

96-166 Centre Road,
Narre Warren –
Dwarf Galaxias
habitat buffer

Year 7
Vegetation Monitoring

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

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Report No. 14090.8 (19.0)



**Nature
Advisory**

(Formerly Brett Lane & Associates Pty Ltd)

5/61-63 Camberwell Road
Hawthorn East, VIC 3123
PO Box 337, Camberwell VIC 3124

(03) 9815 2111

www.natureadvisory.com.au

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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 vegetation monitoring within Dwarf Galaxias habitat buffer areas at 96-166 Centre Road, Narre Warren, approximately 37 kilometres south-east of Melbourne's CBD. The buffers of native vegetation have been retained for the purpose of protecting drainage channels known to support a population of Dwarf Galaxias from neighbouring construction. Dwarf Galaxias is listed as critically endangered under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The vast majority of the property has been approved for a residential subdivision, with construction having commenced in November 2016. Condition 4 of the EPBC Act approval for the project (EPBC 2014-7380) requires that buffer areas around Dwarf Galaxias habitat (Figure 1) are revegetated within 5 years of the commencement of construction and that vegetation cover is retained until the expiry of the approval.

Vegetation targets

The following targets have been set to achieve this objective:

- Less than 40% weed cover 5 years from the commencement of construction; and
- Less than 30% weed cover and at least 70% native vegetation cover 7 years from the commencement of construction.

The targets above are as agreed with the Department of Climate Change, Energy, the Environment and Water (DCCEEW) and contained in the Variation of Conditions Notice that is dated 4th March 2021 and supersedes the original Condition 4.

Timing for monitoring

The following monitoring timeline was set in order to determine if these targets are being met:

- Prior to the commencement of construction to gain baseline data;
- Six months after the commencement of construction;
- Twelve months after the commencement of construction; and
- Two, three, five, seven and 10 years after the commencement of construction.

Construction for the project commenced on the 8th of November 2016. The baseline pre-construction survey was conducted in October 2016 and the 6-month post-construction monitoring survey occurred in September 2017 (though it was actually undertaken at 10 months). The Year 1 survey for November 2017 was accidentally missed and the Year 2 survey occurred in May 2020 (although it was initially planned to occur in November 2019) – this was a further accidental mistake in the project planning as the Year 2 monitoring should have occurred in November 2018, not November 2019. However, because the

Year 2 survey was planned for November 2019, the Year 3 survey was conducted in November 2020. Following this, Year 4 was taken to be the year 2021 and the Year 5 monitoring was conducted in November 2022.

To rectify the mistakes in the monitoring timeline, the Year 7 monitoring occurred in November 2023 in accordance with the approval conditions.

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).

2. Methods

The field assessment was conducted on the 23rd of November 2023. During this assessment, the study area was surveyed on foot and 16 of the 20 previously established quadrats/quadrat locations within the Dwarf Galaxias habitat buffer areas (Figure 1) were assessed.

During the baseline survey, quadrats were established in the following vegetation types:

- Swamp Scrub (EVC 53) – nine quadrats (1, 3, 4, 6, 7, 9, 10, 16, 19 & 20).
- Swampy Riparian Woodland (EVC 83) vegetation – two quadrats (11 & 15).
- Non-native vegetation – four quadrats (2, 5, 13 & 17).
- Quadrats 12, 14 and 18 are not to be surveyed anymore as it was decided during the 6-month assessment that they were too close to other monitoring quadrats and would not add any additional information. Quadrat 8 was removed after the area was disturbed and the marking stake lost.

Under Condition 4 of the EPBC Act, areas of non-native vegetation were required to be revegetated with indigenous species.

At the time of establishment, each quadrat was marked with a single wooden stake in the north-west corner and positioned along a north-south to east-west axis.

A photograph was taken at the north-west corner of the accessible quadrats at a height of approximately 1.3 metres, looking south-east over the quadrat, and the following data was collected:

- Total vegetation cover;
- Native vegetation cover;
- Weed cover;
- Cover of bryophytes, bare ground and litter; and
- Each flora species recorded.

The data collection methodology was repeated during the current survey, however as explained in the following section, there were significant limitations which prevented the quadrats from being accessed. As such, the methodology was amended as appropriate to the circumstances and to determine if Condition 4 will be met.

In addition to the quadrat assessments, incidental observations of rubbish, stockpiles or other disturbances in the habitat buffers were recorded while traversing between quadrats. Incidental observations of high-threat weed species were also recorded, however it was not the purpose of this field assessment to undertake a weed survey for the study area.

3. Limitations

Of the 16 quadrats, none were able to be accessed and surveyed directly (i.e. close-up assessment from standing directly adjacent to the quadrat) during the current survey, due to the habitat buffers being surrounded by deep water and/or impenetrable vegetation.

The habitat buffer running alongside Centre Road is surrounded by water, as both the deep swale drains along the southern edge of the buffer (separating the buffer from Centre Road) and along the northern edge of the buffer (separating the buffer from the residential development) were full of water.

The habitat buffer running between Centre Road and the Pakenham Railway line – which supported quadrats 11, 13, 15, 16 & 17 – was also unable to be accessed due to the deep swale drains full of water along both the eastern and western sides.

Furthermore, even if the swale drains were crossed, the vast majority of the habitat buffers including the quadrat locations comprised impenetrable vegetation (Swamp Paperbark and Blackberry).

As a result of the access limitations above, assessment of the quadrats (cover estimates and flora species) and photographs were taken from the nearest location across the swale drains, to support assessment of the vegetation conditions in the habitat buffers.



Photo 1. Representative photo of the swale drains with deep water surrounding both sides of the habitat buffers, preventing access to the quadrats. Thick vegetation also shown.

4. Results

The cover of native vegetation was generally high; 70-85% for nine out of 16 quadrats, 60-65% for six quadrats and 45% for one quadrat. This was mostly attributable to Swamp Paperbark (including mature individuals and heavy recruitment). In a few sections of the buffers that may be too waterlogged for Swamp Paperbark to establish, there was still a high level of native vegetation cover due to presence of Common Reed or Cumbungi (for example, quadrat 2). Although there were quadrants with less than 70% native vegetation cover, there were other sections of the buffers with very high (>70%) native vegetation cover and the buffers a whole met the 70% target. It was further noted that the aquatic vegetation in the swales and drainage channels were dominated by native Narrow-leaf Cumbungi and Common Reed. Other native species at the edges of the buffers included Tall Spike-sedge, Tall Sedge, Rushes and Slender Knotweed.

The cover of weeds was generally low; 20-25% for eight quadrats, 10-15% for five quadrats and 5% for three quadrats. This was mostly attributable to the high-threat species Blackberry, which has been widespread across the buffers since before the project. Other high threat weed species observed included weed grasses such as Kikuyu, Pampas Grass, Wild Oat, Cocksfoot, Yorkshire Fog and Toowoomba Canary-grass. Weed herbs and sedges included Ox-tongue and Drain Flat-sedge. Outside of the buffers, there were also two particular locations in the project site where weed control is recommended to avoid spread of those weeds into the nearest buffer (although these areas will not affect Dwarf Galaxias).

Overall, high-threat grassy and herb weeds were limited to particular sections of the buffers, particularly in the three suggested planting areas shown in Figure 1. The number of high-threat weeds that were previously common like Ox-tongue, Spear Thistle and Flax-leaf Broom were at much lower covers. Blackberry was also at lower cover from the previous monitoring. Effective weed treatments since the previous monitoring were evident (discussed further in Section 5).

There was little rubbish observed in or near the habitat buffers on the project land, namely a few items of plastic in the swale near quadrat 10, which may have blown in from the adjacent construction area. Some litter was seen in the swale on council land at the crossover between quadrat 10 and 11, most of which likely came from upstream and was carried to this swale from water flows. Some rubbish was also observed along the roadside vegetation on council land, directly adjacent to Centre Road. Rubbish items included food wrappers and fast food containers, evidently from public littering along the road. It should be noted that clean-up of litter or dumped waste on council/public land is not the responsibility of the Proponent.

Sediment fencing or sediment logs between the swales and the project site were generally present though requiring repair/replacement in occasional locations due to wear and tear (as shown in Figure 1). The sediment fencing along the footpath between the buffers and houses at Billy Buttons Drive was in generally poor condition and requires replacement. Furthermore, the sediment log along the buffer between Centre Road and the Pakenham

Railway line ended at the location indicated near quadrat 17; it will need to be extended up to the northern site boundary.



Photo 2. Photos of sediment fencing and sediment log outside the swales, in the project site.

Two areas of soil erosion and one area of soil disturbance were observed near the swales, as mapped in Figure 1 and shown in Photo 3 below.



Photo 3. Photos of the soil erosion and disturbance mapped in the project site.

Algal blooms were observed in the swale along Centre Road, as seen and photographed at the crossing from Centre Road into the project site.



Photo 4. Algal blooms and some litter in the swale on council land, along Centre Road. Specifically at the crossing from Centre Road into the project site.



Photo 5. Representative photo of most of the swales, which are less impacted than in Photo 4 above (less or no algal blooms and no rubbish).

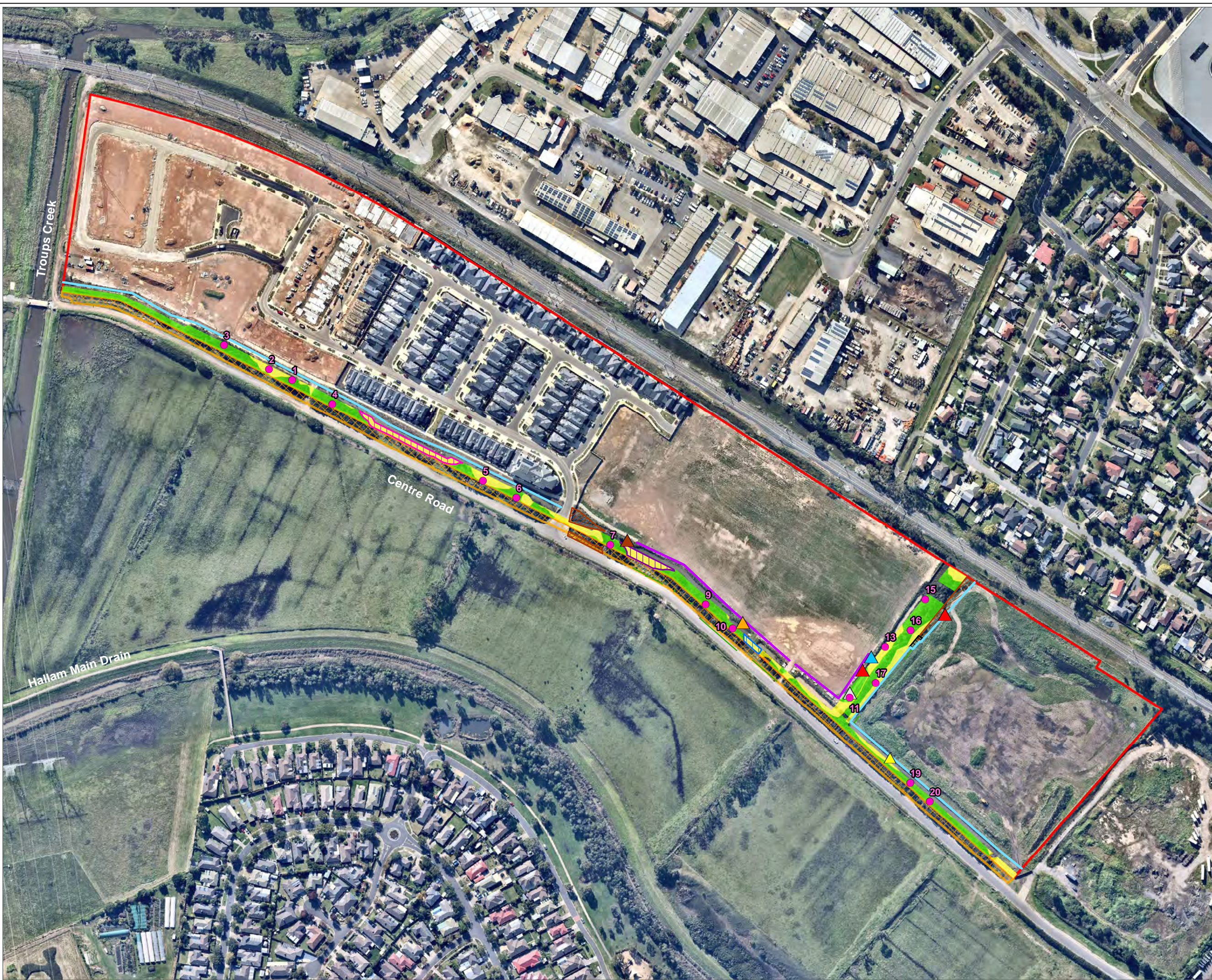
Observations made within the general quadrat locations are provided in Table 1 below and quadrat photos are provided Appendix 1.

Table 1: Qualitative vegetation quadrat data – Year 7

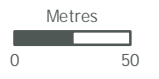
Quadrat No.	Original Vegetation Type	Description	Total vegetation cover	Weed cover	Native vegetation cover
1	Swamp Scrub	Swamp Paperbark dominated. Blackberry present	90	15	75
2	Non-native	Swamp Paperbark and Common Reed dominated. Blackberry present.	90	25	65
3	Swamp Scrub	Swamp Paperbark dominated with Common Reed	90	25	65
4	Swamp Scrub	Dominated by Swamp Paperbark, with some Tall Spike Rush, and Cumbungi	80	5	75
5	Non-native	Co-dominated by Swamp Paperbark, Tall Sedge, Cumbungi and Slender Knotweed. Toowoomba Canary-grass and Drain Flat-sedge on water's edge	90	25	65
6	Swamp Scrub	Dominated by Swamp Paperbark	90	5	85
7	Swamp Scrub	Co-dominated by Swamp Paperbark and Cumbungi. Blackberry and Pampas Grass present.	90	25	65
9	Swamp Scrub	Dominated by Swamp Paperbark, Cumbungi and some Lightwood.	90	25	65
10	Swamp Scrub	Swamp Paperbark dominated, with some Lightwood present.	95	10	85
11	Swampy Riparian Woodland	Dominated by Swamp Paperbark, with Black Wattle nearby Black Wattle, Tall Spike-sedge and Spike Sedge	90	10	80
13	Non-native	Co-dominated by Swamp Paperbark and Black Wattle, with Black Wattle, Tall Spike-sedge and Rush.	65	20	45
15	Swampy Riparian Woodland	Swamp Paperbark, with Black Wattle and Cumbungi.	80	20	60
16	Swamp Scrub	Dominated by Swamp Paperbark and Black Wattle.	90	20	70
17	Non-native	Dominated by Swamp Paperbark.	75	5	70
19	Swamp Scrub	Swamp Paperbark and Common Reed co-dominant.	85	10	75
20	Swamp Scrub	Swamp Paperbark dominant with some Common Reed.	85	10	75

Figure 1: Study area and monitoring locations

Project number: 14090.08
Project: 96-166 Centre Road,
Narre Warren
Date: 15/12/2023



- ▭ Property boundary
- Quadrat locations
- ▲ Bund ends
- ▲ Blackberry
- ▲ Erosion
- ▲ Assorted rubbish in water
- ▲ Soil disturbed
- ▲ Ox-tongue
- ▭ Buffer to be revegetated
- ▭ Buffer with retained native vegetation
- ▭ Swale and Swamp
- ▭ Paperbark on council land
- ▭ Suggested planting area 1
- ▭ Suggested planting area 2
- ▭ Suggested planting area 3
- ▭ Treated Blackberry
- ▭ Weeds
- Sediment fencing
- Sediment log



PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

5. Discussion and recommendations

The applicable Condition 4 target has been met:

- Less than 30% weed cover and at least 70% native vegetation cover 7 years from the commencement of construction.

Active revegetation

Active revegetation through planting in the revegetation buffers has not been undertaken due to the dense vegetation cover and difficulties in managing Blackberry (which are discussed below). Furthermore, revegetation was considered to not be required along the habitat buffers, as natural recruitment should be successful and likely to occur in areas where weeds are removed – this has since proven to be the case, with high levels of natural recruitment of Swamp Paperbark visible in the buffers.

The current monitoring supports this approach as the native vegetation cover in the buffers is generally high (meeting the 70% target overall). Furthermore, the vegetation in the drainage swales were dominated by native aquatic plants as described in Section 4.



Photo 6. Photo of Swamp Paperbark recruitment along the northern side of the habitat buffers along Centre Road – cohort of young trees under the taller, older cohort.

Notwithstanding the above, the site assessment has identified three areas in the buffers that would benefit from revegetation efforts, particularly where Swamp Paperbark has not naturally established (as mapped on Figure 1). The lack of native recruitment may be due to the dense presence of weeds. Weed control and native plantings such as Swamp Paperbark and Tall Sedge would enhance the native vegetation cover and continuous habitat of Swamp Paperbark in the buffers. The suggested planting areas are named in order of priority, i.e. 'suggested planting area 1' being the most important (Photo 7 below).



Photo 7. Photo of 'suggested planting area 1' which has some native vegetation cover (some Swamp Paperbark, Tall Sedge and Cumbungi) and would benefit from active planting.

It is also recommended that the banks of the swales outside of the habitat buffers in the project site be revegetated. This is not required under the EPBC approval conditions, but this will help control soil erosion and establish native vegetation cover on these banks. Some native vegetation cover is already present, such as Cumbungi, Common Reed, native Rush and Tall Sedge.

Weed management

As described in the results, the current level of weeds in the study area indicates that the Condition 4 target of less than 30% weed cover for the habitat buffers has been met.

Weed treatments in and around the habitat buffers have been undertaken by Australian EcoSystems, including treatment of Blackberry, weed grasses and broad-leaved weeds. Spot-spraying with Glyphosate was used in treatments when appropriate but given the sensitivity of the site with swales containing habitat for Dwarf Galaxias, brush-cutting was also used where possible.

Weed control efforts should continue to remove Blackberry and broad-leaved weeds, as well as treatment of weed grasses along the edges of the swales around the habitat buffers.



Photo 8. Photos of brush-cut areas from the Daily Works Record by Australian Ecosystems (Nov 2023). These photos reflected the conditions observed during the current monitoring survey.

It was noted that the banks of the swales outside of the habitat buffers (in the project site) were often occupied by a mixture of Toowoomba Canary-grass and Cocksfoot with Common Reed and Cumbungi (Photo 9 below). Effective weed control up to the sediment fencing beyond was evident. Although these banks are outside the buffers/Dwarf Galaxias habitat, it is recommended that the Toowoomba Canary-grass and Cocksfoot be treated to encourage natural spread of Common Reed and Cumbungi, although this should be done in stages given the current weed grasses are helping to reduce soil erosion.



Photo 9. Strip of mixed Toowoomba Canary-grass and Cocksfoot with Common Reed and Cumbungi outside the habitat buffers along Centre Road (photo taken from the north of the buffers, facing southwest).

Outside sources of weeds

It is important to note that the weed infestations within the adjacent council land (roadside swale and roadside vegetation immediately along Centre Road) pose a challenge for weed removal in the habitat buffers, given they are located directly adjacent to each other. It is not the Proponent's responsibility to conduct weed management activities on council land.

In addition, the cleared unused land across Centre Road, south of the project site, is occupied by a vast expanse of exotic grassland, mainly Toowoomba Canary-grass. The southern side of Centre Road also has a small informal drainage line that contains some aquatic weeds like Drain Flat-sedge.

Blackberry control

It is also important to note that unlike other woody weeds, Blackberry cannot be easily treated with herbicide via the cut and spray method, due to its scrambling habit and the fact that a single plant has many main stems. Although Blackberry can be sprayed with herbicide, this is not advised for the following reasons:

- Issues with accessing the habitat buffers including deep water and often impenetrable vegetation.
- The habitat buffers are surrounded by a sensitive aquatic environment and the amount of herbicide that would need to be sprayed to effectively kill Blackberry could be harmful to aquatic and semi aquatic life, including Dwarf Galaxias.
- The Blackberry is intertwined with the existing native vegetation in the buffers and spraying it would cause a significant amount of off-target damage to native plants.
- The vegetation that the Blackberry is growing in is too dense and much of the Blackberry would not be able to be accessed.
- Blackberry provides protective habitat for local wildlife, such as small birds and mammals, which is particularly important in heavily developed areas such as Narre Warren.

The above issues with Blackberry removal have posed and continue to pose a challenge to meeting the EPBC approval target for weed cover, while at the same time most of the recorded weed covers in the habitat buffers were due to Blackberry.

Rubbish removal

The rubbish observed in the swale near quadrat 11 is to be removed as soon as possible. Rubbish in or near the habitat buffers should continue to be monitored for and removed by the Proponent within the project site.

Recommendations for signage in the project site to help deter littering:

- Temporary signage could be erected at intervals between the edge of the swales and the construction area east of Billy Buttons Drive, to warn construction workers to refrain from littering and take proper care with materials that might be blown into the swales.

- Signage could also be erected along the drainage swales to inform the public about the habitat being retained for Dwarf Galaxias and to refrain from littering, e.g. along the footpath running between the buffers and the houses along Billy Buttons Drive.

As briefly mentioned in Section 4 above, clean-up of litter or dumped waste on council/public land is not the responsibility of the Proponent. The swale and roadside vegetation immediately to the north of Centre Road are located on council land and can be easily accessed by members of the public at any time. Littering and illegal waste dumping on public land are required to be addressed by council.

The approval holder has advised that regular efforts have been made to remove any waste that is detected on their property, as well as to report incidences of littering and illegal waste dumping along Centre Road (which is the appropriate action required by council). As such, the approval holder has made reasonable efforts to address rubbish on public land, which is not attributable to the development of the site.

Sediment fencing

Collapsed or damaged sediment fencing will need to be rectified to prevent further sedimentation and run-off into the swales. This must include (but not be limited to) the sediment fencing along the footpath between the buffers and houses at Billy Buttons Drive. Furthermore, the sediment log along the buffer between Centre Road and the Pakenham Railway line will need to be extended up to the northern site boundary.

All sediment fencing surrounding the habitat buffers should be regularly checked and any collapsed/damaged fencing rectified in a timely manner, as part of routine on-ground works. Any sediment fencing that is no longer serving its purpose is to be replaced to avoid the fencing becoming litter.

Erosion sites observed near the swales will need to be addressed (e.g. rock fill, hay bales and/or sandbags).

Algal bloom management

Algal blooms are an indicator of excess nitrogen and phosphorus in the water, and the algal blooms may impact on native aquatic plants (and therefore the quality of Dwarf Galaxias habitat) by consuming oxygen and blocking sunlight.

Preventing run-off into the swales using sediment fencing and bunds will help to reduce algal blooms. Rubbish management will also support reduction of algal blooms.

It is acknowledged that the swales at the Casey Green site are located downstream of much more degraded aquatic environments in the catchment, resulting in upstream rubbish and run-off/sedimentation issues being carried into the swales through water flows. This is not a factor that can be controlled by the Proponent.

Appendix 1: Representative photos of general quadrat locations, taken on 23rd November 2023



Quadrat 1



Quadrat 2



Quadrat 3



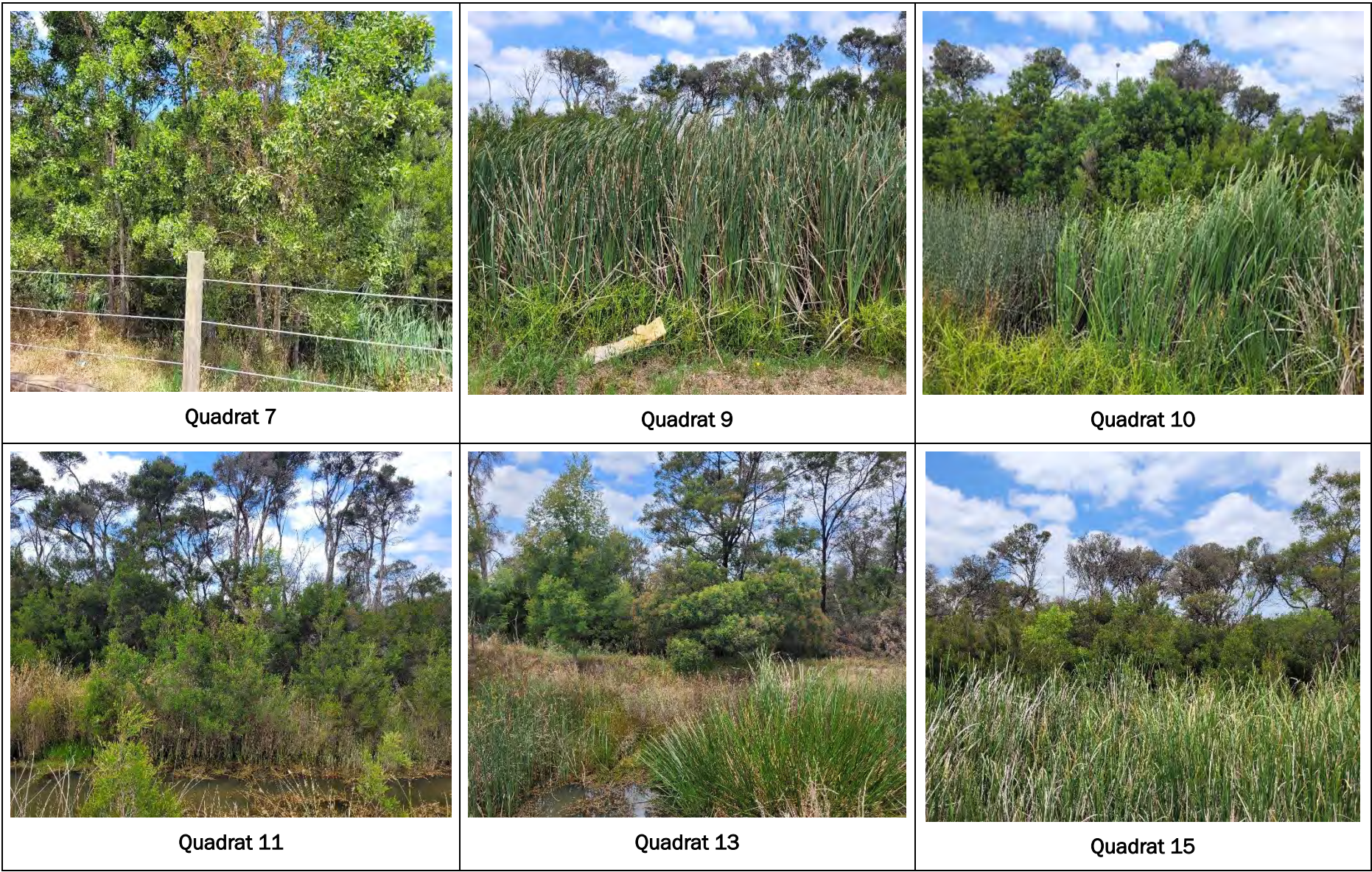
Quadrat 4



Quadrat 5



Quadrat 6





Quadrat 16



Quadrat 17



Quadrat 19



Quadrat 20