsequent decay within the trunk branches or roots, or beneath bark, and may be enclosed or have one or more opening.
- Codominant – Two or more first order structural branches or lower order branches of similar dimensions arising from about the same position from a trunk or stem.
- Compartmentalise - The process with which a tree seals following damage sustained. To ‘wall off’ infected areas of damage in an effort to maintain and restore structural support.
- Compression fork – A fork formed where two stems with an acute branch crotch grow pressing against each other with included bark which becomes enclosed bark where the stems flatten at their interface under increasing compression from each successive growth increment, forming a weak graft as a welded fork which remains susceptible to tensile stress. (Mattheck & Breloar 1994, p60)
- Decay - Decayed wood is a result of a breakdown of cell walls. There is a great loss of strength.
- Deliquescent – tree whose crown is comprised of two or more codominant first order structural branches.
- Diameter at Breast Height (DBH) Measurement of trunk width calculated at a given distance above ground from the base of the tree often measured at 1.4 m. The trunk of a tree is usually not a circle when viewed in cross section, due to the presence of *reaction wood* or *adaptive wood*, therefore an average diameter is determined with a *diameter tape* or by recording the trunk along its narrowest and widest axes, adding the two dimensions together and dividing

them by 2 to record an average and allowing the orientation of the longest axis of the trunk to also be recorded.

- Dieback - the death of some areas of the crown. Symptoms are leaf drop, bare twigs, dead branches and tree death, respectively. This can be caused by root damage, root disease, bacterial or fungal canker, severe bark damage, intensive grazing by insects, abrupt changes in growth conditions, drought, water-logging or over-maturity. Dieback often implies reduced resistance, stress or decline which may be temporary.

- Dominant – A tendency in a leading shoot to maintain a faster rate of apical elongation and expansion than other nearby lateral shoots, and the tendency also for a tree to maintain a taller crown than its neighbours (Lonsdale 1999, p313).

- Epicormic Shoots Juvenile shoots produced at branches or trunk from epicormic strands in some Eucalypts (Burrows 2002, pp. 111-131) or sprouts produced from dormant or latent buds concealed beneath the bark in some trees. Production can be triggered by fire, poor pruning practices, wounding, or root damage but may also be as a result of stress or decline.

- Excrescence – outgrowths or enlargements on a tree, usually abnormal (i.e. burl, gall)

- Fall Zone - The fall zone is assessed considering wind speed and direction, topography, safe fall zone, exclusion zone, any potential danger to the public or property, and environmental implications. It encompasses the area under and around the tree where there is the possibility that the tree could fall.

- Gall – Abnormalised local swelling or an outgrowth on a leaf, stem or root, caused by a parasite.

- Glycolysis is a metabolic process at the start of the chain of reactions within the process of cellular respiration – production of cellular energy. It occurs in the presence or absence of oxygen to enable aerobic and anaerobic cellular respiration. The glycolysis pathway converts one glucose (sugar) molecule into two pyruvate molecules; this ten-step conversion occurs in the presence of specific enzymes in the cell cytosol.

- Habitat tree – (resulting from habitat pruning) – Any tree providing a niche supporting the life processes of a plant or animal e.g. a hollow in the trunk or branches, suitable for nesting birds, arboreal mammals and marsupials, e.g. squirrels, bats or possums, or support of the growth of epiphytic plants e.g. orchids, ferns.

- Immediate – occurring in the present or as soon as possible, near to or related to the present.

- Included bark - Inwardly forming bark occurring at the junction of branches or co-dominate stems.

- Leaning - a tree where the trunk grows or moves away from upright. A lean may occur anywhere along the trunk influenced by a number of contributing factors e.g. genetically predetermined characteristics, competition for space or light, prevailing winds, aspect, slope, or other factors. A leaning tree may maintain a static lean or display an increasingly progressive lean over time and may be hazardous and prone to failure and collapse.

- Lopped – The term used to describe poor pruning practices to trees, not in accordance with the Australian Standards (AS 4373-2007).

- Mature – tree aged 20-80% of life expectancy, in situ.

- Occluding tissue – the woody tissue forming around the perimeter of a wound being a succession of callus wood, wound wood and wood.

- Occlusion – growth processes where wound wood develops to enclose the wound face by the merging of wound margins concealing the wound and restoring the growing surface of the structure with each growth increment gradually realigning fibres in the wood longitudinally along the stem to maximise uniform stress loading.

- Phototropism – A directional growth movement towards light (positive tropism) or away from a source of light (negative tropism, Aphototropic).

- Self-correcting lean (self-correcting) – Atypical stem growth subsequently influenced and modified by tropisms, i.e gravitopism and phototropism, where reaction wood attempts to return it to a more typical habit or form.

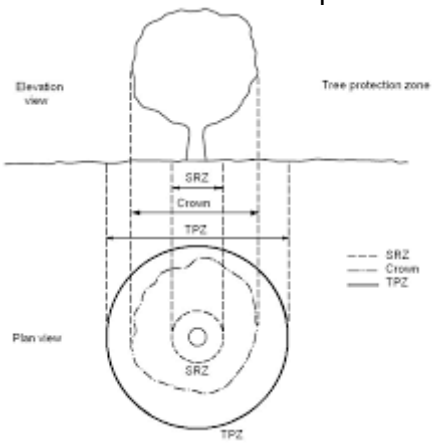
- Significant – important, weighty or more than ordinary.

- Significant tree – a tree considered important, weighty or more than ordinary. Example: due to prominence of location, or in situ, or contribution as a component of the overall landscape for amenity or aesthetic qualities, or curtilage to structures, or importance due to uniqueness of taxa for species, subspecies, variety, crown form, or as an historical or cultural planting, or for age, or substantial dimensions, or habit, or as remnant vegetation, or habitat potential, or a rare or threatened species, or uncommon in cultivation, or for aboriginal cultural importance, or is a commemorative planting.

- Structural root zone (SRZ) – the minimum radial distance around the base of a tree and its root plate required for its stability in the ground against windthrow.

- Structural Woody Roots / Structural Roots – roots supporting the infrastructure of the root plate providing strength and stability to the tree. Such roots may taper rapidly at short distances from the root crown or become large and woody, they are usually first and second order roots, they may be crossed or grafted and are usually contained within the area of crown projection or extend just beyond the drip line.

- Tree Protection Zone (TPZ) – A specified area above and below ground and at a given distance from the trunk set aside for the protection of a trees roots and crown to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by development.



- Trifurcated union – the process of the division of roots or branches at one end into three parts.

- Trunk - a single stem extending from the *root crown* to support or elevate the *crown*, terminating where it divides into separate *stems* forming *first order branches*.

- ULE - usual life expectancy, the estimated remaining life of the tree.

- Union – the junction in the tree where a branch meets the trunk, or a co-dominate and dominate trunk meet.

Extract from Australian Standard AS4970 2009 Protection of trees on development sites

Section 3, Determining the protection zones of the selected trees:

3.3.5 Structural root zone (SRZ)
"The SRZ is the area required for street stability. A larger area is required to maintain a viable tree. The SRZ only needs to be calculated when a major encroachment into a TPZ is proposed. Root investigation may provide more information on the extent of these roots."

Determining the SRZ
The radius of the TPZ is calculated for each tree by multiplying its DBH x 12.

SRZ radius = (D x 50)0.42 x 0.64

Where *D* = trunk diameter, in metres, measured above the root buttress.
Note: The SRZ for trees with trunk diameters less than 0.15 m will be 1.5 m (see Figure 1).

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DISCLAIMER:

This report only covers identifiable defects present at the time of the inspection and assessment of the tree. The author accepts no responsibility or can be held liable for any structural defect or unforeseen event that may occur after the time of the inspection unless clearly specified time scales have been detailed within the report.

Factors including the absence of historical records or local knowledge, recognition of the variability of the integrity of a tree as a naturally living organism as well as the impact of conditions within its surrounds to which it maybe subject including the impacts of mechanical force and the occurrence of weather events, do not allow an arborist to guarantee the age of a tree, or the length of time a tree/s may live or such time as it they may fail.

The author cannot guarantee that a tree will be structurally sound under all circumstances and cannot guarantee that the recommendations detailed will result in the tree/s being made safe. No tree can ever be guaranteed as safe under any circumstances as there will always be risks, particularly when taking into consideration the location, species, age, current state of health and possible constraints on the tree.

Unless otherwise mentioned, this report will only be concerned with above ground inspections conducted visually from the ground level. The recommendations are made on the basis of observations made and recorded at the time of the inspection and therefore the author accepts no liability for any recommendations made. All care has been taken to obtain accurate information from reliable sources however the author can neither guarantee nor be responsible for the accuracy of information provided by others.