

Museums Discovery Centre SSD-10472

Revised

**Tree Replacement
Implementation Plan**





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1 INTRODUCTION

This Revised Tree Replacement Implementation Plan (TRIP) has been developed in consultation with The Hills Shire Council's Parks Assets Officer in relation to Condition B13 of the Museums Discovery Centre Expansion Project Planning Approval SSD-10472.

2 SUBMISSIONS

Following the exhibition of the SSD a number of submissions received raised the tree replacement as an issue. Concerns raised included:

- Revising the Tree Replacement Strategy to account for increased size of replacement planting;
- Revising the Tree Replacement Strategy to account for increased management regimes;
- Ensuring certainty that off-site planting will be undertaken;
- Potential location for off-site planting of replacement trees.

3 ASSESSMENT OF POTENTIAL LOCATIONS

An opportunity has been identified for a possible collaboration with The Powerhouse Museum and Taronga Zoo to satisfy the consent condition. This includes providing 674 trees for the Zoo's Koala Browse Project at the University of Western Sydney (UWS) Richmond Campus site.

There are several possible sites identified in the Zoo proposal for planting, that will comfortably accommodate 674 eucalyptus trees, and have irrigation already available. Details of the proposal are attached in Appendix A. This proposal forms a key pillar in the NSW Koala Strategy - to support safe and healthy koala populations in NSW. The NSW Koala Strategy fulfills the NSW Chief Scientist's recommendations to deliver a strategy that uses the best available science and responds to feedback received from the NSW community on the scope of the strategy and Draft Save Our Species (SOS) Iconic Koala Project. An important component in the rehabilitation of koalas is the ability to provide quality browse (food) for koalas that come into the care of Taronga Zoo. An established 1.8ha site at the UWS of approximately 20,000 native trees, suitable exclusively for koala browse, has recently been reduced by 50% due to the 2019/20 drought and recent flooding in the Richmond area.

The Hills Shire Council has nominated two locations for off-site planting of 74 of the replacement trees. These 74 replacement trees will be distributed across either or both of the following two reserves - Centenary of ANZAC Reserve, and Arnold Avenue Reserve, with the remainder of the 600 replacement trees will be planted at the UWS, Richmond Campus, as part of the Taronga Zoo Koala Project. The Hills Shire Council has a preference that all 74 of the replacement trees be planted at Arnold Avenue Reserve.

An assessment of potential locations for replacement planting at the two reserves nominated by Council follows:

3.1 Arnold Avenue Sports Complex Reserve, Kellyville

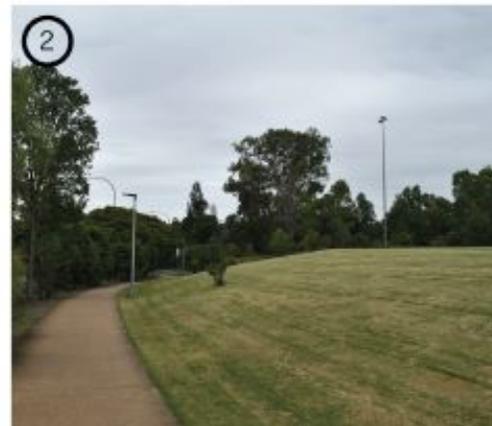


The Arnold Avenue Sports Reserve includes formalised playing fields and recently developed sports infrastructure including an amenities complex. Significant landscaping works have been completed, however it is considered there exist further opportunity to increase canopy cover.

Owner	The Hills Shire Council
Zoning	RE1- public recreation
Potential replanting areas	14,185 square metres
Potential number of trees	617
Opportunities	<ul style="list-style-type: none"> • Increased canopy cover and shade surrounding sports field for spectators. • Improved outlook for surrounding residential housing.

Section 4 of this Addendum Strategy outlines the process for determining which of these locations will be chosen for the replacement planting.

3.2 Centenary of ANZAC Reserve, Castle Hill



The Centenary of ANZAC Reserve is located in close proximity to the Museums Discovery Centre site between Green Road and Harrington Avenue. There exists opportunities to increase tree canopy cover along the Green Road alignment surrounding the sports fields.

Owner	The Hills Shire Council
Zoning	RE1- public recreation
Potential replanting areas	3,996 square metres
Potential number of trees	174
Opportunities	<ul style="list-style-type: none"> • Increased canopy cover and shade surrounding sports field for spectators. • Increased green buffer along the Green Road alignment. • Clearing of weeds and overgrowth along creek corridor for new tree planting.

4 REPLACEMENT TREES IN LOCAL LGA:

The following sections confirm the commitments for tree replacement in response to consultation with the Parks Assets Officer at Council.

4.1 Species

It is intended that all replacement planting in The Hills Shire Council Local Government Area will be endemic species that are suitable for the location chosen. Following consultation with the council landscape architect the species chosen will also provide fodder for the Glossy Black Cockatoo, found in The Hills LGA. A variety of *Allocasuarina spp.* will be split across the two sites. These include:

1. *Allocasuarina littoralis*
2. *Allocasuarina torulosa*
3. *Allocasuarina inophloia*

4.2 Pot Sizes

A minimum of 50% (i.e. 37 of the replacement trees on Council land will be of 75 litre pot sizes, and the rest will be 45 litre pots, subject to availability.

4.3 Maintenance Period

Following consultation with Council a one month maintenance period is agreed to - until plant establishment occurs, and it is preferable for planting to occur between March- September.

5 IMPLEMENTATION

Please see attached proposal from Taronga Zoo (Appendix A).

Background

Koala populations have experienced a decline in numbers over large areas of their natural range even prior to the impact of the 2019-20 fire season. In 2012 the Koala was listed as threatened by the NSW and Commonwealth Governments. Koalas face many threats, including habitat loss, clearing and degradation, drought, fire, climate change, predation by dogs, roadkill, disease and inbreeding. In 2010 the Koala population in NSW was estimated to be 21,000 individuals, a 33% decline since 1990.

The NSW Koala Strategy sets out the first phase of actions to stabilise priority Koala populations in NSW. It provides a starting point to achieve the longer-term goal of increasing koala numbers across the State.

The NSW Koala Strategy fulfils the NSW Chief Scientist and Engineer's recommendation to deliver a strategy using the best available science. It also responds to feedback received from the NSW community on the scope of the Strategy and the draft Saving Our Species (SOS) Iconic Koala Project.

A key pillar of the NSW Koala Strategy is to support safe and healthy Koala populations in NSW. The NSW Government wants to improve the triage, treatment and rehabilitation of Koalas. A core component of this work is for Taronga to work with tertiary institutions and relevant stakeholders, including the Vet Practitioners Board and other peak bodies (such as the Vet Nurses Council), to develop and implement wildlife care professional development training for veterinarians and veterinary nurses.

An important component in the rehabilitation of Koalas is the ability to provide quality browse (food) for Koalas that come into Taronga's care when required. It can be at times difficult to provide Koalas in care with adequate fresh eucalypt leaves.

The collection of browse at Taronga Zoo is an essential requirement for a number of Native (& Exotic) animal species which rely on browse as the primary food source in their diet. Browse is also used as a supplementary food source and behavioural enrichment device for a large number of species in the Zoo population.

Koala browse is generally collected four times a week by Taronga's horticultural staff that go to site and cut as required. Browse collection sources range from established plantation areas located in institutions to individual residences and other approved areas. A range of collection sources is necessary due to the variety of native and exotic browse species that are required to be collected.

At present a number of Taronga's browse collection sites across Sydney are being impacted by a range of external factors which have resulted in reduced supply of browse available. The areas that are immediately impacted contain varieties of native browse that are critical for feeding Taronga Koalas and Glossy Black Cockatoos. The native Eucalypt and Casuarina species required to feed these animals as a primary food source is being threatened by disease, insect attack, land clearing for development and restricted site access.

The supply of browse is a critical factor that determines the number of species and individuals within that species that can be cared for at Taronga. The supply of quality browse is also an important factor in the success of Taronga's animal breeding programs and in providing an immersive visitor experience.

The provision of browse for Koala's during the 2019-20 Bushfire season was challenging. Taronga cared for a number of impacted Koalas during this time. For Taronga to meet its commitments to conservation and the ability for it to also be in a position to provide browse in emergency situations (Bushfire 2020) Taronga must continue to increase its capacity at the Richmond plantation. It is critical that the supply of browse for both the immediate short term collection requirements and the long term future needs remains reliable and sustainable.

Koala Nutrition

To ensure that the Koalas held are kept in good physical condition it is important to ensure that the diet is varied and of high quality. A Koala typically eats between 400 - 1000g (approximately 10% of its body weight) of eucalyptus per day. Koalas show a definite preference toward some eucalyptus species with some being highly preferred, others eaten occasionally, while others are rarely if ever eaten. Requirements and choice varies according to locality and season. Koalas in care prefer only a few species of eucalypts which suitable as staple foods are.

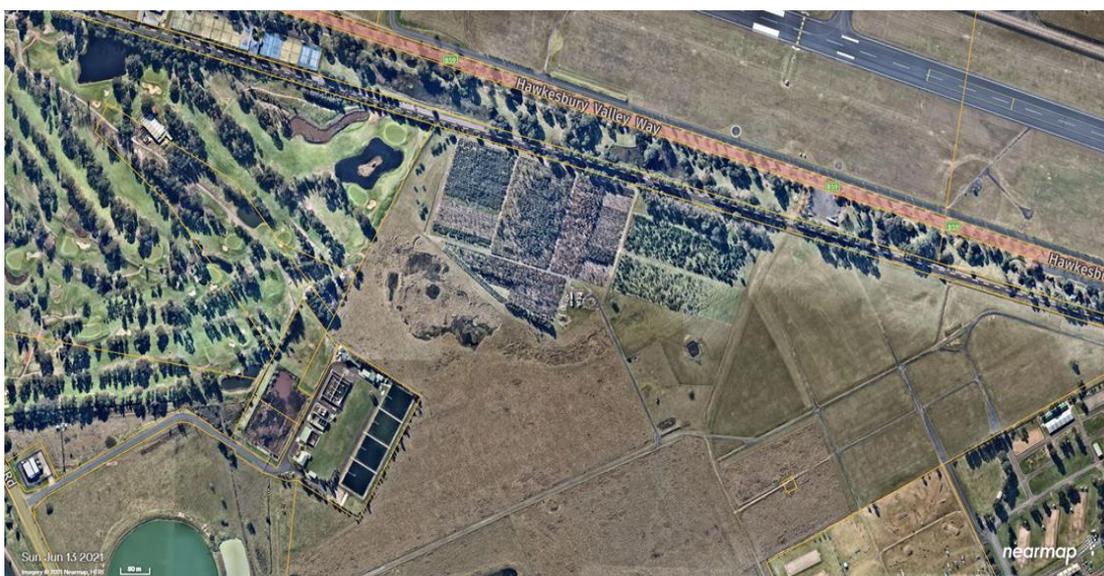
Established Plantations

University of Western (UWS) Sydney. Richmond Campus Site.

The UWS site is 1.8 hectares in area and is comprised of approximately 20 000 native trees suitable exclusively for Koala browse. Approximately 60% of Taronga's Koala browse is collected from the University of Western Sydney Campus. This has recently reduced to 50% due to the drought (2019/2020) and the recent flooding events that inundated the Richmond area.

Koala browse plantings recommend approx. 1000 trees (plants) per Koala. This figure is in accordance with the Koala Browse Plantation Guide - 2003, which states for Plantation Design: "Typically 1000 plants per Koala is an appropriate number, with harvest duration varying from 3 months to 2 years".

This figure of 1000 trees per koala is based on koala average consumption levels of both leaves and tip growth, and typical plantation production rates and harvest periods.



University of Western (UWS) Sydney. Richmond Campus Site.

Proposed Planting site

There are several sites that are suitable for planting at Richmond. The sites outlined below (image2) will comfortably accommodate 600 trees. The sites identified have irrigation available



Richmond Plantation – Site 1 (site A, B, C)

Site A (3555m2)



Site B (1272m²)



Site C (1537m²)



Preferred species to be plant (600 trees)

300 x *Eucalyptus amplifolia*



300 x *Eucalyptus robusta*



Propagation

There are several methods of propagation, with seed germination being the most commonly used technique. *Eucalyptus* germinates reliably from seed that can be sown throughout the year in Australia.

Excellent plant establishment and growth rates can be achieved through planting *Eucalyptus* at the commencement of the growing season and by using plants that display an abundance of fleshy, white roots. These are generally young plants that are approximately 6 months old. This can be achieved through planning propagation to ensure that plants are at this stage prior to planting taking place. Allow 4 – 6 months from sowing of the seed to planting. All pot sizes will be tubestock.

Water

There is a secure (recycled) water source on site.

Irrigation

Irrigation is often used to ensure productivity during periods of limited rainfall and to increase growth rates throughout the year.

The function of an irrigation system is to make up the shortfall between rainfall and the water requirements of each particular plant. Irrigation can also ensure that a browse plantation has water throughout the year and not just during periods of seasonal rainfall. The amount of supplementary water a plantation requires is determined by many factors including soil type, aspect, and climate.

Maintaining moisture to the plants enhances the productivity of the plantation and the quality of the browse produced.

Any new planting should take place during periods when there is regular rainfall. Irrigation may be required to support these new plants.

Plantation Design

Browse consists of short stems of tip growth; approximately one metre in length to larger 2- 3 metre branches that comprise both leaves and tip growth. Browse consumption can be variable depending on several factors including the time of the year, animal activity levels, leaf moisture content and weight and age of the Koalas.

The number of plants required in a plantation can be simply calculated by multiplying the number of branches provided to a Koala each week. This will give a weekly browse requirement for each of the animals. This figure is then multiplied to give a yearly total. Under suitable conditions a browse plant can be expected to produce 5 –7 browse pieces for harvest. The duration between harvests can vary from several months to a few years. From these figures the number of plants required to sustain a Koala can be calculated.

Plant Spacing

The space between browse plants is dependent on the type of species being planted. Plantation size, growth rates of the species selected, and the number of plants required.

The average distance between plants in a Koala browse plantation is approximately 2-3 metre will provide benefit from having air circulation around the plant and by increasing the spacing to 3 metres.

Bed Preparation

Taronga will undertake preparation work of the site prior to planting.

Timing of these works should be considered so as to maximise exposure to periods of rainfall and to ensure soil damage is minimised. This is particularly relevant to soils that may be disadvantaged if cultivated while waterlogged.

Tree Guards and Staking

Tree guards provide an artificial micro - climate for seedlings. They are protected from drying winds, moisture can gather on the sides of the guards; levels of humidity and warmth are often enhanced. Seedlings are also protected from post planting weed control activities. A large number of animals including rabbits, wallabies, and kangaroos are located around this area.

There are different tree guards available with commercial plastic tree guards and wax coated milk cartons commonly used.

Staking of tube stock is not required.

Maintenance

All maintenance of the trees will be undertaken by Taronga's Horticultural department. The tubestock will be monitored for health several times a week as we have full time horticulturalist that work at the plantation. The intension is that the plantation at Richmond will be maintained for perpetuity. Longevity of eucalypts vary although 50 – 100 years+ would be expected. They are critical source of nutrition for Koala's both at Taronga and in the event of an emergency. Taronga also has access to 20Mg/L of recycled water per annum, this will ensure that the plantation builds and maintains its resilience during times of drought.

Nursery Supplies

Taronga can provide advice regarding suppliers of tube stock and labour

Toolijooa Nursery Twenty Fifth Ave, West Hoxton NSW 2171 Phone: (02) 9986 1859

The Hawkesbury Community Nursery Hawkesbury 10 Mulgrave Road, Mulgrave (02) 4560 4651

Harvest Seed and Native Plants 281 Mona Vale Rd, Terrey Hills NSW 2084 Phone: (02) 9450 2699

Cabbage Tree Nursery 64 Quarry Road, Dural NSW 2158, Australia Phone(02) 9651 1851 (M) 0407 709 544

Indigo Nursery: 6 Wattle Rd, Ingleside NSW 2101 Phone (02) 9970 8709