

96-166 Centre Road, Narre Warren

Offset Site Monitoring for Revegetation and Weeds – 6 Months Post-construction

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

June 2024 Report No. 14090.7 (2.0)



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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 previous monitoring survey was conducted at the completion of all construction works, on 18th December 2023.

The current monitoring survey constitutes the 6-month post-construction monitoring survey on 17th June 2024.

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 Neassa Fritchley (Botanist), Maya Zaeim (GIS Analyst) and Caroline Tan (Senior Ecologist and Project Manager).



Figure 1: Study area and monitoring observations

Project:96-166 Centre Road, Narre Warren Project No:14090_07 **Date**: 26/06/2024 Toowoomba Canary-grass, Drain Flat-sedge and Kikuyu Site boundary Weed area **Weed observations** Site observations Nature Advisory Melbourne Water Dwarf Galaxias Blackberry Damage matting Blackberry Habitat Wild Gladiolus infestation seen in Drain Flat-sedge and Yorkshire Fog Damaged fence Cassinia sifton Vegetation area December 2023 High weed cover - Mixture of grassy and herbaceous weeds Damaged matting Gorse Mixed native and non-native Discarded material Sow Thistle vegetation Toowoomba Canary-Grass Dumped tyres Sweet Brian Non-vegetated area Toowoomba Canary-Grass and Dumped rubbish Sweet Pittosporum Revegetation Area Paspalum Drain flat sedge White Arum-lily Toowoomba Canary-grass and Yorkshire Fog Fallen rope bunting

Yukka

Toowoomba Canary-grass along egde

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2. Methods

The field assessment was conducted on 17th June 2024. During this assessment, the offset site was surveyed on foot, mainly in the revegetation areas as the remainder of the offset site was largely riparian and contained extremely dense vegetation (especially extremely dense expanses of Common Reed).

The current monitoring survey followed the survey method for the baseline monitoring survey, including revegetation and weed monitoring assessments as outlined in the OMP.

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 in the offset site, including open wetlands and dense Common Reed (top and bottom left), with Swamp Scrub along the northern and western boundaries (top and bottom right).

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.

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.

Plant Mortality

Total mortality of plantings matting was estimated to be about 5% overall. Species that appear to be establishing well were the Hop Goodenia, Mat-rushes and Spear Grasses all between 40 - 80cm in height and flowering. The species that appears to be struggling most is the herbaceous Kidneyweed, which accounted for most of the mortality.

Planted Swamp Paperbark and Woolly Tea-tree in the western entrance have mostly survived. However, some have been knocked over relatively recently, as fallen individuals still have green vegetation (see photo below). The cause of this is unclear.

Note that supplementary planting, if needed, is to occur in Year 2 under the OMP.

Some areas of the erosion matting had become unpinned and 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 and the plantings in these areas that died
 as a result will need to be replaced. We recommend replanting with Hop Goodenia, Matrushes and Spear Grasses (avoid using Kidneyweed).
- The planted Swamp Paperbark and Woolly Tea-tree that have fallen over will need to replaced.
- Most tree guards have been removed from site. A small collection of planted shrubs along the border of the southern dam still have tree guards. These will need to be removed and disposed of appropriately (offsite), when no longer required.



Photos 5-8. 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 (shown in 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).

High-threat weed species in the offset site, included:

- Blackberry (C)
- Gorse (C)

Yucca

- White Arum-lily
- Drain Flat-sedge
- Ox-tongue
- Sweet Briar (C)
- Sweet Pittosporum (C)
- Spear Thistle (C)
- Toowoomba Canarygrass
- Yorkshire Fog

As revegetation areas were covered in erosion matting, weed presence here was generally minor. The main weed species were Drain Flat-sedge and Common Sow-thistle. There appeared to be some spot spraying of weeds which would be helping to suppress weed infestations between the native plantings (see below).

The edges of the existing dirt track at the northern part of the offset site contained scattered 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. A few high threat and woody weed species were observed along this track like multiple occurrences of sweet briar, blackberry, a spear thistle, and a few larger Ox-tongue individuals.

During the baseline survey which occurred in summer, a large infestation of Wild Gladiolus was also observed at the northern part of the offset site (this area is included in Figure 1), as well as scattered individuals around the site. Due to the winter timing of the current survey, this weed species was not flowering and therefore a lot less conspicuous to detect. Therefore, though not seen in this survey, it should be assumed that they are still present.



Photo 9. Area of Wild Gladiolus infestation mapped and photographed in December 2023.

The edges of the revegetation track had similar weeds to the existing dirt track, though infestations were to a lesser degree (varying from moderate to minor/scattered). The dominant weeds were the Drain Flat-sedge and Aster Weed, often limited to the drainage line either side of the track.

The Swamp Scrub along the site boundaries contained understorey weeds at the edges of the scrub, weed incursions further inside the scrub were only minor. Understorey weeds at the edges included similar weeds to track edges as described above. It is worth noting that roadside Kikuyu may become an issue in future as it was observed climbing into the vegetation of Swamp Scrub. Blackberry spread throughout the immediate understory along the roadside vegetation, as well as incidental White Arum-lily and tall Yucca trees.

Weed control is likely to be a continued challenge along tracks, revegetation areas, and along the adjacent roads (Hallam Road and Centre Road) as these types of disturbed areas are at the edges of existing vegetation which 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 in the areas of Swamp Scrub, including reducing woody weeds (Blackberry, Gorse, Sweet Briar, Sweet Pittosporum and Yucca).
 - Continue to 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 areas containing significant infestations of Toowoomba Canary-grass (as shown in Figure 1), it is strongly recommended that the Toowoomba Canarygrass 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, Yukka, and Sweet Briar) can be removed using the cut-and-paint method, at any time of the year.
- Spot-spraying of Wild Gladiolus should occur in summer when it is flowering and therefore easily visible.



Photos 10-14. Top left – Weedy area along the dirt track. Top right – Entrance point at the northeastern part of the offset site. Bottom left – example of Toowoomba Canary-grass dominated area. Bottom right – weeds along the revegetation track in the southern part of the site.

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 as shown by the dumping of rubbish within the offset site. The survey found that the northern fencing had been damaged, likely by vandals (see photo below and Figure 1).



Photos 15. Damaged perimeter fencing next to 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. Additional rubbish has also been found inside the offset site (see below). Clean-up of litter or dumped waste within the site is the responsibility of the proponent, but not along roadsides, this is required to be addressed by council.



Photos 16-19. 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 (Figure 1). 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 rope bunting should now become part of the rubbish removal effort.



Photo 20-21. Rope bunting along the southern portion of the revegetation track.

Non-vegetated area

The current monitoring found an area at the southwestern part of the offset site that was generally devoid of vegetation, except for recolonising small plants and weed species (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 naturally. As weeds have begun colonising this area, there is increasing threat of invasion to the adjacent existing native wetland vegetation and revegetation works.



Photo 22. Non-vegetated area at the southwestern part of the offset site.

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 further

limit 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 as shown from the post-construction baseline survey and the current 6-months post-construction survey.

- 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 should 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 as they have become rubbish in the site. It will become harder to removed as the vegetation becomes more overgrown.
- 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

Origin	Common name	Scientific name	EPBC	FFG-T	FFG-P	CaLP Act
*	Aster-weed	Symphyotrichum subulatum				
*	Bastard's Fumitory	Fumaria bastardii				
	Bidgee-widgee	Acaena novae-zelandiae				
*	Black Nightshade	Solanum nigrum s.l.				
*	Blackberry	Rubus cissburiensis				С
*	Cat's Ear	Hypochaeris spp.				
*	Clustered Dock	Rumex conglomeratus				
*	Cocksfoot	Dactylis glomerata				
	Common Blown-grass	Lachnagrostis filiformis s.l.				
#	Common Cotula	Cotula australis			Р	
	Common Reed	Phragmites australis				
*	Common Sow-thistle	Sonchus oleraceus				
	Common Spike-sedge	Eleocharis acuta				
	Crane's Bill	Geranium spp.				
*	Creeping Buttercup	Ranunculus repens				
*	Curled Dock	Rumex crispus				
*	Drain Flat-sedge	Cyperus eragrostis				
*	Flaxleaf Fleabane	Erigeron bonariensis				
*	Gorse	Ulex europaeus				С
	Hairy Pennywort	Hydrocotyle hirta				
*	Hemlock	Conium maculatum				С
	Hop Goodenia	Goodenia ovata				
*	Jointed Rush	Juncus articulatus subsp. artic				
	Kidney Weed	Dichondra spp.				
*	Kikuyu	Cenchrus clandestinus				
	Knobby Club-sedge	Ficinia nodosa				
*	Lesser Quaking-grass	Briza minor				
*	Lesser Reed-mace	Typha latifolia				
	Mat-rush	Lomandra spp.				
*	Ox-tongue	Helminthotheca echioides				
*	Paspalum	Paspalum dilatatum				
*	Perennial Rye-grass	Lolium perenne				
*	Prairie Grass	Bromus catharticus				
*	Prickly Lettuce	Lactuca serriola				
*	Prunus	Prunus spp.				
*	Rat-tail Grass	Sporobolus africanus				
*	Ribwort	Plantago lanceolata				

Notes: EPBC = Threatened species status under the EPBC Act; FFG-T = Threatened species status under the FFG Act; FFG-P = Listed as protected (P) under the FFG Act; CalP Act: Declared noxious weeds under the CalP Act (S = State Prohibited Weeds – any infestations must be reported to DELWP that is responsible for control of these; P = Regionally Prohibited Weeds – landowners must eradicate these; C = Regionally Controlled Weeds – landowners must prevent the growth and spread of these; R = Restricted Weeds – trade in these weeds and propagules, either as plants, seeds or contaminants in other materials is prohibited).

† = planted



^{* =} introduced to Victoria

^{# =} Victorian native taxa occurring outside the natural range

Origin	Common name	Scientific name	EPBC	FFG-T	FFG-P	CaLP Act
*	Rough Sow-thistle	Sonchus asper s.l.				
	Rush	Juncus spp.				
*	Scarlet Pimpernel	Lysimachia arvensis var. arver				
*	Self-heal	Prunella spp.				
*	Shepherd's Purse	Capsella bursa-pastoris				
*	Silvery Hair-grass	Aira caryophyllea subsp. caryo				
*	Slender Centaury	Centaurium tenuiflorum				
	Slender Knotweed	Persicaria decipiens				
	Small Loosestrife	Lythrum hyssopifolia				
*	Soft Brome	Bromus hordeaceus				
	Spear Grass	Austrostipa spp.				
*	Spear Thistle	Cirsium vulgare				С
#	Swamp Paperbark	Melaleuca ericifolia				
*	Sweet Briar	Rosa rubiginosa				С
#	Sweet Pittosporum	Pittosporum undulatum				
	Tall Sedge	Carex appressa				
*	Toowoomba Canary-gra	Phalaris aquatica				
*	Twiggy Turnip	Brassica fruticulosa				
	Variable Willow-herb	Epilobium billardiereanum				
*	Veldt Grass	Ehrharta spp.				
	Water Milfoil	Myriophyllum spp.				
	Water Plantain	Alisma plantago-aquatica				
	Wattle Mat-rush	Lomandra filiformis				
*	White Arum-lily	Zantedeschia aethiopica				
*	White Clover	Trifolium repens var. repens				
*	Wild Radish	Raphanus raphanistrum				
	Woolly Tea-tree	Leptospermum lanigerum				
*	Yorkshire Fog	Holcus lanatus				
*	Yucca	Yucca aff. whipplei (Long Fore				

Notes: EPBC = Threatened species status under the EPBC Act; FFG-T = Threatened species status under the FFG Act; FFG-P = Listed as protected (P) under the FFG Act; CaLP Act: Declared noxious weeds under the CaLP Act (S = State Prohibited Weeds – any infestations must be reported to DELWP that is responsible for control of these; P = Regionally Prohibited Weeds – landowners must eradicate these; C = Regionally Controlled Weeds – landowners must prevent the growth and spread of these; R = Restricted Weeds – trade in these weeds and propagules, either as plants, seeds or contaminants in other materials is prohibited).



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