

**96-166 Centre Road,
Narre Warren**

Offset Site Monitoring for Revegetation and Weeds – Post-construction

**Prepared for
Narre Warren Central Pty Ltd
c/- The Fidus Group**

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**Nature
Advisory**

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Contents

1. Introduction.....	3
2. Methods	6
3. Monitoring results and recommendations.....	7
3.1 Overview of native vegetation	7
3.2 Revegetation works.....	8
3.3 Weeds	9
3.4 Other.....	11
Appendix 1: Flora species list.....	14

Figures

Figure 1: Study area and monitoring observations	5
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1. Introduction

Background

Nature Advisory (formerly Brett Lane & Associates) were engaged by Fidus Group, on behalf of Narre Warren Central Pty Ltd (the Proponent), to conduct ecological monitoring of an offset site located at 1-39 Hallam Rd, Hampton Park, in the Casey local government area (Figure 1). The offset site is to account for clearing of Eastern Dwarf Galaxias (*Galaxiella pusilla*) habitat at 96-166 Centre Road, Narre Warren (the development site). Dwarf Galaxias is listed as critically endangered under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The offset site is approximately 3.35 hectares in area (see Figure 1). It is bordered by Centre Road to the north, Hallam Road and a large drain to the west, with grassland and constructed stormwater wetlands owned by Melbourne Water to the east and the south. Past land use at the offset site appears to have been agriculture (e.g. grazing). There is a Melbourne Water managed site for Eastern Dwarf Galaxias located west of the offset site, on the opposite side of Hallam Road. However, there was no connectivity between this western site and the offset site prior to the works at the offset site.

Prior to the current works at the offset site, it was densely vegetated with exotic pasture grasses, weeds and some native wetland vegetation on a peaty and porous topsoil.

The offset site is to be designed and managed in accordance with the Offset Management Plan (OMP) that was prepared by Nature Advisory in November 2015.

The offset site is owned by Melbourne Water. Narre Warren Central Pty Ltd will be responsible for managing and maintaining the offset site for at least the first five years (in consultation with Melbourne Water), after which the handover period for managerial responsibilities will be negotiated with Melbourne Water.

Objectives for the offset site:

The offset site is to achieve the following objectives listed in Section 5.2.1 of the OMP:

- Use engineering solutions to modify the hydrological and wetting regime of the offset site to the benefit of Eastern Dwarf Galaxias;
- Create an off-line wetland connected to existing Eastern Dwarf Galaxias habitat, vegetated to provide suitable habitat for the species;
- The enhancement of the created Eastern Dwarf Galaxias habitat within the proposed offset site through revegetation and weed control to create a range of open and shady areas suitable for the species; and
- Implement measures to mitigate the incursion of high threat fish species such as Eastern Gambusia.

It is important to note that the vegetation buffers around the western and eastern boundaries of the offset site (along Centre Road and Hallam Road) are to be retained and weed management in these buffers is to be undertaken. Areas of missing native vegetation within these buffers are to be revegetated.

Timing for monitoring

The following weed and revegetation monitoring timeline was set under Section 5.4.2 and Section 5.4.3 of the OMP:

- At the completion of all construction works (including wetland construction and revegetation works);
- Six months post-construction;
- 12 months post-construction; and
- Annually in spring in years 2, 3, 4, 6 and 8.

The construction works were completed on 7th December 2023, whereupon Melbourne Water inspected the offset site and the establishment period officially began on this date.

Consistent with the OMP, the current monitoring survey was conducted at the completion of all construction works, on 18th December 2023.

Report structure

This report is divided into the following sections:

Section 2 describes the methods used for the field survey.

Section 3 describes the limitations of the assessment.

Section 3 describes the results of the field survey.

Section 4 provides a review of the monitoring program.

Section 5 provides the recommendations for management of the habitat buffers.

This investigation was undertaken by a team at Nature Advisory comprising Caroline Tan (Senior Botanist) and Inga Kulik (Senior Ecologist and Project Manager).

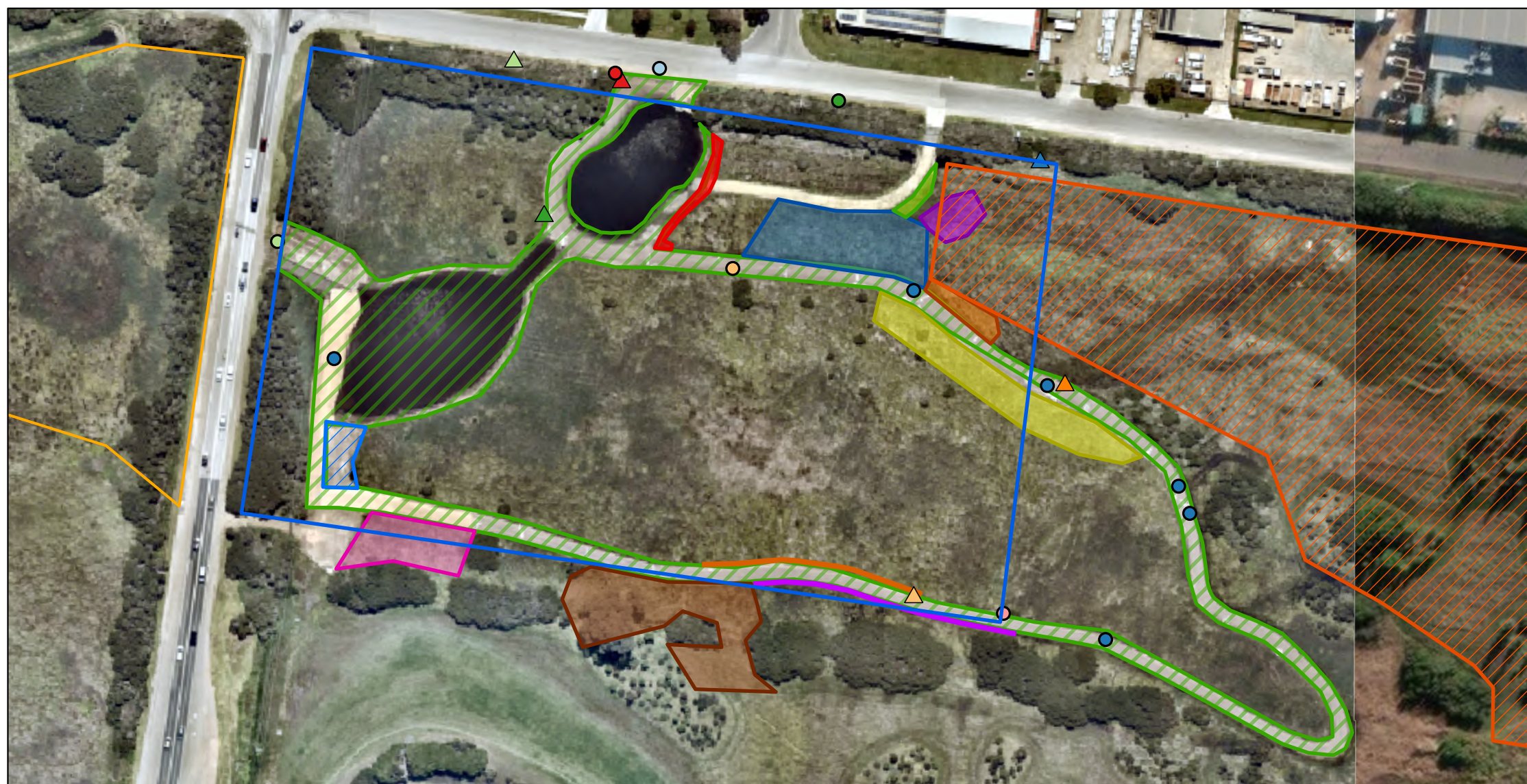


Figure 1: Study area and monitoring observations

Project No: 14090.07 **Project:** 96-166 Centre Road, Narre Warren **Date:** 24/01/2024

- Offset Site Boundary
- Melbourne Water Dwarf Galaxias Habitat
- Mixed native and non-native vegetation, main weed being Toowoomba Canary-grass
- Non-vegetated area
- Revegetation Area

Weed Areas in Offset Site

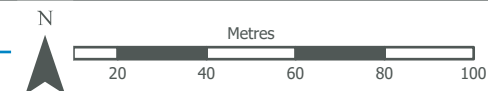
- 1 – 75% weed cover with many grassy and herbaceous weeds
- 2 – Toowoomba Canary-grass, Yorkshire Fog and Wild Gladiolus
- 3 – Drain Flat-sedge infestation
- 4 – Wild Gladiolus infestation
- 5 – Toowoomba Canary-grass, Dallis Grass and Wild Gladiolus
- 6 – Toowoomba Canary-grass
- 7 – Toowoomba Canary-grass
- 8 – Toowoomba Canary-grass

Weed observations

- ▲ Apple
- ▲ Dracaena
- ▲ Hawthorn
- ▲ Large Ox-tongue
- ▲ Large Ox-tongue and Carrot
- ▲ Sweet Briar
- ▲ Toowoomba Canary-grass
- ▲ Weeds especially Drain Flat-sedge
- ▲ Drain Flat-sedge along edge
- ▲ Toowoomba Canary-grass at edge

Site observations

- Damaged fence
- Damaged matting
- Discarded material
- Dumped tyres
- Fallen roped bunting
- Rubbish dumping
- Torn jute & erosion



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2. Methods

The field assessment was conducted on the 18th of December 2023. During this assessment, the offset site was surveyed on foot, mainly in the revegetation areas as the remainder of the offset site contained extremely dense vegetation.

The current monitoring survey presents the baseline information for the offset site, immediately post-construction.

During the weed monitoring assessment, the following data were collected:

- Estimation of total weed cover (%);
- Estimation of cover for each high-threat weed species (%);
- Mapping of distinct high-threat weed infestations;
- Compilation of a list of all weed species identified in the study area.

During the revegetation monitoring assessment, the following data were collected:

- Plant survival/mortality of plantings: approximate percentage and identify which species are not surviving;
- Evidence of herbivore or pathogen damage; and
- Presence and cover-abundance of introduced weeds.

Definition of high-threat weed

A high-threat weed is determined as any of the following:

- All woody weeds;
- Declared noxious weeds under the *Catchment and Land Protection Act 1994* (CaLP Act);
- Any other weed deemed to be high-threat due to the potential risk the species poses to the surrounding landscape; or
- Weeds not otherwise accounted for above that are on Department of Energy, Environment and Climate Action's (DEECA) *Advisory List of Environmental Weeds* and occurred above a negligible percentage of cover.

3. Monitoring results and recommendations

3.1 Overview of native vegetation

The topology of the offset site is a relatively flat, floodplain landscape with many areas being naturally waterlogged and periodically inundated. The offset site supports a mosaic of native wetland vegetation types, mainly Tall Marsh (EVC 821) as well as Plains Grassy Wetland (EVC 125) and Swamp Scrub (EVC 53).

Areas of Tall Marsh were dominated by Common Reed in most of the offset site, with Tall Marsh dominated by Cumbungi present near the northern boundary. Areas of Plains Grassy Wetland occurred at the northern part of the site, often dominated by dense Tall Sedge while containing a variety of native plants such as Common Blown-grass, Common Spike-sedge, Small Loosestrife, Mat-rushes, Jointed Rush and other Rushes.

Stands of Swamp Scrub dominated by Swamp Paperbark and often Woolly Tea-tree were observed along the northern, southern and western fringes of the offset site, as well as scattered Swamp Paperbark trees around the site. In particular, Swamp Scrub comprising dense Swamp Paperbark surrounded the inundated drains along the northern and western boundaries, with indigenous Slender Knotweed and Rushes in the understorey.



Photos 1-4. Native wetland vegetation with Swamp Scrub along the northern and western boundaries.

3.2 Revegetation works

The revegetation works were established around the two constructed refuge pools and along a 'revegetation track' through the central section and southern boundary of the offset site (Figure 1). The revegetation areas had erosion matting pinned down.

Dead plantings were less than 5% overall. (Note that supplementary planting, if needed, is to occur in Year 2 under the OMP).

The plantings at the northern side of refuge pool 1, the western side of refuge pool 2 and in between the pools consisted of Swamp Paperbark. This will over time fill in the gaps in Swamp Paperbark cover along the northern and western site boundaries, as well as create Swamp Scrub vegetation between the refuge pools.

The remainder of the revegetation works included other indigenous species that are common in wetlands in the region, such as Hop Goodenia, Kidneyweed, Mat-rushes and Rushes. Plantings were at an appropriate density, approximately 4 to 6 per metre square.

Some areas of the erosion matting had become unpinned and slightly damaged (see photo below). Locations of the most damaged mat areas are shown in Figure 1.

Recommendations

- Damaged areas of erosion matting will require repair.
- Collect tree guards and dispose of appropriately (offsite), when no longer required.



Photos 8-12. Revegetation works at refuge pools and revegetation track. Some damaged erosion matting.

3.3 Weeds

Overall, weeds at the offset site were at a low level, apart from mapped Weed Areas (Figure 1) and the edges of the existing dirt track at the northern part of the site. The density of the native wetland vegetation, particularly in the areas dominated by Common Reed, Cumbungi and Tall Sedge, has helped to suppress weed infestations in the rest of the site.

It was noted that the expanses of grassland northeast and east of the offset site appeared to contain a mixture of native and non-native vegetation, with Toowoomba Canary-grass as the main weed, as viewed from afar inside the offset site and Centre Road (Figure 1).

The high-threat weed species in the offset site, including the Swamp Scrub along Hallam Road and Centre Road, were:

- | | | |
|--------------------|---------------------|--------------------------|
| ▪ Blackberry (C) | ▪ Ox-tongue | ▪ Toowoomba Canary-grass |
| ▪ Dracaena | ▪ Spear Thistle (C) | ▪ Wild Gladiolus |
| ▪ Drain Flat-sedge | ▪ Sweet Briar (C) | ▪ Yorkshire Fog |
| ▪ Hawthorn (C) | | |

The revegetation areas were covered in erosion matting, although some minor weed growth through the matting had occurred in scattered places amongst the native plantings.

The edges of the existing dirt track at the northern part of the offset site contained infestations of Toowoomba Canary-grass, Yorkshire Fog, Dallis Grass and many herbaceous weeds such as Asterweed, Flaxleaf Fleabane, Scarlett Pimpernel, Carrot Weed, Ox-tongue, Wild Gladiolus, Clustered Dock and Drain Flat-sedge. Also, one individual of Spear Thistle was observed along this track.

The edges of the revegetation track had similar weeds to the existing northern dirt track, though infestations were to a lesser degree (varying from moderate to minor/scattered).

The Swamp Scrub along the site boundaries contained understorey weeds at the edges of the scrub, though weed incursions further inside the scrub were only minor. Understorey weeds at the edges included similar weeds to track edges as described above, as well as the woody weed Blackberry. Sweet Briar was recorded in the Swamp Scrub at Centre Road.

Weed control is likely to be a continued challenge along these tracks and along the adjacent roads (Hallam Road and Centre Road) as these types of disturbed areas at the edges of existing vegetation are easily recolonised by weeds.

A full list of flora species recorded during the current survey is provided in Appendix 1. This includes all weed species in the offset site that are listed as regionally prohibited (P) or regionally controlled (C) under the CaLP Act.

Recommendations

- Continued weed control should aim for the following:
 - While all weeds should be removed or reduced as much as possible, aim to prioritise the high-threat weed species (listed above).
 - Reduce weed cover in the Weed Areas mapped on Figure 1.

- Reduce weed cover along the dirt track in the northern part of the site and at the edges of Swamp Scrub, including reducing woody weeds.
- Spot-spray weeds growing amongst the revegetation works.
- Continued weed control actions should include the following:
 - Weed control should mostly occur during the times of the year when herbaceous and grassy weeds are actively growing and prior to flowering/seed set (generally in late spring), so treatment is most effective.
 - Spot-spray using a herbicide that is appropriate for use in environmentally sensitive areas, such as Roundup Biactive® (Glyphosate). Spot-spray on target grassy and herbaceous weeds, with care to avoid off-target damage to revegetation works and native plants in the existing wetland vegetation.
 - For all areas containing Toowoomba Canary-grass (particularly Weed Areas 1, 2, 5, 6, 7, and 8), it is strongly recommended that the Toowoomba Canary-grass be regularly slashed every 3 months, including in late spring. Slashing prior to seed set in late spring will help prevent their spread and recruitment. Slashing also reduces biomass, enhancing visibility for weed treatment.
 - Woody weeds (Blackberry, Dracaena, Hawthorn and Sweet Briar) can be removed using the cut-and-paint method, at any time of the year.



Photos 13-16. Top left – Weed Area 1. Top right – dirt track in the northern part of the offset site. Bottom left – Toowoomba Canary-grass infestation in Weed Area 2. Bottom right – weeds along revegetation track.

3.4 Other

Fencing

Permanent fencing was installed at the two refuge pools as indicated on Figure 1. The current perimeter fencing along the norther boundary does not prevent members of the public from accessing the offset site (this appears to be intentional as there is an open entryway incorporated into the fence). However, this leaves the revegetation works vulnerable to vandalism and damage. The survey found that the northern fencing had been damaged, likely by vandals (see photo below and Figure 1).



Photos 17-18. Damaged perimeter fencing and the entryway at the northern boundary.

Rubbish

Some rubbish was also found near this fencing, at the edge of the Swamp Scrub along Centre Road (Figure 1). More rubbish (such as car tyres) was found along Centre Road, in or near the Swamp Scrub along this road. Unfortunately, this Swamp Scrub can be easily accessed by members of the public from Centre Road. Clean-up of litter or dumped waste on the roadsides is not the responsibility of the Proponent, and clean-up is required to be addressed by council.



Photos 19-20. Litter inside the offset site and dumped tyres in the Swamp Scrub along Centre Road.

Some roped bunting was observed along the interface of the existing wetland vegetation and the revegetation track, in the southern part of the offset site. This was evidently used

to prevent accidental encroachment into the vegetation during construction of the revegetation track, however it currently does not appear to serve a purpose and some sections had fallen. The roped bunting could become rubbish inside the site over time.



Photo 21 Rope bunting along the revegetation track.

Non-vegetated area

The current monitoring found an area at the south-western part of the offset site that was generally devoid of vegetation, except for recolonising small plants (see photo below and Figure 1). This area appeared associated with access to the southern refuge pool from the entryway at the south-west corner of the site. It is currently not known what the intention for this area is, i.e. whether it is for maintenance vehicle access or if it will be left to become wetland vegetation. If no action is taken for this area, it is likely that it will become colonised by weeds which will threaten the adjacent existing native wetland vegetation and revegetation works.



Photo 22 Rope bunting along the revegetation track.

Recommendations

- The damaged section of the northern fencing will require repair.

- Although the intention may be to enable public access to the offset site in the long-term, it is recommended that the fencing along Centre Road include wire mesh (Image 1 below) and that the entry ways be locked off outside of maintenance activities, to protect the revegetation works from damage while it is still establishing. Revegetation sites and reserves tend to be vulnerable to vandalism and other disturbances like dumping of garden waste.
- Remove litter and dumped rubbish inside the offset site.
- It is the council's responsibility to address littering and illegal waste dumping on public land, such as the roadsides of Centre Road and Hallam Road. The Proponent can report incidences of littering and waste dumping along these roads to council.
- Remove all roped bunting (and stakes) at the southern part of the offset site, otherwise these may become rubbish in the site over time.
- Future use of the non-revegetation area is to be confirmed. If this area is to be a permanent area set aside for maintenance and access, soil erosion may become an issue and this area may require works to provide a proper foundation. If this area will not serve a maintenance purpose and is intended to become part of the wetland vegetation on site, it is recommended that revegetation treatment be undertaken here to rapidly provide native vegetation cover and manage soil erosion. This area might be revegetated with Common Reed or native Rushes, for example.



Image 1. Example photo of mesh fencing.

Appendix 1: Flora species list

*	Common name	Scientific name	CaLP Act	WONS
*	Annual Veldt-grass	<i>Ehrharta longiflora</i>		
*	Aster Weed	<i>Symphyotrichum subulatum</i>		
*	Bastard's Fumitory	<i>Fumaria bastardii</i>		
*	Black Nightshade	<i>Solanum nigrum</i>		
*	Blackberry	<i>Rubus cissburiensis</i>	C	WONS
*	Cat's Ear	<i>Hypochaeris</i> spp.		
*	Clustered Dock	<i>Rumex conglomeratus</i>		
*	Cocksfoot	<i>Dactylis glomerata</i>		
	Common Blown Grass	<i>Lachnagrostis filiformis</i>		
	Common Cotula	<i>Cotula australis</i>		
*	Common Dandelion	<i>Capsella bursa-pastoris</i>		
	Common Reed	<i>Phragmites australis</i>		
*	Common Sow-thistle	<i>Sonchus oleraceus</i>		
	Common Spike-sedge	<i>Eleocharis acuta</i>		
*	Creeping Buttercup	<i>Ranunculus repens</i>		
	Cumbungi	<i>Typha latifolia</i>		
*	Curled dock	<i>Rumex crispus</i>		
*	Dracaena	<i>Dracaena</i> spp.		
*	Drain Flat-sedge	<i>Cyperus eragrostis</i>		
*	Flaxleaf Fleabane	<i>Erigeron bonariensis</i>		
	Hairy Pennywort	<i>Hydrocotyle hirta</i>		
*	Hawthorn	<i>Crataegus monogyna</i>	C	
*	Hemlock	<i>Conium maculata</i>		
	Hop Goodenia	<i>Goodenia ovata</i>		
	Jointed Rush	<i>Juncus articulatus</i>		
	Kidney weed	<i>Dichondra</i> spp.		
	Knobby Club-sedge	<i>Ficinia nodosa</i>		
*	Lesser Quaking-grass	<i>Briza minor</i>		
*	Ox-tongue	<i>Helminthotheca echioides</i>		
*	Paspalum	<i>Paspalum dilatatum</i>		
*	Perennial Rye-grass	<i>Lolium perenne</i>		
*	Prairie Grass	<i>Bromus catharticus</i>		
*	Prunus	<i>Prunus</i> spp.		
*	Rat-tail Grass	<i>Sporobolus africanus</i>		
*	Ribwort	<i>Plantago lanceolata</i>		
*	Rough Sow-thistle	<i>Sonchus asper</i> s.l.		
	Rush	<i>Juncus</i> spp.		
*	Scarlet Pimpernel	<i>Lysimachia arvensis</i> var. <i>arvensis</i>		
*	Self-heal	<i>Prunella</i> spp.		

*	Common name	Scientific name	CaLP Act	WONS
*	Silvery Hair-grass	<i>Aira caryophyllea</i>		
	Slender Knotweed	<i>Persicaria decipiens</i>		
	Small Loosestrife	<i>Lythrum hyssopifolia</i>		
*	Soft Brome	<i>Bromus hordeaceus</i> ssp. <i>hordeaceus</i>		
*	Spear Thistle	<i>Cirsium vulgare</i>	C	
	Swamp Paperbark	<i>Melaleuca ericifolia</i>		
*	Sweet Briar	<i>Rosa rubiginosa</i>	C	
	Tall Sedge	<i>Carex appressa</i>		
*	Toowoomba Canary-grass	<i>Phalaris aquatica</i>		
*	Twiggy Turnip	<i>Brassica fruticulosa</i>		
	Variable Willow-herb	<i>Epilobium billardioreanum</i>		
	Water Milfoil	<i>Myriophyllum</i> spp.		
	Water Plantain	<i>Alisma plantago-aquatica</i>		
	Wattle Mat-rush	<i>Lomandra filiformis</i>		
*	White clover	<i>Trifolium repens</i> var. <i>repens</i>		
*	Wild Gladiolus	<i>Gladiolus undulatus</i>		
*	Wild Radish	<i>Raphanus raphanistrum</i>		
	Woolly Tea-tree	<i>Leptospermum lanigerum</i>		
*	Yorkshire Fog	<i>Holcus lanatus</i>		

* Denotes that this plant species is a weed.