GOULBURN BROKEN INDIGENOUS SEEDBANK

GROWING SEED STRATEGY

Supplying climate adapted, genetically diverse seed for large scale restoration goals.

PREPARED BY

Cath Olive,
Angus Thompson &
Kim Wilson.

CONTACT

Cath Olive,
cathy.olive@euroaarboretum.com.au

EXECUTIVE SUMMARY

Euroa Arboretum Inc, (manager of the Goulburn Broken Indigenous Seedbank), is seeking a financial commitment of $2.5 million for Stage 1 to develop large scale Seed Production Areas and Seedbank facilities for the Goulburn Broken Catchment.

Current seed availability and supply will only meet an estimated 10% of the Victorian State Government Biodiversity Strategy 2037 vision and goals. Urgent planning and substantial investment are required if large scale landscape restoration is to occur.

Seed Production Areas (SPA) provide climate adapted, genetically diverse seed and are an efficient way to harvest large amounts of seed for future demand. Our remnant populations alone will not meet targets.

This proposal outlines how we can increase seed supply in the Goulburn Broken Catchment. The proposal is adaptable to share across other catchments throughout Victoria and NSW.

Stage 1 investment over the next 10 years will:

- Establish 20 hectares of new seed production areas across 3 sites.
- Build a new seedbank facility at Euroa Arboretum to increase efficiencies and storage.
- Upgrade existing intensive seed production facilities at Euroa Arboretum.

Implementing Stage 1 will double existing seed supply over the next 10 years from 160kg p.a. to 350kg p.a. With Stages 2 and 3 being implemented over the next 6 – 8 years, we will be approaching the Victorian Government vision and goals within the Goulburn Broken catchment of 1000 kg p.a.

WHY SEED PRODUCTION AREAS?

Wild Harvest limitations:

- Wild populations are often fragmented, small and genetically degenerating. All seed collectors are governed by a seed harvesting permit for crown land seed collection. We can harvest 10% of seed from the plant and have set limits per species from wild populations. *For most species, we cannot harvest enough seed from these wild populations to meet government targets.*

Seed Collection Challenges:

- Many species seed during December. Most species used for landscape restoration projects such as wattles and peas ripen and shed seed between the Christmas and New Year period. Extreme heat days mean the seed ripens quickly and sometimes instantly. Dry periods prior to seeding can mean the seed will abort or have low viability highlighting yearly variations. SPA's with water access and large numbers of plants enable a team to harvest in a few locations with optional irrigation during drought periods to ensure seed viability.

Climate Adapted Seed Preparation:

- SPA are created using healthy seed collected from multiple remnant populations. We specifically target populations adapted to hot and dry conditions. These collections are planted together to create reliable quantities of high quality, genetically diverse seed. SPA offer ethical and efficiency advantages to seed collecting whilst building on resiliency of a species and improving landscape restoration.

Across Victoria we currently have 2,500kg of seed in storage and the capacity to collect 400 kg annually. In the Goulburn Broken Catchment, we harvested 160 kg of seed in 2021/22. Two-thirds were harvested from existing seed production areas with 1.3 FTE paid staff, 0.4 FTE volunteer contribution and contracted collectors over peak harvest.

PROJECT TARGETS

Infrastructure:

- Build Seedbank facilities by 2026 to ensure the drying, cleaning and storage of seed is efficient and high quality and can meet increased quantities.

Scaling Up:

- Develop and upgrade SPA's to 120 hectares to supply 1000 kg of seed by 2028 from 80 species. Species will include both the widely used direct seeding species and the conservation species that are declining in the wild.

Bulk Seed:

- 20 species used in direct seeding to be established in large orchard production. These will be represented with large populations of plants from diverse genetics. Collection of plants from dry, hot areas will ensure climate adaption within the seed orchard. Species will be replicated across multiple sites to reduce risk of crop failure due to potential floods, drought, insect attack or disease.

Conserving Declining Species:

- 60 conservation species to be established in smaller SPA. These are species that are declining in the wild and are used in smaller quantities in nurseries or in distinct locations for direct seeding. While large volumes of seed are not required, to safeguard the species for the future and to encourage climate adaption, these species should be represented in SPA with populations of at least 500 plants per species.

Techniques to Grow Our Seed:

- A range of orchard techniques to enable efficient collection from various species are planned. These include;
    - intense, irrigated, matted orchards at Euroa Arboretum (known as ISPA – Intensive Seed Production Areas),
    - daisy boxes for smaller intricate species. These are raised, irrigated boxes with species planted close together to ensure pollination.
    - SPA for common groundcover species planted close together in a paddock.
    - SPA for common shrubs in rows as in a traditional orchard.

Note: Trees, grasses and VROT (Victorian Rare or Threatened) species are largely excluded from seed production at this point.

PROJECT ACTION PLAN

We are currently seeking investment for Stage 1

*Refer to Appendices for more information on species and the number of plants proposed for each SPA site.

Stage 1 - Activities required for SPA 2023-25:

New Seedbank Facility located at Euroa Arboretum

- Fit for purpose Seedbank facility to increase current efficiencies and future seed capacity.

Goulburn Valley Water (GVWater) at Avenel

- New 13 hectare SPA of common widespread shrubs
- 1 hectare of widespread groundcover species

GVWater at Euroa

- 3 hectares of common, tall shrubs

GVWater at Murchison

- 3 hectares of common shrubs

Euroa Arboretum

- Upgrade of existing Intensive Seed Production Area at Euroa Arboretum
- 13 species targeted for seed production

Stage 1 will provide:

- New seedbank facilities.
- 20 hectares of new seed production areas.
- 13 conservation species targeted.
- Bulk supply of 9 commonly used, direct seeding species.
- 4 widespread groundcover species for improved pollination services.

See Appendix 5 for Stage 2 and 3 outline.

FINANCIAL REQUIREMENT FOR STAGE 1 – $2.5 MILLION OVER 10 YEARS

This proposal is based on four locations and the following operating costs have been assumed, mainly consisting of labour plus expenditure on plants and contracted services for some maintenance. Over a ten year period, this would amount to an outlay of $2.5 million, comprising of Operating Costs of $2.0 million and $0.5 million Capital Expenditure.

These operating costs could be partially offset by future seed sales; however, income would not accrue until the plants had reached maturity from around 2029 and much of the cost and all of the commitment occurs in the earlier years. The orchards productivity would start to decline after eight years and after 15 years the orchard needs replacing.

Proposed Avenel SPA Site:

Located just outside Avenel on the Goulburn Valley Water (GVW) site, the 13 ha orchard is forecast to produce a maximum yield of 120 kg of seed by 2029.

The cost of this production at the Avenel GVW site over the next ten years is as follows:

All $000's	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	Total
Preparation and Planting	110	109									219
Maintenance			14	36	16	14	14	34	14	14	156
Harvesting and Seed Processing						192	192	192	132	132	840
Total Cost	110	109	14	36	16	206	206	226	146	146	1215

In 2028 costs will rise considerably as a team of casual labour will be engaged and trained for harvesting and processing seed.

Proposed Euroa SPA Site:

At Euroa on the GVW site, the 3 ha orchard is forecast to produce a maximum yield of 30kg of seed by 2030. The trained casual seed harvesting and processing team will be in place in 2029.

The cost of this production at the Euroa GVW site over the next ten years is as follows:

All $000's	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	Total
Preparation and Planting	18	18									36
Maintenance			10	15	10	10	10	15	10	10	90
Harvesting and Seed Processing							41	41	41	41	164
Total Cost	18	18	10	15	10	10	51	56	51	51	290

Proposed Murchison SPA Site:

At Murchison on GVW site, the 3 ha orchard is forecast to produce a maximum yield of 30kg of seed by 2029. The trained casual seed harvesting and processing team will be in place in 2028.

The cost of this production at the Murchison GVW site over the next ten years is as follows:

All $000's	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	Total
Preparation and Planting		58									58
Maintenance				7	9	17	9	9	17	9	77
Harvesting and Seed Processing						45	45	45	30	30	195
Total Cost	0	58	0	7	9	62	54	54	47	39	330

Existing Euroa Arboretum Site:

At Euroa Arboretum of the three existing ISPA, two require replacement. The two new ISPA will produce a maximum yield of 7 kg of seed by 2029. It should be noted that the ISPA have a life of eight years before requiring replacement. A further proposal would be required, if they are to be replaced, in 2032.

The cost of this production at the Euroa Arboretum ISPA site over the next ten year period is as follows:

All $000's	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	Total
Preparation and Planting	33	32									65
Maintenance			2	3	3	5	3	3	3		22
Harvesting and Seed Processing					24	24	24	24	24		120
Total Cost	33	32	2	3	27	29	27	27	27		207

Stage 1 -
Current & Emerging Partners

Business	Role	Provision
Taungurung Land and Waters Council	An emerging partner with Bush crew support for seed collecting, cleaning and storage.	Co-management of Avenel GV Water potentially. Euroa Arboretum provides mentoring currently for new natural resource management staff.
Goulburn Broken Catchment Management Authority	Equal partner with Euroa Arboretum to support GBIS. A Memorandum of Understanding governs the relationship.	Financial support. Advice Steering committee role. Training
Goulburn Valley Water	An emerging partner. Access to land.	Land access – ensuring all tracks and roads are serviceable. 50 ha site at Avenel 3 ha site at Euroa 3 ha site at Murchison
Melbourne University	An existing partner. Access to land and some facilities at Dookie Campus. Support with grassland restoration development.	Seed production area. Facilities for storage of seed harvesting machinery. Advice for grassland restoration.
Tahbilk Winery, Nagambie	An existing partner. Tahbilk contribute land and maintenance.	3 seed production areas.
Regent Honeyeater Project, Winton	An existing partner. Regent Honeyeater project manage their own 5 ha SPA.	Seed production area with the ability for GBIS to purchase seed.
Shepparton City Council and Yorta Yorta, Mooroopna	An existing partner. Shepparton City Council contribute land. Yorta Yorta contribute maintenance and harvesting.	Seed Production Area.
Euroa Arboretum	Umbrella organisation to GBISeedbank	Staff employment and contracts Invoicing Funding applications and reports Steering committee role Co-developing seedbank opportunities
Agriculture Victoria	Research and Development for native grasslands and pollinator species in commercial orchards,	Agriculture Victoria provides research into beneficial insects for orchards, Euroa Arboretum provides advice, seed and plants for grassland establishment in existing orchards for research trials.
Kilter Rural	Existing partner	Seed Production Area

APPENDICES

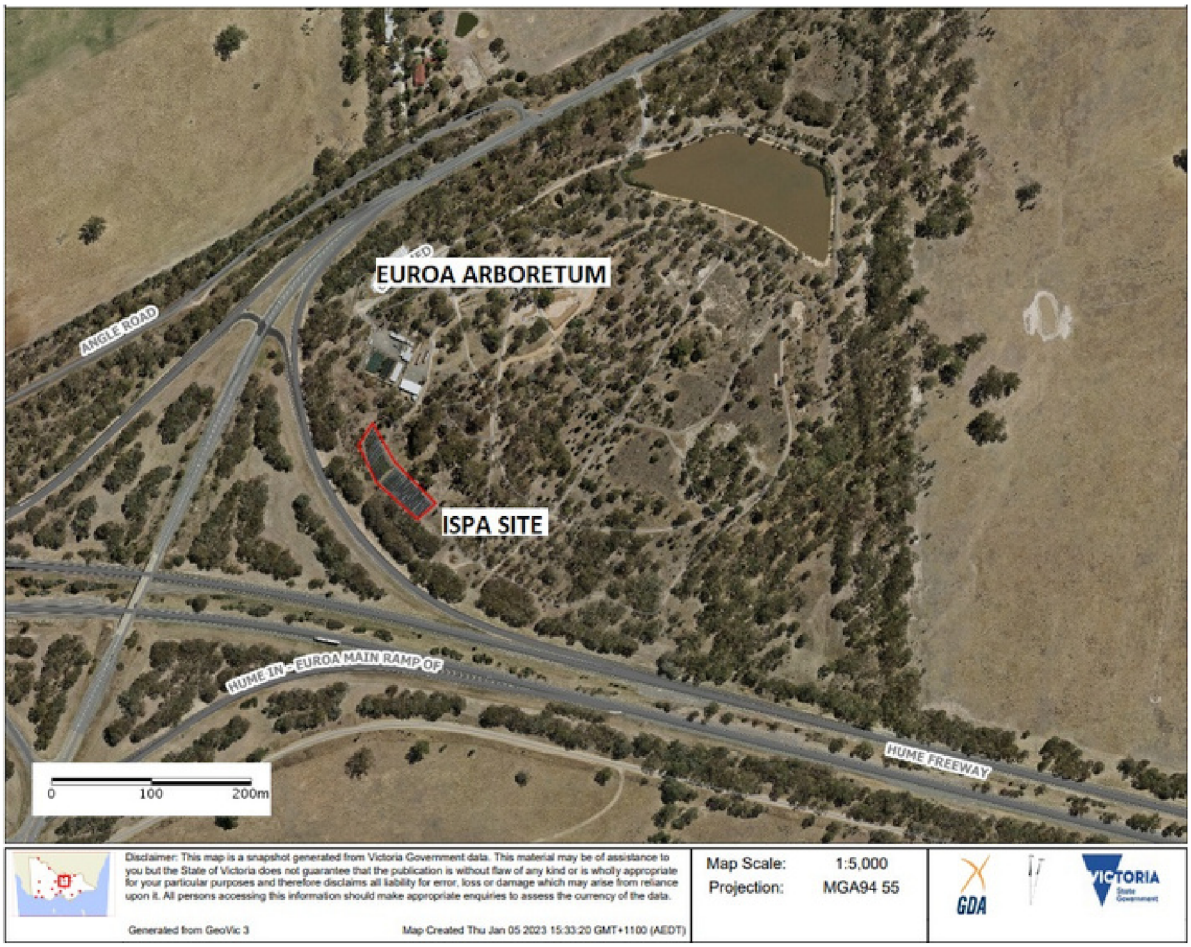
Appendix 1
Euroa Arboretum ISPA site

Replacement of Intensive Seed Production Area with target pea species;

- Narrow-leaf Bitter-pea, *Daviesia leptophylla,* 400 plants
- Grey Parrot-pea, *Dillwynia cinerascens*, 400 plants
- Showy Parrot-pea, *Dillwynia sericea*, 400 plants
- Matted Bush-pea, *Pultenaea pedunculata*, 300 plants
- Twiggy Bush-pea, *Pultenaea largiflorens*, 400 plants

Replacement of species and/or genetics in daisy boxes. Target species:

- Hoary Sunray, *Leucochrysum albicans*
- Magneta Storks-bill, *Pelargonium rodneyanum*
- Mulla Mulla, *Ptilotus species*
- Blue Grass Lily, *Caesia callianthe*
- Broughton Pea, *Swainsona procumbens*
- Native Flax, *Linum marginale*
- Swamp daisy, *Brachyscome paludicola*
- Chamomile Sunray, *Rhodanthe anthemoides.*



Appendix 2
Avenel Goulburn Valley Water site

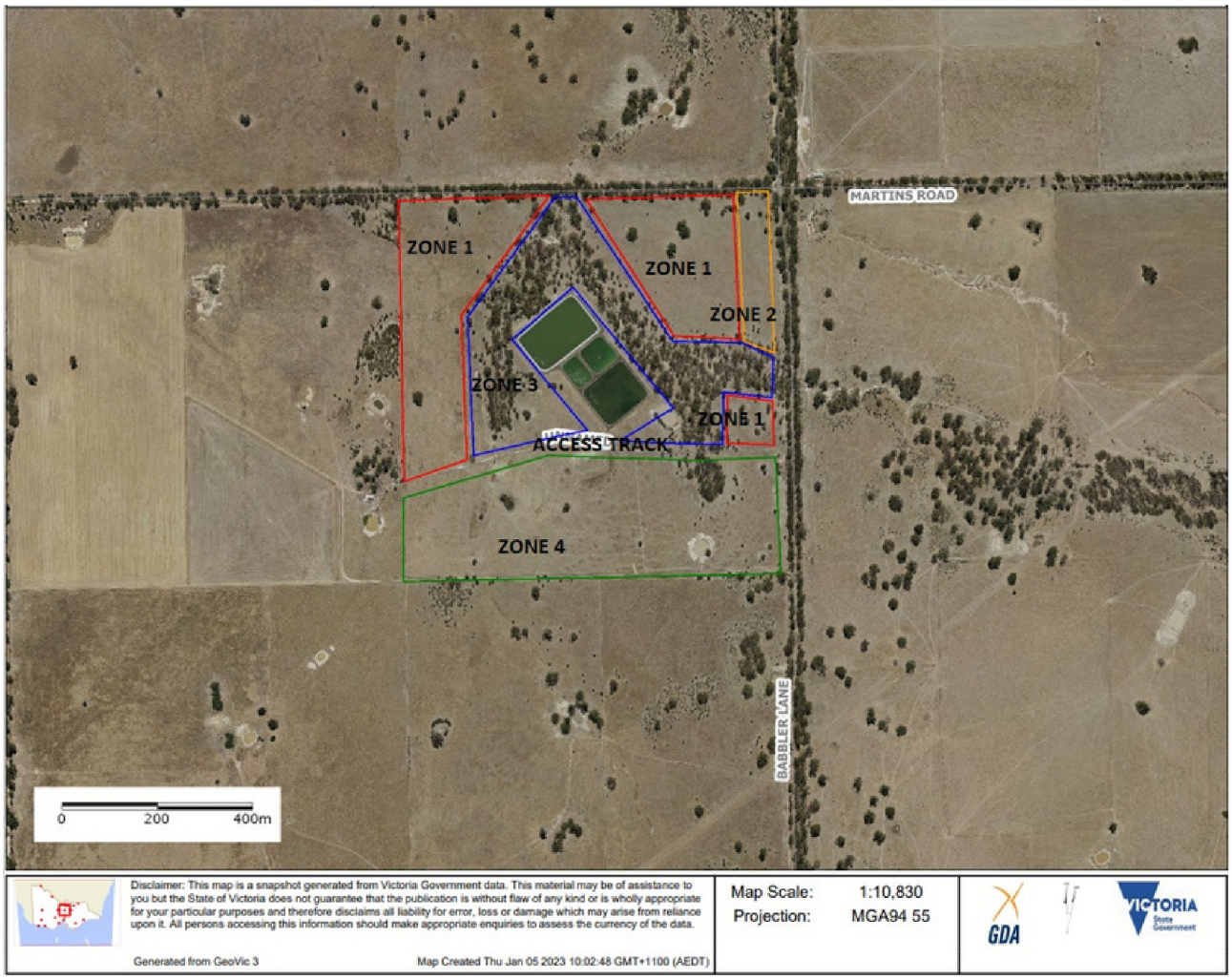
Zone 1 (13ha) - Shrub Target species;

- Gold-dust Wattle, *Acacia acinacea*, 3ha, 1800 plants
- Hedge Wattle, *Acacia paradoxa*, 2ha, 1200 plants
- Golden Wattle, *Acacia pycnantha*, 4ha, 2000 plants
- Long-leaf Hop-bush, *Dodonaea viscosa ssp angustissima*, 2ha, 1200 plants
- Austral Indigo, *Indigofera australis*, 1ha, 600 plants.

Zone 2 (1ha) - Grassland Target Species:

- Common Everlasting, *Chrysocephalum appiculatum*, 0.25ha
- Clustered Everlasting, *Chrysocephalum semipapposum*, 0.25ha
- Hoary Sunray, *Leucochrysum albicans*, 0.25ha
- Sticky Everlasting, *Xerochrysum viscosum,* 0.25ha

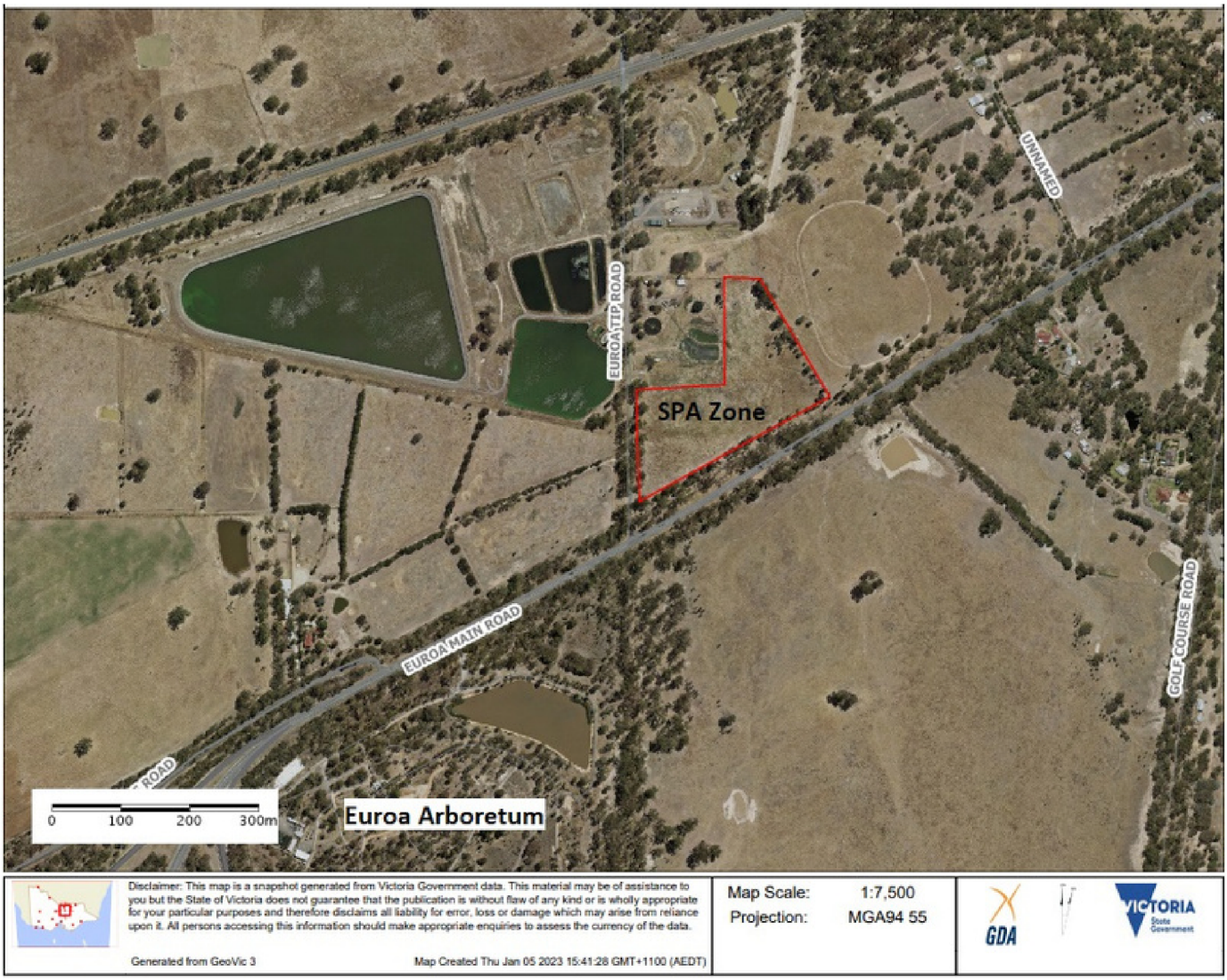
Zone 3 and Zone 4 - Target Shrub Species for Creeks and Rivers and enhance naturally occurring semi-aquatic ecosystem in colloration with Taungurung Lands and Water Council



Appendix 3
Euroa Goulburn Valley Water site

Target Small Tree Species:

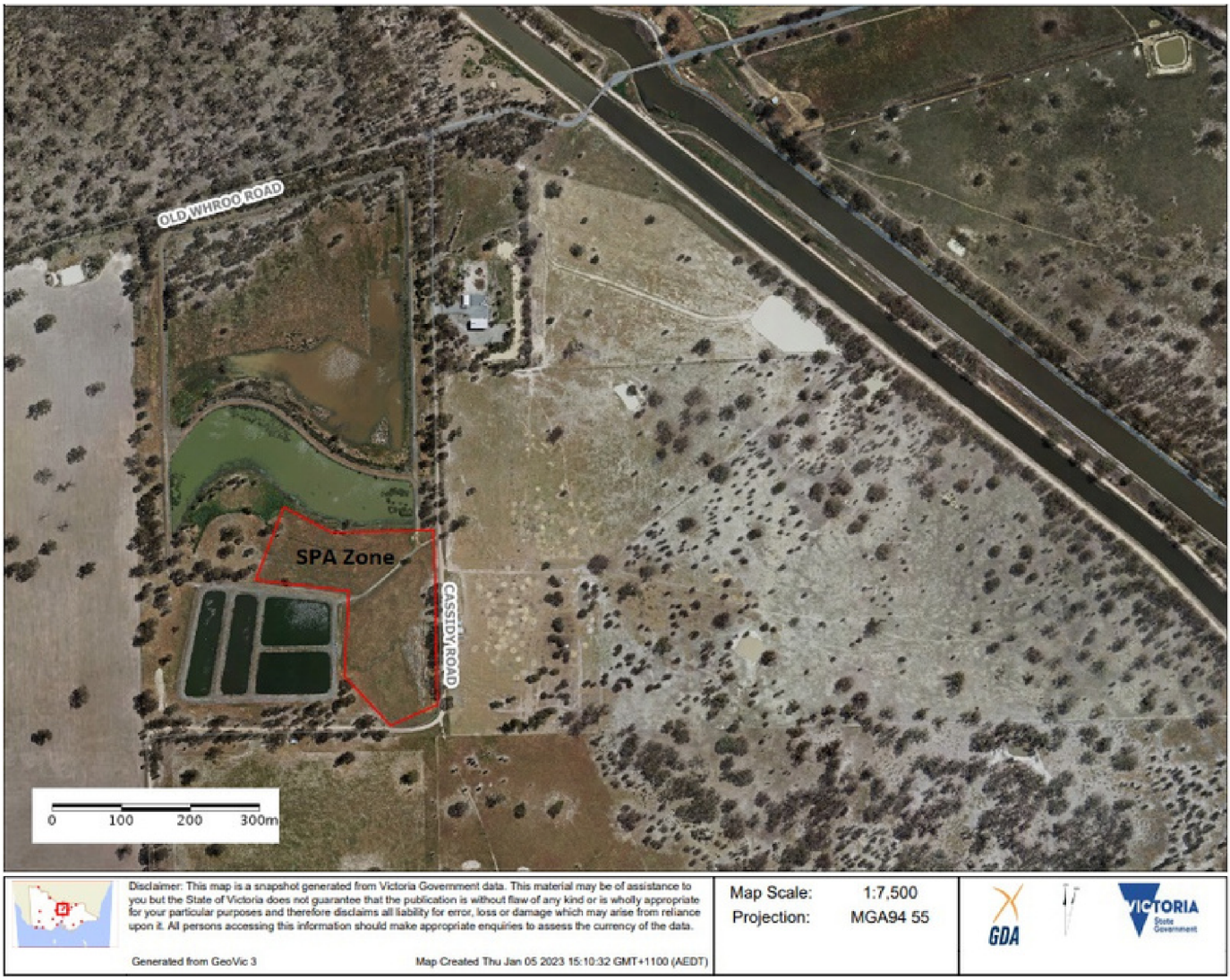
- Lightwood, Acacia implexa, 1ha, 125 plants
- Black Wattle, Acacia mearnsii, 2ha, 250 plants



Appendix 4
Murchison Goulburn Valley Water site

Target Shrub Species:

- Mallee Wattle, Acacia montana, 2ha, 1000 plants
- Bent-leaf Wattle, Acacia flexifolia, 1ha, 500 plants



Appendix 5

Stage 2 – Activities required for SPA 2024/26:

GV Water at Avenel

• Zone 3 and 4, 15ha and 20ha respectively, to be planned and planted in conjunction with Taungurung Traditional Owners

Shepparton City Council and Yorta Yorta at Mooroopna

• Replace existing seed production area plants and expand Seed Production Area by 5 hectares

Tahbilk Winery at Nagambie

• Replace plants in existing seed production areas.

University of Melbourne, Dookie

• Replace plants in existing seed production areas.

Regent Honeyeater Project at Winton

• Replace plants in existing seed production areas.

Stage 3 – Future activities for SPA 2026/28:

Strathbogie site 40ha

• Find a suitable site to grow a range of endemic species to the Strathbogie Ranges

• 40 hectares of seed production for 40 species of conservation species found in the Strathbogie Ranges.

Murray Fans and Victorian Plains 10 ha

• Find a suitable site to grow a range of endemic species found to the north of the catchment.

Appendix 6
Project Background

The vision and goals of the State Government Biodiversity Plan 2037 address three main priorities:

• Engaging all Australians in indigenous biodiversity conservation.
• Building ecosystem resilience in a changing climate using suitable indigenous plants.
• Attaining measurable results. Over the next 15 years the revegetation goals for Victoria are:
  - 200,000 ha of revegetation in priority areas for connectivity between habitats.
  - 200,000 ha of new permanently protected areas on private land.

The Goulburn Broken Catchment Management Authority, (GBCMA) have a desired target of 2,000 ha of revegetation or remnant protection every year, or 10,000 ha over 5 years.

There are 3 main methods for establishing native vegetation. These are: remnant protection and natural regeneration, hand planting with nursery grown plants and direct seeding with a machine or by hand.

Achieving large scale revegetation is commonly delivered by direct seeding. This method is preferred for medium to large scale projects as it is quicker and cheaper than hand planting. Direct seeding rates are 500 – 600 grams per hectare. To meet the target of 2,000 ha per annum across the Goulburn Broken Catchment, one tonne of seed is required.

Planting tube stock is the other option for revegetation at approximately 500 plants per hectare.
There are seven suppliers of indigenous plants currently in the Goulburn Broken catchment.
The collective capacity from nursery growers across the catchment is estimated at 250,000 plants p.a. which would revegetate 500 ha.

Currently, Goulburn Broken Indigenous Seedbank have 605kg of seed in cool storage representing 253 species. They can be broken into various categories:

- **Direct seeding species:** generally heavy seed producers, are easily harvested and direct seed well. These may be widespread or more localised with their distribution.
- **Conservation species**: produce small quantities of seed, are restricted in their distribution. Known to be declining in their populations and health in the natural landscape.
- **Vulnerable, Rare or Threatened species**: small populations, small numbers, limited potential in revegetation, require distinct programs and guidelines to harvest, sell and restore these plants in the landscape.

This Strategy addresses increasing the supply of direct seeding and conservation species.

CONTACT

Cath Olive
cathy.olive@euroaarboretum.com.au

Euroa Arboretum
Growing Back the Bush

Goulburn Broken
Indigenous
Seedbank