



Arboricultural Assessment

Glenellen Solar Farm

Prepared for

Trina ISBU Australia – Trina Solar Group

(Contact: Jose Flores)

Prepared by

Ian McKenzie

(Consulting Arborist, ArborViews Australia)

13th June 2023

ArborViews Australia

ABN: 77 596 863 791

18 Payten Street
Eraring NSW 2264
mob: 0414 682 001

website: www.arborviews.com.au

email: ian.mckenzie@arborviews.com.au



Acknowledgement

ArborViews recognises the land, upon which the subject trees of this report are growing, is the Traditional Land of the Wiradjuri People, and that sovereignty of the First Peoples of Australia has never been ceded. ArborViews respects the Traditional Custodians and acknowledges their ancient and evolving culture, and their ongoing living relationship with Country. ArborViews pays respect to their Elders – past, present, and emerging – and to their cultural knowledge-holders.

Disclaimer

This report is to be read and considered in its entirety. Visual Tree Assessment (VTA) methodology has been used to form the basis of the report. No aerial inspection, internal analysis or below ground root inspection has been undertaken. The assessment and recommendations are based on the current situation. Trees are living, dynamic entities and circumstances can change. The duty of care by owners of trees requires an ongoing appropriate level of professional inspection and assessment. All recommendations contained in the report should be implemented.

We confirm we are the authors of this report and that we are appropriately qualified and have the relevant experience necessary to prepare this report. We acknowledge our professional duty to provide impartial and objective opinions and recommendations free from undue influence and confirm we have fulfilled this duty.

Ian McKenzie
13th June 2023

Charmian Eckersley
13th June 2023

Contents

Acknowledgement

Disclaimer

Declaration

1 Summary	3
2 Introduction	4
2.1 Précis	4
2.2 Brief	4
2.3 Methodology.....	4
2.4 Limitations and assumptions	5
3 Site Details	7
3.1 Site description	7
3.2 Tree location plan	9
4 Arboricultural Assessment.....	10
4.1 Tree assessment	10
4.2 Tree assessment schedule.....	12
5 Discussion	16
5.1 Approach	16
5.2 Tying back.....	16
5.3 Pruning impacts	17
5.4 Summary of required pruning.....	17
5.5 Mitigation	19
6 Recommendations	20
7 References	22

Appendices

Appendix 1	Tree Location Plan
Appendix 2	Specification for Pruning and Tying Back Branches
Appendix 3	Tree Assessment – an overview
Appendix 4	Glossary

1 Summary

ArborViews assessed twenty-six eucalypts in a one and a quarter kilometre corridor of critically endangered ecological community along a road required for over-size truck access to a proposed solar farm. The trees form a natural archway over the road but the twenty-six identified trees encroach into the 7.5-metre high clearance zone over the road.

Two methods are recommended to provide the necessary clearance. In addition to pruning the encroaching branches, it is recommended that where possible branches or trees are tied back to achieve the necessary clearance. This temporary measure delivers the benefit that there is no loss of branches or foliage contributing to the impact on tree health.

Fifteen of the 26 trees assessed will need live branches to be pruned. Of these, ten trees require less than 10% of their crowns to be removed and should recover within a couple of years with no significant impact in their ongoing viability.

Two trees will have a quarter of their crown removed. They may fully recover over several years but it will depend upon ongoing growing conditions such as rainfall, heat and if they are affected by pests, diseases or abiotic impacts.

Two trees will lose more than half their foliage. They should survive but are unlikely to fully recover, and their useful life expectancy (ULE) will diminish to some extent.

One tree is effectively removed entirely. Whilst it is recommended that it is retained and severely lopped to allow it to regenerate, it is considered a total loss.

It is estimated a total of 300 m³ of canopy will be lost due to the pruning. Measures to mitigate the impact from the pruning are recommended. In particular, watering for at least twelve months will help the trees recover. Local provenance tree stock should be planted to adequately compensate for the loss of canopy.

2 Introduction

2.1 Précis

The proposal to develop a solar farm at Glenellen, north of Albury, is a State Significant Development involving the installation of 200 MW of solar photovoltaic cells, transformers, inverters, batteries and associated infrastructure.

Access to the development site is via a section of unsealed rural road where remnant eucalypts form a natural archway over the road. Delivery of transformers to the site will necessitate the use of oversize trucks that will require adequate clearance.

The NSW Department of Planning and Environment (DPI) has emphasised the importance of the site, which is a Critically Endangered Ecological System, for squirrel gliders and requested its assessment by a suitably qualified arborist.

2.2 Brief

- Identify trees in the route from the Walla Walla Jindera Road along Lindner and Ortlipp Roads to the entrance of the proposed solar farm whose branches extend into a 7.5 metre-high clearance zone required for the delivery of plant on over-size trucks.
- Conduct a thorough inspection of the 26 identified trees, with specific attention to the 27 limbs from 15 of those trees that will be affected by pruning.
- Assess the potential impact of the pruning on the *Eucalyptus blakelyi*, *Eucalyptus melliodora* and *Eucalyptus polyanthemos* ssp. *polyanthemos* trees, considering factors such as tree stability, structural integrity and overall health.
- Assess the expected viability of each tree after the pruning, accounting for potential stress caused by limb removal and any associated risks.
- Prepare a comprehensive report outlining the findings of the assessment, including detailed observations, analysis, and recommendations.

2.3 Methodology

ArborViews' two consulting arborists visited the site on the 1st June 2023. They walked the route from the Walla Walla Jindera Road along Lindner and Ortlipp Roads to the entrance of the proposed solar farm in the company of Jose Flores, Head of Development at Trinar Solar, and Daniel Magdi, Principal Environmental Consultant at Eco Logical Australia and tied tape onto 26 trees identified as encroaching the required clear zone.

The approximate location of the 26 trees, collected on a Samsung Galaxy smart phone, is shown in the Tree Location Plan (Section 3.2 and Appendix 1).

ArborViews assessed the 26 trees over 1st and 2nd June 2023. Numbered tags were attached to each tree. (The tags' numbers are a bit random due to availability.)

Each tree was geolocated and data was collected and recorded using Trimble® Terraflex™. The trees were assessed in accordance Visual Tree Assessment (VTA) methodology as described by Mattheck & Breloer (1994, pp. 145-6). The following data was collected for each subject tree:

- Tree species
- Trunk diameters at breast height (DBH)
- Tree height
- Avg crown spread
- Age classification
- Health and vitality
- Structure and form
- Useful life expectancy (ULE)
- Wildlife significance
- Landscape significance

Habitat value was considered and attributed a rating on a scale of very high, high, moderate and low.

Tree retention value was determined by combining ULE, which incorporated tree risk, with the landscape significance of the tree including its habitat value.

No aerial inspection, internal analysis, tissue analysis or soil testing has been undertaken.

Branches that extend into the 7.5-metre high clearance zone were identified and pruning locations were marked with a laser pointer and photographed. The percentage of crown removed was estimated and recorded.

The impact upon the ongoing viability of the tree was considered based on the percentage of crown lost and the assessed health and vitality of the individual trees.

2.4 Limitations and assumptions

An aim of the assessment and report is to determine the likely impact by the required pruning on the ongoing viability of trees. However, trees are complex biological entities and the consequences of pruning a given number of branches on any individual tree cannot predicted with any certainty.

The one-off assessment is a snapshot in time of the tree's potential in the opinion of the assessor. It requires assumptions regarding the history of the site and of the trees. Ongoing monitoring of the trees' health would have provided a sounder baseline from which to draw conclusions about the impacts from the pruning.

Specifically, it has been assumed that the health of the subject trees reflects the good rainfall over recent years and no chemical, biological or physical disturbance of the trees' rhizospheres.

The assessment of the future health of the trees pruned also assumes ongoing adequate rainfall. Inadequate rainfall and drought will impact negatively on all the trees but will have a compounding effect of the trees that are pruned.

The likelihood of increasing heat due to climate change is unknown and has not been considered in relation to the future health of the trees.



Figure 3 Remnant eucalypts form a natural tree archway over the road.

3.2 Tree location plan



Figure 4

4 Arboricultural Assessment

4.1 Tree assessment

Tree assessment first describes a tree – its location, species, common name and dimensions. The trees assessed were three species of eucalypt – *Eucalyptus blakelyi* (Blakely’s red gum), *Eucalyptus melliodora* (yellow box) and *Eucalyptus polyanthemos* ssp. *polyanthemos* (red box). The trees’ size ranged from small to very large.

Secondly, the sustainability of a tree in its location is assessed. Age, health, vitality, structural condition, form, suitability to the site and growing conditions, and risk are considered in determining the useful life expectancy (ULE) of the tree. Assessment of a tree’s ULE considers the factors that affect the likely period that the tree will be retained. This includes its natural life expectancy modified by risk and conflict with infrastructure. ULE is an assessment of the tree’s current situation and can change with circumstances, prolonged life expectancy with improved growing conditions or shortened life expectancy due to future impacts or change of use of its surrounding environs. ULE is categorised as one of the following – greater than 40 years, 15 to 40 years, 5 to 15 years, or less than 5 years. All twenty-six trees assessed were considered to have a greater than 40 years ULE.

Thirdly, the tree’s significance in the landscape is assessed. Environmental, social and cultural factors are considered. Size, suitability of location, visual prominence, ecological importance, amenity the tree provides, Indigenous cultural significance, and heritage value affect the tree’s landscape significance. The wildlife value of native trees in particular has particular bearing on landscape significance. Trees contribute habitat and food for birds, mammals, reptiles, amphibians and invertebrates. The likely benefit to wildlife is assessed and considered in determining landscape significance. There are numerous signs of arboreal mammals using the subject trees and there were bird nests in several of the trees. Landscape significance is rated as one of seven categories – significant, very high, high, moderate, low, very low or insignificant. Fourteen of the 26 trees were rated as having very high landscape significance. Another nine were rated high.

Sustainability of a tree is combined with its landscape significance to determine its tree retention value on a scale of four categories – high, moderate, low and very low. Twenty-three of the 26 trees assessed had high tree retention value. The other three were rated as moderate.

The data collected for the 26 trees is laid out in the tree assessment schedule in the next section of the report. The matrix used to determine tree retention values is shown in Table 1 below.

A more detailed overview of tree assessment is provided in Appendix 2. Newcastle City Council (NCC) provides a detailed explanation and methodology for determining tree retention value in its [Urban Forest Technical Manual \(2018\)](#). The methodology has been adapted from other similar methodologies.

Table 1 Matrix to determine tree retention value (TRV)

	Landscape Significance Rating						
Useful Life Expectancy (ULE)	1 significant	2 very high	3 high	4 moderate	5 low	6 very low	7 insignificant
greater than 40 years	High Retention Value			Moderate			
15 to 40 years							
5 to 15 years				Low			
less than 5 years				Very Low			

4.2 Tree assessment schedule

Table 2 Tree assessment schedule

Tree No.	Species	Common name	DBH	Height	Avg crown spread	Age class	Health & vitality	Structure	form	ULE	Habitat	Landscape Significance	Tree Retention Value	Notes
80	Eucalyptus polyanthemos ssp. polyanthemos	red box	101	15	16	mature	good	good	typical	>40	high	very high	high	2 branches to prune. 5% canopy loss.
81	Eucalyptus polyanthemos ssp. polyanthemos	red box	60	20	12	mature	good	good	typical	>40	high	very high	high	1 branch to prune. 2 to tie back. Est. 5% canopy loss.
82	Eucalyptus polyanthemos ssp. polyanthemos	red box	58	13	10	mature	good	good	bowed codominant trunk	>40	high	very high	high	Small habitat cavity. Investigate prior to pruning. 5 branches to prune. 60% canopy loss.
83	Eucalyptus blakelyi	Blakely's red gum	52	18	10	mature	good	good	asymmetric bowed codominant trunk Codominant stem previously failed at 4m.	>40	high	very high	high	1 branch. 10% canopy loss.
84	Eucalyptus blakelyi	Blakely's red gum	65	14	16	mature	good	good	codominant trunk	>40	high	very high	high	One 2 nd order branch. 5% canopy loss.
85	Eucalyptus polyanthemos ssp. polyanthemos	red box	59	15	15	mature	good	good	typical codominant trunk At 3m.	>40	high	very high	high	Tie back western stem. Remove deadwood and 5 branches over road. 25% canopy loss.
86	Eucalyptus polyanthemos ssp. polyanthemos	red box	143	14	16	mature	good	good	asymmetric	>40	very high	very high	high	Remove two 3 rd order branches. Tie up low hanging tertiary branch on west side to branch above. 5% canopy loss.
87	Eucalyptus melliodora	yellow box	27	10	8	mature	good	fair	bowed 45 degree lean across road.	>40	moderate	moderate	moderate	Tie overhanging branch to branch behind.

Tree No.	Species	Common name	DBH	Height	Avg crown spread	Age class	Health & vitality	Structure	form	ULE	Habitat	Landscape Significance	Tree Retention Value	Notes
88	Eucalyptus melliodora	yellow box	51	17	10	mature	good	fair	bowed straight lean 48 degree lean to S	>40	very high	very high	high	Tie top of tree up and back to red gum 4m to east.
89	Eucalyptus polyanthemos ssp. polyanthemos	red box	111	22	25	mature	good	good	codominant trunk	>40	high	very high	high	Remove 3 lower dead branches.
90	Eucalyptus blakelyi	Blakely's red gum	42	16	10	mature	good	good	asymmetric bowed	>40	high	high	high	Remove one live branch and one dead branch. 5% canopy loss.
91	Eucalyptus blakelyi	Blakely's red gum	16	10	10	mature	good	fair	asymmetric suppressed bowed	>40	moderate	high	high	Remove deadwood. Tie up and back to tree on western side of T91.
92	Eucalyptus polyanthemos ssp. polyanthemos	red box	57	13	10	mature	good	good	typical Large	>40	high	very high	high	Remove 1 eastern branch. Tie back western branch. 5% canopy loss.
93	Eucalyptus polyanthemos ssp. polyanthemos	red box	69	21	14	mature	good	good	asymmetric	>40	high	high	high	Remove 2 tertiary branches. Tie eastern branch to branch higher in the tree. 5% canopy loss.
94	Eucalyptus blakelyi	Blakely's red gum	39 44	17	12	mature	good	good	codominant trunk	>40	high	high	high	Tie back overhanging branch to other main stem of the tree.
95	Eucalyptus blakelyi	Blakely's red gum	64	20	12	mature	good	fair	bowed Previously failed codominant stem at base.	>40	high	very high	high	Remove one 1 st order branch. Remove one dead branch. 25% canopy loss.

Tree No.	Species	Common name	DBH	Height	Avg crown spread	Age class	Health & vitality	Structure	form	ULE	Habitat	Landscape Significance	Tree Retention Value	Notes
96	Eucalyptus blakelyi	Blakely's red gum	33 29	15	11	mature	good	good	bowed	>40	high	high	high	100% canopy over road. W stem: Lop two 2 nd order branches 15cm above union. E stem: at branch union 4m AGL remove lower, 1 st order branch at union. Reduction prune upper 1 st order branch back to second 2 nd order branch.
97	Eucalyptus blakelyi	Blakely's red gum	34	11	8	mature	good	good	asymmetric bowed Most of canopy over road.	>40	high	high	high	One branch removed. 60% canopy loss.
98	Eucalyptus polyanthemos ssp. polyanthemos	red box	59 35	14	10	mature	good	fair	bowed codominant trunk	>40	high	high	high	Tie back 3 branches to higher in the same tree.
99	Eucalyptus blakelyi	Blakely's red gum	43	18	12	mature	good	good		>40	very high	very high	high	Prune deadwood over road.
100	Eucalyptus blakelyi	Blakely's red gum	19	10	5	mature	good	fair	suppressed	>40	moderate	moderate	moderate	Tie back overhanging branches to tree behind.
200	Eucalyptus blakelyi	Blakely's red gum	32	13	8	mature	good	good		>40	high	high	high	Tie back overhanging branches to trees behind.
199	Eucalyptus melliodora	yellow box	20	8	6	mature	good	fair	suppressed bowed	>40	high	moderate	moderate	Tie back overhanging branch to tree to the west.
198	Eucalyptus polyanthemos ssp. polyanthemos	red box	93 52	18	18	mature	good	good	codominant trunk	>40	high	very high	high	Tie back overhanging branches to high northern stem in same tree.

Tree No.	Species	Common name	DBH	Height	Avg crown spread	Age class	Health & vitality	Structure	form	ULE	Habitat	Landscape Significance	Tree Retention Value	Notes
197	Eucalyptus blakelyi	Blakely's red gum	71	18	16	mature	good	good		>40	high	very high	high	Reduction prune southern stem to perpendicular stem. 10% canopy loss.
196	Eucalyptus melliodora	yellow box	56	15	12	mature	good	good	codominant trunk	>40	high	high	high	Reduction prune one branch. 5% canopy loss.



5 Discussion

5.1 Approach

The brief to ArborViews was to identify which branches needed to be pruned to achieve the required clearance and to assess the impact upon the trees' viability as a result of the pruning. Given the importance of this corridor of Critically Endangered Ecological Community for the movement of Squirrel Gliders, ArborViews' approach has been to specify the minimal amount of pruning that will be required to achieve the necessary clearance.

For example, where the orientation of foliage is in the direction of travel, the load will push it out of the way. Where foliage is oriented against the direction of travel it will be tied back or, if necessary, pruned.

The Biodiversity and Conservation Division (BCD) of the Department of Planning and Environment requires that a precautionary approach is taken in assessing the impact of the pruning and overestimating rather than underestimating the impact on the ongoing viability of the trees.

The level of precision required to minimise the amount of pruning increases the likelihood of unforeseen conflict between branches and the load. For example, a load may be slightly larger than anticipated or recent rainfall or wind may cause branches to encroach further than they otherwise would have (see Section 5.5). It is recommended that an arborist is utilised as a spotter.

Whilst the amount of pruning has been minimised, the assessment of impacts assumes that some additional pruning may be necessary due to unforeseen circumstances.

5.2 Tying back

It was agreed that the objective of achieving the required clearance for oversize trucks to use the road could also be satisfied by tying back the encroaching branches in some instances. Thus certain branches can be tied to higher up branches to pull them up; other instances branches can be pulled sideways out of the clearance zone; or a combination of upwards and sideways.

It was determined that 10 of the 26 trees whose branches encroached the clearance zone could have branches tied back instead of being pruned. Another five trees could have some branches tied back whilst other branches on those trees would need to be pruned.

The obvious benefit of tying branches back rather than pruning them is that there is no impact upon the tree's health from the loss of those branches. Two examples of where branches can be tied back to avoid the clearance zone are shown in Figures 5 and 6.



Figure 5 Tree 87 can be pulled out of the clearance zone and tied to the tree behind.



Figure 6 Tree 88 can be pulled out of the clearance zone and tied to an anchor point high in the tree behind it.

5.3 Pruning impacts

A combination of two factors that result from pruning branches negatively affects tree health. Firstly, loss of leaves reduces the photosynthetic capacity of the tree, thus reducing the production of energy required for the tree to live, grow and withstand pests and diseases. Secondly, wounds that results from pruning use energy for defence against fungal attack and to grow new wood around and over the wound. The combination of these two factors reduces the tree's energy and will negatively affect tree health. The greater the amount of leaf loss and the greater the size and number of pruning wounds, the greater the impact on the tree's health.

5.4 Summary of required pruning

Fifteen trees require pruning of live branches to varying degrees to provide the necessary clearance. Ten of these trees will lose an estimated 10 percent or less of crown volume. Their health is rated good and it is anticipated that they will recover from the pruning impacts.

Two trees will have an estimated one quarter of their crowns removed. These trees will take some time to recover and due to their reduced energy levels will be predisposed to pests and diseases, which if they occur, will further exacerbate the impact on tree health. Adequate water will be critical for these trees to remain healthy and recover fully from

the pruning impacts. Lack of water will further exacerbate the trees' stress and could potentially reduce their useful life expectancy (ULE).

An estimated 60 percent of crown will be removed from two trees. Whilst these trees are currently healthy, it is unlikely they will ever fully recover from the pruning. Their ULE will undoubtedly diminish and drought stress or disease or insect attack could potentially result in premature death.

Tree 96 will be subject to pruning that will remove an estimated 95% of its crown. It cannot fully recover from this degree of pruning but may be able to survive through the production of epicormic growth. It is debateable whether it would not be better to completely remove the tree. *Eucalyptus blakelyi* is a lignotuberos species and cutting the tree to ground level would stimulate lignotubers to sprout and form new stems. In an urban setting, the tree would be removed. Retaining the tree will require it to be lopped, a form of pruning that is generally discouraged and described in the Australian Standard *Pruning of Amenity Trees* AS 4373:2007 as an undesirable practice. Nonetheless, in this environment it considered reasonable to retain and lop. However, in considering the overall impact and determining compensatory planting, this tree should be considered a total loss.

Table 3 lists the estimated individual crown loss for each pruned tree. The total loss of canopy that will be removed by the clearance pruning is estimated to be approximately 300 m³. This is equivalent to one large tree that has taken at least 20 or 30 years to attain maturity.

Table 3 Summary of the crown volume removed.

Tree no.	Species	Estimated crown volume	Live crown ratio (LCR)	# branches pruned	% lost	Crown loss m ³
80	<i>E. polyanthemos</i>	302	50%	2	5%	8
81	<i>E. polyanthemos</i>	226	50%	1	5%	6
82	<i>E. polyanthemos</i>	102	50%	5	60%	31
83	<i>E. blakelyi</i>	141	50%	1	10%	7
84	<i>E. blakelyi</i>	281	50%	1	5%	7
85	<i>E. polyanthemos</i>	265	67%	2	25%	44
86	<i>E. polyanthemos</i>	281	67%	2	5%	9
89	<i>E. polyanthemos</i>	1,080	50%	3 dead	0%	0
90	<i>E. blakelyi</i>	126	50%	2	5%	3
92	<i>E. polyanthemos</i>	102	50%	1	5%	3
93	<i>E. polyanthemos</i>	323	50%	2	5%	8
95	<i>E. blakelyi</i>	226	67%	2	25%	38
96	<i>E. blakelyi</i>	143	67%	3	95%	91
97	<i>E. blakelyi</i>	55	50%	1	60%	17
197	<i>E. blakelyi</i>	362	67%	1	10%	24
196	<i>E. melliodora</i>	170	50%	1	5%	4
					Avg 20%	Total 300 m ³

5.5 Mitigation

Timing of truck movements

The level of a tree's hydration varies significantly depending upon the amount of available water in the soil. Well hydrated branches are heavier than branches that are holding less water and will hang lower. In addition, the water that adheres to foliage following rain adds to the weight of branches, which will hang even lower.

It rained twice in the region during the week prior to ArborViews' assessment – about 10 mm each time. This should have resulted in average conditions with respect to how low branches were hanging.

Heavy rainfall may result in the assessed branches hanging lower than they were when assessed, especially if foliage is still wet. As much as possible, truck movements should avoid periods following heavy or prolonged rainfall, especially immediately after the rain when foliage is still wet. Summer and autumn are the preferable times for the over-size trucks to travel along the road to avoid conflict with branches. Water transpires from trees more quickly when it is warmer as well as average rainfall being lower over summer.

Watering

The loss of leaves from pruning reduces the capacity for a tree to photosynthesise and produce energy to live, grow and withstand pests and disease attack. Photosynthesis requires water and a lack of water in the soil will reduce a tree's ability to photosynthesise also, further impacting the tree's generation of energy following pruning. Ensuring adequate water in the soil around the trees that are pruned will mitigate the impacts of pruning.

Albury receives an average of about 60 mm rainfall per month, with slightly more rainfall in months of winter and spring. It is recommended that rainfall is monitored and that supplementary watering is applied to the root zones of the trees that have been pruned to ensure that water equivalent to 60 mm rainfall per month is available to the pruned trees for the period of the development.

Compensatory tree planting

Whilst the trees that are pruned are likely to survive and most will recover from the pruning impacts, the loss of canopy will reduce the benefits the trees currently provide. New tree planting will help compensate for the loss of benefits from the trees.

To maintain the local provenance of the vegetation, it is recommended that seeds are collected from the trees along Lindner Road and propagated for planting when they are established.

6 Recommendations

1. It is recommended that ArborViews Australia or another suitably qualified (minimum AQF 5) and experienced consulting arborist is engaged as the project arborist for the duration of the project.
2. It is recommended that the following trees are pruned in accordance with the pruning specifications in Appendix 2, to achieve the required clearance.

Trees numbered 80, 82, 83 ,84, 89, 90, 95, 96, 97, 197 and 196.

3. It is recommended that the following trees are pruned in accordance with the pruning specifications in Appendix 2 of this report and that other branches that encroach into the clearance zone, which are not specified for pruning, are tied back to achieve the required clearance.
Trees numbered 81, 85, 86, 92 and 93.

4. It is recommended that the following trees are not pruned but are tied back to achieve the necessary clearance, in accordance with the specification in Appendix 2 of this report.

Trees numbered 87, 88, 91, 94, 98, 99, 100, 200, 199, and 198.

5. Pruning and tying back should be completed no longer than two weeks prior to the first over-size truck movements.
6. It is recommended that an arborist with a minimum qualification of Arboriculture Certificate 3 is engaged to undertake the pruning and tying back of branches, in accordance with the specification in Appendix 2 of this report.
7. It is recommended that tree works to achieve the necessary clearance complies strictly with the specification in Appendix 2 of this report.
8. As much as possible, avoid over-size truck movements immediately following periods of high rainfall.
9. It is recommended that a spotter, ideally the project arborist, is engaged to move with the over-size trucks and watch that branches do not catch on the load and break. If an unforeseen conflict between the over-size load and branches occurs, with the approval of the project arborist, the affected branch should be pruned.
10. Where the road widens near Tree 96, trucks should move to the left-hand (northern) side of the road if necessary.
11. It is recommended that monthly rainfall is monitored. After the trees have been pruned, when the monthly rainfall is less than 60 mm, supplementary watering shall be provided. An area of 10 metres from the roadside and 10 metres either side of trees that have been pruned shall be watered. Water shall

be applied at a rate of one litre per square metre for each mm less than 60 mm rainfall in a month. For example, if 40 mm rain fell in the month, 20 litres of water per m² would be applied to an area of 200 m², totalling 4,000 litres of water.

12. It is recommended that a record of supplementary watering is maintained and provided to the project arborist on a monthly basis.
13. It is recommended that seeds are collected from the trees along Lindner Road to propagate trees for compensatory tree planting.
14. It is recommended that the number of trees planted to compensate for the loss of canopy and the loss of trees that die prematurely due to the pruning is based on the removal of approximately 300 m³ of canopy including the loss of one tree (Tree 96).

7 References

Australian Standards Committee EV-018, Arboriculture (2007), AS 4373–2007 *Australian Standard – Pruning of Amenity Trees*, Standards Australia, Sydney.

Centre for Australian National Biodiversity Research (2015) EUCLID *Eucalypts of Australia* Edition 4, <https://apps.lucidcentral.org/euclid/text/intro/index.html> date visited 28/2/21.

Google Maps (2023), <https://apps.nearmap.com/maps/#/@-35.9348647,146.8919214,17.17z,0d/V/20230403> visited: June 2023.

Farmonline Weather, visited 7/6/23
https://www.farmonlineweather.com.au/station.jsp?lt=site&lc=72160&list=rb&of=of_a&ot=ot_a&mm=05&yyyy=2023&sub=go

Mattheck, C. & Breloer, H. (1994), *The Body Language of Trees: A Handbook for Failure Analysis*. TSO, London, England.

Nearmap (2023), *Photomaps*, <http://maps.au.nearmap.com/> visited: June 2023.

State of NSW and Department of Planning and Environment (2021), *Trees Near Me* NSW, <https://treesnearme.app/>.



	ArborViews Australia	Glenellen Solar Farm	DRAWN	IMcK	TITLE/DWG NO. Tree Location Plan	A3
			DATE	8/6/23		
			SCALE	1:3000		



Specification for Pruning & Tying Back Branches

Lindner & Ortlipp Roads, Glenellen

13th June 2023

1. The objective of the specified pruning and tying back is to provide clearance for oversize vehicles to a height of 7.5 metres to travel from the Jindera-Walla Walla Road along Lindner Road and Ortlipp Road to the entrance to the Glenellen Solar Farm without damaging the trees or the equipment.
2. Pruning and tying back shall be undertaken in accordance with these specifications. The trees to be pruned and/or tied back have blue numbered round tags attached at approximately 2 metres above ground level to the side of the trunk facing the road. Blue flagging tape is also tied to the tagged trees.
3. Pruning shall be undertaken only when it is not practical to tie the branches back to achieve the necessary clearance.
4. Pruning and tying back shall be undertaken by an arborist with a minimum qualification of Arboriculture Certificate 3.
5. Pruning and tying back shall be undertaken in compliance with the Safe Work Australia Guide to Managing Risks of Tree Trimming and Removal Work, July 2016.
6. Pruning shall be undertaken in accordance with the Australian Standard *Pruning of Amenity Trees* AS4373:2007, with the exception of Tree 95.
7. Branches to be tied back may be pulled upwards out of the clearance zone or sideways out of the clearance zone or a combination of upwards and sideways, depending on the availability of suitable anchors. The tie-off location on the branches being pulled and the anchors is indicated in this document but the arborist undertaking the work shall have discretion to select the appropriate points to tie off to.
8. Branches shall be tied back using minimum 50 mm jute webbing. The webbing shall be laid flat around the branches and tied with a non-slip knot.
9. The tiebacks shall be removed within a fortnight from when clearance for the passage of over-size trucks is no longer required.

Note: The photos in this specification refer to looking eastwards and westward. That should not be interpreted literally as the road has several bends. Looking eastwards should be interpreted as looking along the road in the direction away from the Walla Walla Jindera Road. Looking westwards is looking back towards the Walla Walla Jindera Road.

Appendix 2

Tree No.	Species	Pruning class	# branches to be pruned	Approx. % to be pruned
80	<i>E. polyanthemos</i>	reduction pruning	2	5%

Instruction

Prune two branches back to the branch unions indicated by yellow line in Figure 1.



Figure 1 Two branches to be reduction pruned. Photo is taken from the road looking eastwards.

Appendix 2

Tree No.	Species	Pruning class / tie back	# branches to be pruned / tied back	Approx. % to be pruned
81	<i>E. polyanthemos</i>	selective pruning, tying back	1 / 2	5%

Instruction

- Prune one branch back to the branch union indicated by the arrow and yellow lines in Figures 2 & 3.
- Tie back 2 smaller branches.



Figure 2 Photo of Tree 81 taken from the road looking eastwards, showing the branch to be pruned.



Figure 3 A closer-up photo of Figure 2.

Appendix 2

Tree No.	Species	Pruning class	# branches to be pruned	Approx. % to be pruned
82	<i>E. polyanthemos</i>	reduction pruning; selective pruning	5	60%

Instruction

Investigate small habitat cavity before prior to pruning. The larger main stem that overhangs the road bifurcates into two first-order branches at about 6 metres above ground level (AGL). The western first order branch (A) has three pruning cuts shown in Figures 4 and 5. The eastern first order branch (B) bifurcates into two second-order branches a metre higher. One of these is selectively pruned to the union. The other second-order branch is reduction pruned back to an upright tertiary branch just above the second-order branch union. See Fig 6.



Figure 4 Photo taken from the road looking eastwards at the closer of the two first-order branches, showing the locations for three pruning cuts.

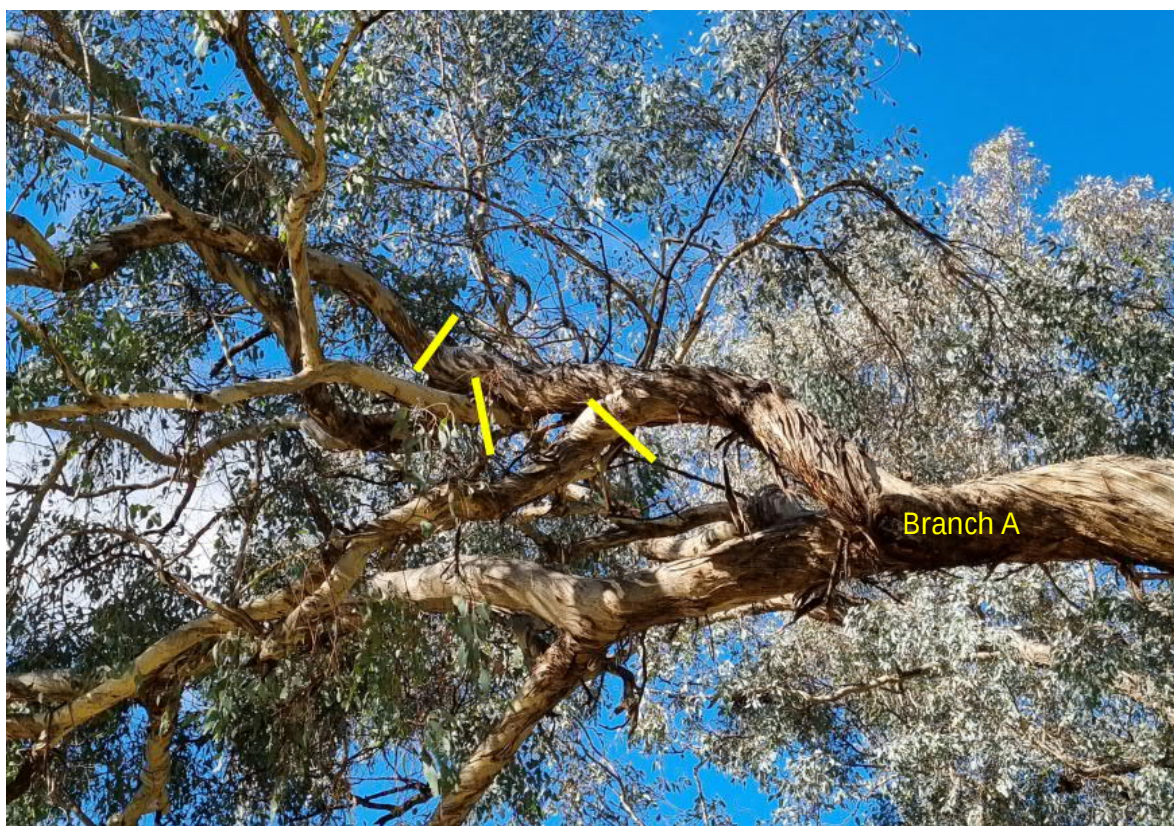


Figure 5 A closer view showing the pruning locations on Branch A.

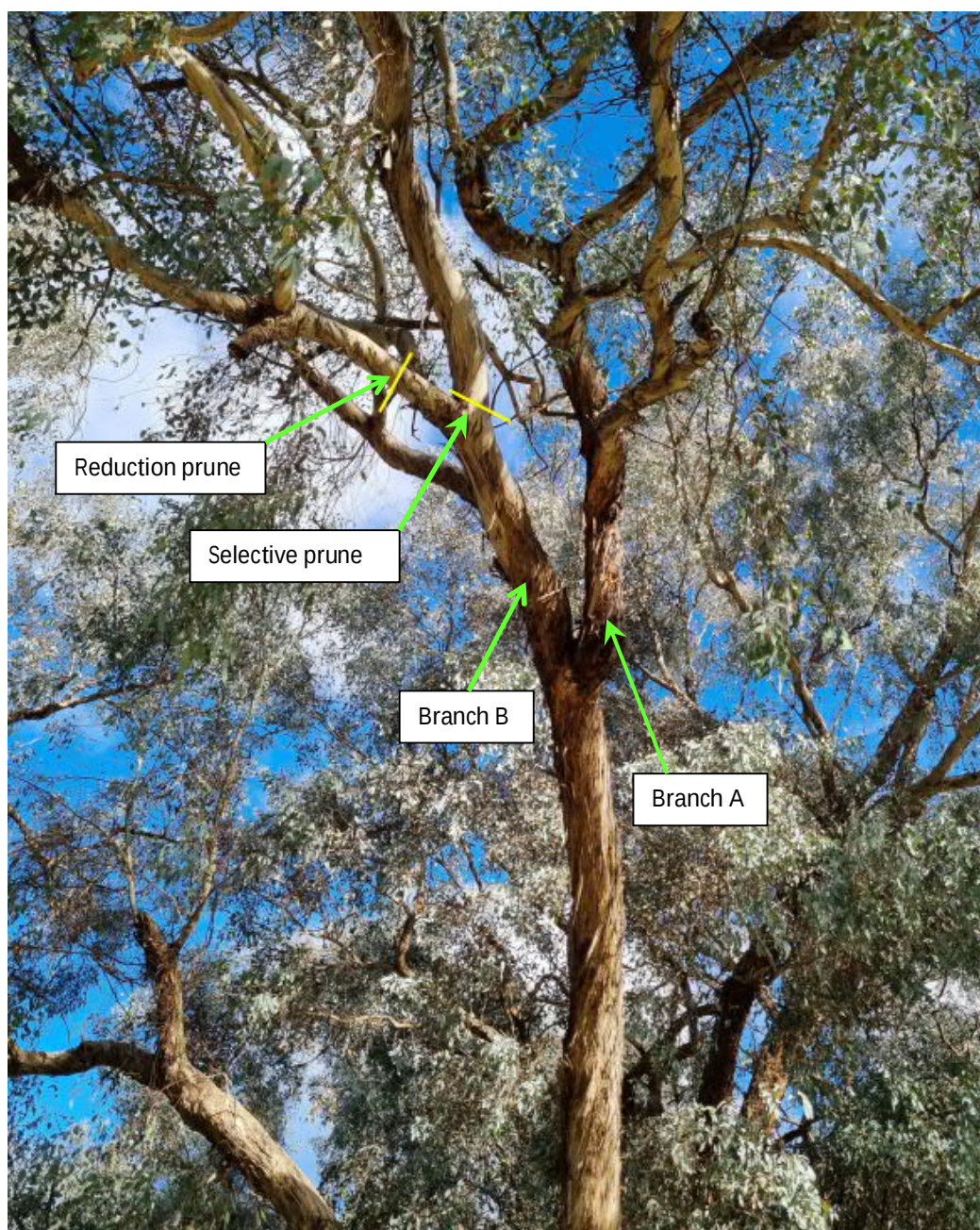


Figure 6 A view from the road directly under the overhanging trunk showing the two first-order branches, A and B, and the two pruning locations on Branch B.

Appendix 2

Tree No.	Species	Pruning class	# branches to be pruned	Approx. % to be pruned
83	<i>Eucalyptus blakelyi</i>	reduction pruning	1	10%

Instruction

Reduction prune the end on one branch overhanging road.



Figure 7 Reduction prune the branch overhanging the road back to the union shown by the yellow line in the photo above. The photo is taken from the road looking westwards.

Appendix 2

Tree No.	Species	Pruning class	# branches to be pruned	Approx. % to be pruned
84	<i>Eucalyptus blakelyi</i>	selective pruning	1	5%

Instruction

Prune one branch back to the branch union indicated by yellow line in Figure 1.

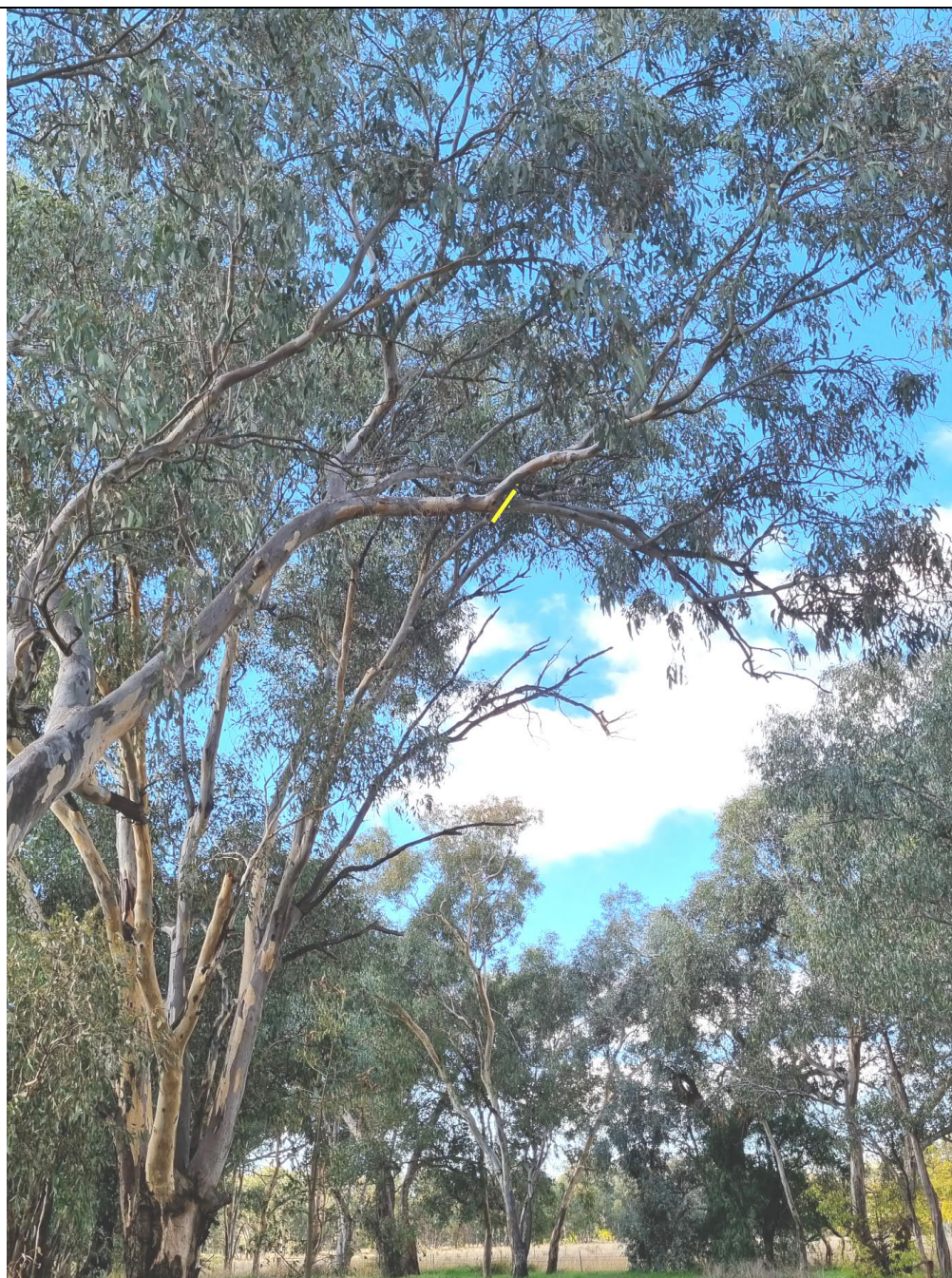


Figure 8 One overhanging branch to be pruned to the union shown by the yellow line. Photo is taken from the road looking eastwards.

Appendix 2

Tree No.	Species	Pruning class / tie back	# branches to be pruned/tied back	Approx. % to be pruned
85	<i>E. polyanthemos</i>	selective pruning, deadwooding, tieback	2 live + 3 deadwood 1 tie back	25%

Instruction

- Prune two live branches back to the branch unions indicated. Prune deadwood that extends into the 7.5 metre clearance zone.
- Tie back western stem.



Figure 9 Two branches to be reduction pruned plus deadwood. Five cuts total.
Photo is taken from the road underneath the tree.

Appendix 2

Tree No.	Species	Pruning class / tie back	# branches to be pruned / tied back	Approx. % to be pruned
86	<i>E. polyanthemos</i>	reduction pruning, tying back	2 / 1	5%

Instruction

- Reduction prune two live branches leaving one smaller vertically oriented branch near the union of the two branches being pruned and indicated by the green arrow.
- Tie up low hanging tertiary branch on western side to the branch above.



Figure 10 Reduction prune two branches. Retain smaller upright branch indicated by green arrow. See Figure 11 for magnified image.

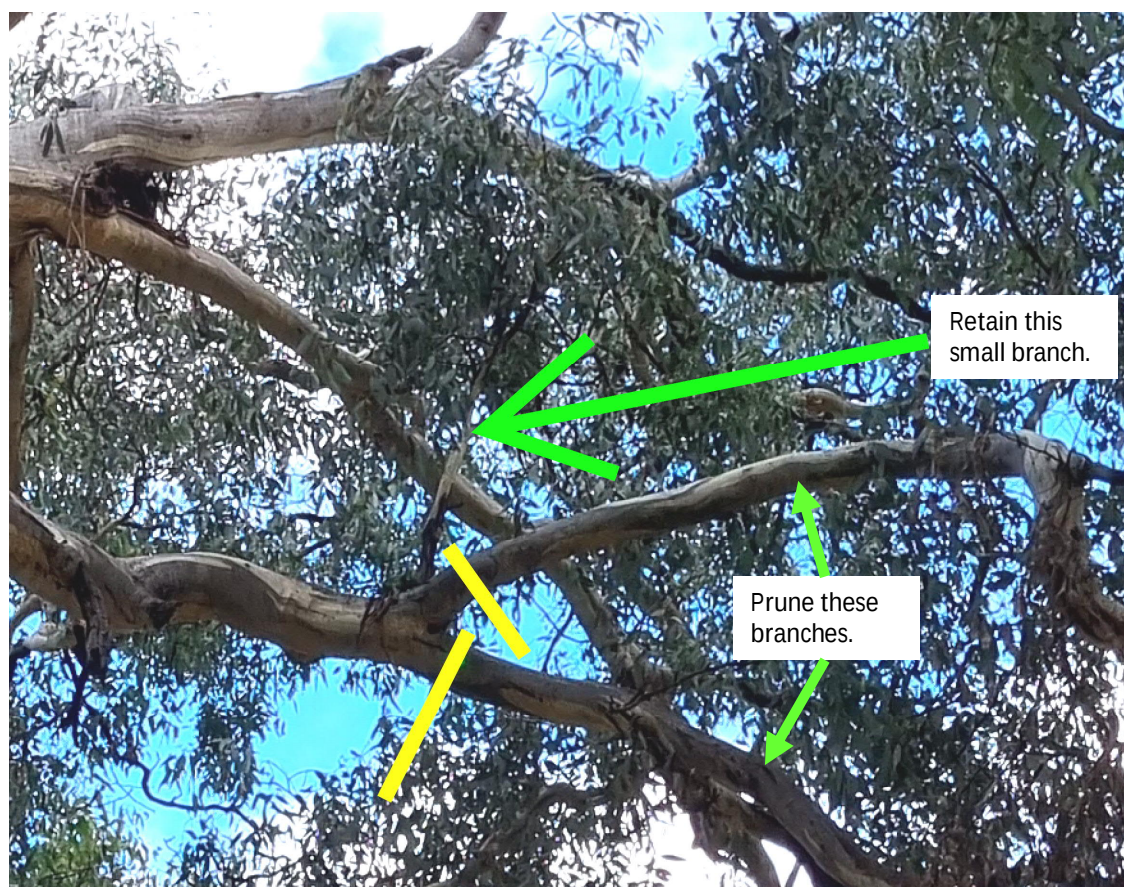


Figure 11 Figure 10 magnified.

Appendix 2

Tree No.	Species	Pruning class / tie back	# branches to be tied back	Approx. % to be pruned
87	<i>E. melliodora</i>	tie back	1	0%

Instruction

Tie back overhanging branch to branch behind.



Figure 12 Arrow indicates line to tie back Tree 87. Photo is taken from road looking westward.

Appendix 2

Tree No.	Species	Pruning class / tie back	# branches to be tied back	Approx. % to be pruned
88	<i>E. melliodora</i>	tie back	1	0%

Instruction

Tie top of tree up and back to red gum 4m to east.



Figure 13 Arrow indicates line to tie back Tree 88. Photo is taken from road looking westward.

Appendix 2

Tree No.	Species	Pruning class	# branches to be pruned	Approx. % to be pruned
89	<i>E. polyanthemos</i>	deadwooding	3	0%

Instruction

Prune three lower dead branches that extend into the zone within 7.5 metres of the road surface.



Figure 14 Prune 3 dead branches that extend down into the clearance zone. Photo taken looking eastwards.

Appendix 2

Tree No.	Species	Pruning class	# branches to be pruned	Approx. % to be pruned
90	<i>Eucalyptus blakelyi</i>	Reduction pruning & deadwooding	1 live + 1 dead	5%

Instruction

Reduction prune one live branch and prune one dead branch back to the branch unions indicated by the yellow lines in Figure 12.



Figure 15 Two branches to be reduction pruned plus deadwood. Five cuts total. Photo is taken from the road underneath the tree.

Appendix 2

Tree No.	Species	Pruning class	# branches to be pruned	Approx. % to be pruned
91	<i>Eucalyptus blakelyi</i>	Deadwooding	Deadwood / top of tree	5%

Instruction

- Prune deadwood.
- Tie up and back to tree on western side of Tree 91.



Figure 16 Tree 91 leans over the road. Photo taken from road looking eastwards.

Appendix 2

Tree No.	Species	Pruning class / tie back	# branches to be pruned / tied back	Approx. % to be pruned
92	<i>E. polyanthemos</i>	Reduction pruning / Tie back	1 / 1	5%

Instruction

- Reduction prune one branch as indicated by the yellow lines in Figures 16 and 17.
- Tie back western branch



Figure 17 Photo from road looking eastwards.



Figure 18 Figure 17 magnified showing branch to be reduction pruned.

Appendix 2

Tree No.	Species	Pruning class / tie back	# branches to be pruned / tied back	Approx. % to be pruned
93	<i>E. polyanthemos</i>	Selective pruning & reduction pruning Tie back	2 / 1	5%

Instruction

- Prune lower branch to branch collar and reduction prune higher branch as indicated.
- Tie back western branch



Figure 19 One branch to be selectively pruned. A second smaller branch to be reduction pruned. Photo is taken from road looking westwards.

Appendix 2

Tree No.	Species	Pruning class / tying back	# branches to be tied back	Approx. % to be pruned
94	<i>Eucalyptus blakelyi</i>	Tie back	1	0%

Instruction

Tie back overhanging branch to other main stem of the same tree.



Figure 20 Tie lower branch back to same tree. Photo taken looking westwards.

Appendix 2

Tree No.	Species	Pruning class	# branches to be pruned	Approx. % to be pruned
95	<i>Eucalyptus blakelyi</i>	selective pruning & deadwood	1 first-order branch & deadwood	25%

Instruction

Prune overhanging first-order branch back to branch collar. Prune indicated deadwood to achieve clearance .



Figure 21 Photo taken looking eastwards.

Appendix 2

Tree No.	Species	Pruning class	# branches to be pruned	Approx. % to be pruned
96	<i>Eucalyptus blakelyi</i>	Lopping & Reduction pruning	4	95%

Instruction

Western stem: Lop two branches as indicated.

Eastern stem: Prune two branches indicated. Four cuts total.



Figure 22 Western stem: two branches to be lopped. Photo taken from underneath.



Figure 23 Eastern stem: Two branches reduction pruned. Photo taken from underneath.

Appendix 2

Tree No.	Species	Pruning class	# branches to be pruned	Approx. % to be pruned
97	<i>Eucalyptus blakelyi</i>	reduction pruning	1	60%

Instruction

Reduction prune leading stem at 4.3m AGL back to the small upright branch as indicated.



Figure 24 Leading stem to be reduction pruned to small upright. Photo looking eastward.

Appendix 2

Tree No.	Species	Tie back	# branches to be tied back	Approx. % to be pruned
98	<i>E. polyanthemos</i>	tie back	3	0%

Instruction

Tie back 3 branches to higher in the same tree.



Figure 25 Tie back to same tree. Photo taken looking westwards.

Appendix 2

Tree No.	Species	Pruning class	# branches to be pruned	Approx. % to be pruned
99	<i>E. blakelyi</i>	deadwooding	deadwood over road	0%

Instruction

Prune deadwood over the road.



Figure 26 Prune deadwood as marked. Phot taken looking eastwards.

Appendix 2

Tree No.	Species	Tie back	# branches to be tied back	Approx. % to be pruned
100	<i>E. blakelyi</i>	tie back	all branches overhanging	0%

Instruction

Tie back branches overhanging the road to the top of the tree.



Figure 27 Tie back to trees behind. Photo taken looking eastward.

Appendix 2

Tree No.	Species	Tie back	# branches to be tied back	Approx. % to be pruned
200	<i>E. blakelyi</i>	tie back	all branches overhanging	0%

Instruction

Tie back overhanging branches to trees behind...



Figure 28 Tie back to same tree or another tree further back. Photo taken looking westwards.

Appendix 2

Tree No.	Species	Tie back	# branches to be tied back	Approx. % to be pruned
199	<i>E. melliodora</i>	tie back	all branches overhanging	0%

Instruction

Tie back overhanging branch to tree to the west .



Figure 29 Tie back tree to tree behind sufficiently to clear from clearance zone. Photo taken looking westwards.

Appendix 2

Tree No.	Species	Tie back	# branches to be tied back	Approx. % to be pruned
198	<i>E. polyanthemos</i>	tie back	all branches overhanging	0%

Instruction

Tie back overhanging branches to high northern stem in same tree.



Figure 30 Tie back branches to the main stem. Photo taken looking eastwards towards the intersection of Ortlipp Road.

Appendix 2

Tree No.	Species	Pruning class	# branches to be pruned / tied back	Approx. % to be pruned
197	<i>Eucalyptus blakelyi</i>	Reduction pruning	1	10%

Instruction

Prune southern stem to perpendicular stem as indicated.



Figure 31 Southern to be reduction pruned. Photo is taken looking westward.

Appendix 2

Tree No.	Species	Pruning class / tie back	# branches to be pruned	Approx. % to be pruned
196	<i>E. melliodora</i>	Reduction pruning	1	5%

Instruction

Prune one branch as indicated.



Figure 32 One branch to be reduction pruned. Photo is taken looking east.



Tree Assessment – an overview

A tree is described by its species, its size and its age. Health, vitality, structure and form are assessed and are the basis of the tree's useful life expectancy (ULE). The tree's ULE combined with its importance in the landscape are used to determine the tree's retention value.

Tree no. – Each tree is identified by a number on the site plan and in the tree assessment schedule.

Species – The scientific name of the tree using binomial nomenclature.

Common name – The common name is the name by which the tree is commonly known. Many species may have more than one common name, which may vary between geographical areas.

DBH – Diameter at Breast Height. This is the mean trunk diameter measured at 1.4 metres above ground level. If there are multiple stems, the notional DBH is calculated by adding the cross-sectional areas of the stems and determining a diameter for a circle of that area. DBH is measured in centimetres with a diameter tape.

Height – The height of the tree is measured in metres with a laser height meter. If this is not possible due to obstacles, tree height is estimated.

Crown spread – This is the average spread of the branches and foliage of the tree measured north south and east west. Crown spread is either measured with a laser distance meter, paced out, or measured on Google Earth or NearMap. Crown spread can be used to calculate approximate crown area and help calculate crown volume.

Age class – Trees are categorised into three age classes – young, mature and senescing.

Health – Health relates to freedom from predation by pests, diseases, ailments and stress. The tree's health is categorised on a scale of excellent, good, fair, poor and dead.

Vitality – Vitality refers to the tree's capacity to resist impacts upon its health and its ability to grow. Vitality is categorised as normal, high, low or dormant.

Structure – The structure of the tree is the arrangement of its parts (roots, stem, branches, etc.). The assessment of structure generally considers injuries, defects, structural weaknesses, anchorage and the physical effects of attack from insects, bacteria and fungi. Risks from trees usually relate to structural defects, which, as

Appendix 3

well as being a factor in the condition of a tree, are a primary consideration in risk assessment. The structure of the tree is assessed on a scale of excellent, good, fair or poor.

Form – The form of a tree relates to its shape, architecture, crown symmetry, crown density, live crown ratio, suppression, phototropism, whether the tree leans and the type of lean.

Useful life expectancy (ULE) – ULE is measured as:

- long term (greater than 40 years),
- medium term (15 to 40 years),
- short term (5 to 15 years), and
- plan for removal (less than 5 years).

ULE is the period for which the tree can practically be retained. It is affected by the tree's health and vigour, its structural condition, risk it may present, conflict with infrastructure, suitability in its location and conflict with changing land use.

Landscape significance – A tree's significance in the landscape relates to the amenity it provides, its environmental value and its contribution to heritage. These are affected by the tree's species, its ecological importance, its size and form, its location and its visual prominence. Landscape significance is categorised on a seven-point scale of significant, very high, high, moderate, low, very low and insignificant. Heritage listed trees have the highest rating and weed species have the lowest rating.

Tree retention value – Tree Retention Value is based on a tree's ULE and the landscape significance of the tree. The matrix at table 1 below is used to determine the retention value, which is rated as high, moderate, low or very low.

Table 1 Methodology used to assess Tree Retention Values¹

	Landscape Significance Rating						
Tree sustainability period	1 significant	2 very high	3 high	4 moderate	5 low	6 very low	7 insignificant
greater than 40 years	high						
15 to 40 years			moderate				
5 to 15 years					low		
less than 5 years					very low		

¹ Newcastle City Council, 2018, *Technical Manual – Newcastle Urban Forest*, Newcastle.

Glossary of Arboricultural Terms

absorbing roots	fine, fibrous roots that take up water and mineral; most absorbing roots are within the top 30 cm of soil
adventitious	shoots and roots that develop other than at their normal positions of origin
aeration	provision of air to the soil to alleviate soil compaction and improve its structure
age class	young – less than 20% of life expectancy mature – 20% to 80% life expectancy over-mature – greater than 80% of life expectancy
allelopathic effect	effect caused by chemical substances produced by some plants that inhibit the growth and development of other nearby plants
bifurcation	natural division of a branch or stem into two or more stems or parts
bracket	fruiting or spore producing body of wood decay fungi, forming on the external surface of the trunk or branch
cambial	pertaining to cambium
cambium	thin layer of cells that produces phloem on the outside and xylem on the inside
canopy	converging crowns of two or more trees
chlorotic	leaves turning pale green, yellow or white from lack of chlorophyll, usually due to nitrogen deficiency
cleaning / clean out	in pruning – the selective removal of dead, dying, diseased, damaged, broken and defective branches
codominant	similar in size and importance, usually associated with trunks or scaffold branches; arising from a common junction and lacking a normal branch union
compaction (soil)	compression of the soil, often as a result of vehicle or heavy equipment, that breaks down soil aggregates and reduces soil volume and total pore space, especially the macropores
condition	overall state of the tree; refers to health, vigour and structure rated as excellent, good, fair, poor or dead
crown	the part of the tree comprising the total amount of foliage
DAB	Diameter Above Buttress – trunk diameter measured immediately above the root buttress
DBH	Diameter at Breast Height; trunk diameter measured at 1.4 metres above ground level
decay	(n.) an area of wood that is undergoing decomposition; (v.) decomposition of organic tissues by fungi or bacteria

decline	gradually diminishing health or condition of a tree
decurrent	the form of a tree with no central leader but with structural scaffold branches forming the basis of a spreading crown, compare with excurrent
defect (structural)	internal or external points of weakness that reduce the stability of the tree
desiccation	drying out, or dehydration, of part of a tree – usually roots or leaves
designated TPZ	is the actual area designated to be protected from activities that could affect the health or ongoing viability of the tree and is generally based upon the indicative TPZ but modified to recognise buildings and other existing encroachments in the indicative TPZ or parts of the indicative TPZ excised for development
epicormic	arising from a latent or adventitious bud
evapotranspiration	the process through which plants release water to the surrounding air, dissipating ambient heat
excurrent	the form of a tree with a central leader and symmetric, vertical crown, compare to decurrent
failure	structural collapse in part or full of part of a tree – roots, trunk or branches – often leading to the whole tree or part of the tree falling
fastigate	having clusters of vertical branches, appearing as a single columnar form
form	the shape and symmetry of a tree
hanger	broken or cut branch hanging in a tree
hazard	a condition that predisposes a tree to failure
health	freedom from pests, diseases, ailments, stress – measured as excellent, good, fair, poor or dead
heartwood	inner xylem, consisting of dead cells, does not transport water and minerals
hung-up	a tree or a branch that has failed and become caught in another tree, or in the same tree in the case of a branch
included bark	bark that becomes imbedded in a union between branches, a branch and stem, or co-dominant stems
indicative TPZ	is the circular area around a tree whose radius is calculated by multiplying the DBH by 12, regardless of existing obstructions
leader	dominant upright stem, particularly on excurrent trees
live crown ratio	ratio of the height of the crown containing live foliage to the height of the tree
lopping	cutting of branches or stems between branch unions (this practice is generally unacceptable).
occlusion	Growth processes where wood develops to enclose the wound face by the merging of the wound margins concealing the wound
phloem	conductive tissue immediately beneath the bark; transports food

	materials throughout the tree
phototropic	the tendency of a tree to grow towards light
reactive soils	soils with high clay content that expand and shrink due to changes in moisture levels
rhizosphere	the root zone; the soil around the fine and woody roots
risk	a combination of the potential for tree failure and the likely consequences if failure does occur
root crown	area where the main root joins the plant stem, usually at or near ground level
sapwood	outer part of the xylem that transports water and minerals
scaffold branches	permanent or structural branches; arising from the trunk
Structural Root Zone (SRZ)	the area around the tree, usually within 3 to 4 metres from the trunk, in which the structural roots are situated, and which must be protected, particularly during construction.
structural roots	large, woody tree roots that anchor and support the trunk and crown; roots characterised by secondary thickening and relatively large diameter giving form to the root system and functioning in anchorage and support
structure	construction and arrangement of parts (roots, trunk, branches) – rated as excellent, good, fair or poor
target	person, object or structure that could be injured or damaged in the event of tree or branch failure
topping	cutting the main trunk to reduce the height of a tree (this is an unacceptable practice)
Tree Protection Zone (TPZ)	is the principal means of protecting trees on development sites and is a combination of the root area and crown area required to be isolated from construction impacts so that the tree will remain viable
vigour	capacity to grow, and to resist disease, ailments, pests, stress – categorised as normal, high low and dormant.
xylem	the wood – inside of the cambium layer; transports water and dissolved mineral nutrients from the roots to other parts of the tree; provides strength in trunk and branches

REFERENCES

The definitions included in this glossary have been adapted from the following:

Australian Standards Committee EV-018, Arboriculture (2007), AS 4373–2007 *Australian Standard – Pruning of Amenity Trees*, Standards Australia, Sydney, Australia.
 Australian Standards Committee EV-018, Arboriculture (2009), AS 4970—2009 *Australian Standard – Protection of Trees on Development Sites*, Standards Australia, Sydney, Australia.
 Draper B.D. and Richards P.A. (2009), *Dictionary for Managing Trees in Urban Environments*, Institute of Australian Consulting Arboriculturists (IACA), CSIRO Publishing, Collingwood, Victoria, Australia.



Appendix 4

International Society of Arboriculture (2005), *Glossary of Arboricultural Terms*, ISA, Champaign, IL
Lonsdale, David (1999), *Principles of Tree Hazard Assessment and Management*. TSO, London, England.
Matheny, Nelda P. & Clark, James R. (1994), *A Photographic Guide to the Evaluation of Hazard Trees in Urban Areas*, (2nd Ed), International Society of Arboriculture, Savoy, IL.

