



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

Year 5  
Vegetation Monitoring

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

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Nature  
Advisory

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# 1. Introduction

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 2 years of the commencement of construction and that vegetation cover is retained until the expiry of the approval.

The following targets were set to achieve this objective:

- Less than 10% weed cover 6 months from the commencement of construction; and
- Less than 40% weed cover 5 years from the commencement of construction.

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, 10 and 15 years after the commencement of construction.

A baseline study was conducted in October 2016, before construction started in November 2016, during which 15 x 1m<sup>2</sup> quadrats were established within representative areas of the habitat buffers for future monitoring. The quadrats were surveyed again in September 2017 to collect monitoring data at six months post the commencement of construction, though it was actually undertaken 10 months after construction commenced. The twelve months survey (November 2017) was missed and the Year 2 survey (scheduled for November 2019) was delayed by six months (May 2020). The Year 3 survey was conducted in November 2020. This report presents the Year 5 monitoring data which was collected in December 2022.

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 Cody Hajnal (Botanist), Caroline Tan (Senior Botanist) and Inga Kulik (Senior Ecologist and Project Manager).

## 2. Methods

The field assessment was conducted on the 16<sup>th</sup> December 2022. 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.

This assessment 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 and 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 located alongside Centre Road and west of the entry to Billy Button Drive was unable to be accessed due to being surrounded by water, as both the drainage channel along the southern edge of the buffer (separating the buffer from Centre Road) and the deep swale that ran along the northern edge of the buffer were full of water. The habitat buffer that continued east of the entry to Billy Button Drive was also inaccessible due to the barrier of deep water in the drainage channel and swale, as well as impenetrable vegetation (mainly Blackberry) on the channel slopes.

The habitat buffer which ran between Centre Road and the Pakenham Railway line – which supported quadrats 11, 13, 15, 16 & 17 – was unable to be accessed due to the large swale drains containing deep water along both the eastern and western sides (Photo 1). Access at the entry from the Centre Road onto Billy Button Drive and the crossing between quadrat 1 and 4 were attempted, however there was still deep water and/or impenetrable vegetation at those locations, and the habitat buffers could not be accessed safely.

As a result of the access limitations above, assessment of the quadrats (cover estimates and flora species) was undertaken from across the drains and photographs were taken to support the qualitative descriptions of the vegetation condition at each quadrat location.



**Photo 1.** Swale drain with deep water (foreground) preventing access to the habitat buffer between Centre Road and the Pakenham Railway line, which supported quadrats 11, 13, 15, 16 & 17.

## 4. Results

The cover of native vegetation was generally high; 70-80% for nine out of 16 quadrats, 50-60% for five quadrats and less than 50% for two quadrats. This was mostly attributable to Swamp Paperbark (including mature individuals and heavy recruitment) with Black Wattle also present. It was further noted that the aquatic vegetation in the swales and drainage channels were usually dominated by native Narrow-leaf Cumbungi, Common Reed and (to a lesser extent) Slender Knotweed and Spike Rush.

It should be noted that at quadrats 7, 9, 19 and 20, the Swamp Paperbark appeared to have dieback occurring, i.e. moderate to severe crown decline.

The cover of weeds was generally medium to high; 40-50% for six out of 16 quadrats, 25-30% for four quadrats, 5-10% for four quadrats and 0% for two quadrats. This was mostly attributable to the high-threat species Blackberry. Other high threat weed species observed included Flax-leaf Broom, Patterson's Curse, Spear Thistle and Ox-tongue.

Based on email correspondence with the Project Manager at Naturelinks Landscape Management Pty Ltd, weed spraying and removal of weed material was conducted in the week prior to the current monitoring. Effective control of Flax-leaf Broom along the drainage channel west of the habitat buffer between Centre Road and the Pakenham Railway line was evident. However, some recruitment had become established again in this area and a new high-threat weed species Patterson's Curse was also observed on the slope of the channel (near quadrat 15). Spear Thistle was previously reported as common around the study area; while there has been an overall reduction of this species across the study area, individuals of Spear Thistle and Ox-tongue were common along the edge of the vegetation along Centre Road.

Rubbish was observed within or close to the buffer areas, including polystyrene, plastic materials including bottles, cardboard, fast food containers and construction waste. Rubbish came from construction activities within the study area as well as from public littering along Centre Road. Some litter was recorded at the location of quadrat 19. The hard rubbish that was photographed during the previous monitoring had been removed.

Sediment fencing between the habitat buffers and swales/drains was in generally good condition across the study area. A few areas of sediment fencing had collapsed or been damaged, as mapped in Figure 1. The previous monitoring had reported collapsed fencing with erosion channelling occurring in the central part of the study area; the current monitoring found this has been rectified with intact fencing and the erosion was addressed with some rock fill, hay bales and sandbags.

Algal blooms were observed in the water inside the habitat buffer along Centre Road, as seen and photographed from the entry to Billy Button Drive from Centre Road.

Observations made within the general quadrat locations are provided in Table 1 below and quadrat photos are provided Appendix 1. Other general photos of the study area are provided in Appendix 2.

Table 1: Qualitative vegetation quadrat data – Year 5

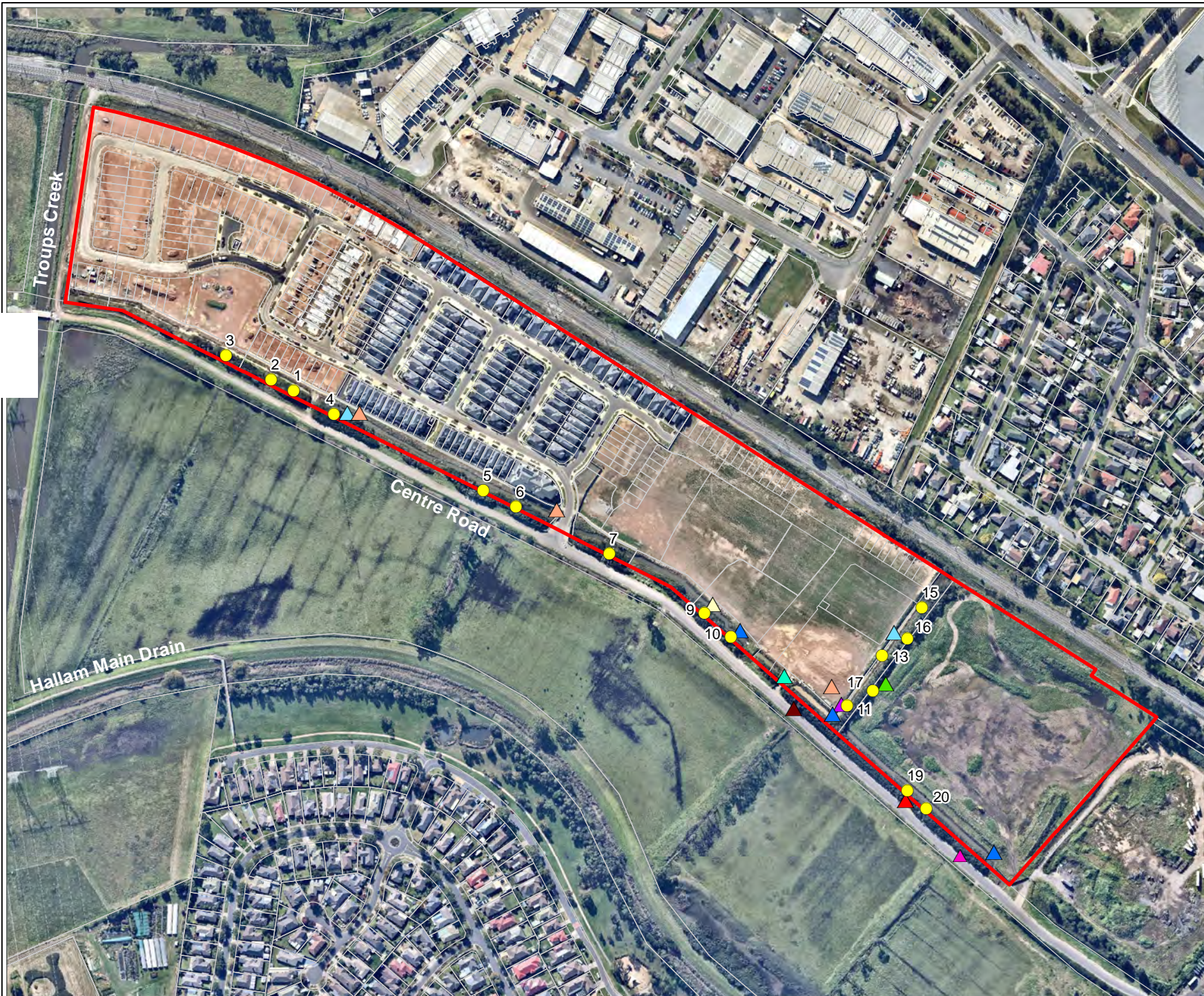
Quadrat No.	Vegetation Type	Description	Weed cover (estimated)	Native vegetation cover (estimated)
1	Swamp Scrub	Swamp Paperbark dominated. Blackberry present	5	80
2	Non-native	Co-dominated by Common Reed and Blackberry	30	70
3	Swamp Scrub	Co-dominated by Swamp Paperbark and Blackberry	40	50
4	Swamp Scrub	Very dense, dominated by Swamp Paperbark, with some Slender Knotweed and Rush on water's edge	0	80
5	Non-native	Co-dominated by Swamp Paperbark, Narrow-leaf Cumbungi and Slender Knotweed. Blackberry, Toowoomba Canary-grass and Drain Flat-sedge on water's edge	30	70
6	Swamp Scrub	Dominated by Swamp Paperbark	10	80
7	Swamp Scrub	Co-dominated by Swamp Paperbark and Blackberry. Swamp paperbark experiencing dieback	50	40
9	Swamp Scrub	Dominated by Swamp Paperbark. Blackberry present. Swamp paperbark experiencing dieback	50	50
10	Swamp Scrub	Blackberry dominated. Swamp Paperbark present	40	60
11	Swampy Riparian Woodland	Very dense, dominated by Swamp Paperbark, high cover of Blackberry, with Black Wattle nearby	40	60

Quadrat No.	Vegetation Type	Description	Weed cover (estimated)	Native vegetation cover (estimated)
13	Non-native	Co-dominated by Swamp Paperbark and Black Wattle, high cover of Blackberry	40	15
15	Swampy Riparian Woodland	Very dense, dominated by Swamp Paperbark, with Black Wattle and Narrow-leaf Cumbungi present	10	80
16	Swamp Scrub	Co-dominated by Swamp Paperbark and Black Wattle, moderate cover of Blackberry	30	70
17	Non-native	Dominated by Swamp Paperbark. Blackberry present	0	50
19	Swamp Scrub	Swamp Paperbark, Common Reed and Blackberry present. Swamp paperbark experiencing dieback	25	75
20	Swamp Scrub	Dominated by Swamp Paperbark, with a low cover of Common Reed. Swamp paperbark experiencing dieback	10	70

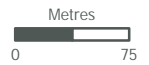
Figure 1: Site and monitoring locations

Project: 96-166 Centre Road, Narre Warren  
Client: Narre Warren Central Pty Ltd  
Date: 21/12/2022

-  Property boundary
-  Quadrat locations
- Monitoring December 2022**
-  Assorted rubbish
-  Carboard
-  Damaged fencing
-  Erosion damage
-  Fallen fence
-  Large cement blocks
-  Plastic waste
-  Sediment fencing
-  Styrofoam



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## 5. Discussion and recommendations

The following EPBC Benchmarks were to be met:

- Ensure that buffer areas are revegetated within 2 years of commencement of construction; and
- Less than 40% weed cover 5 years from the commencement of construction.

### *Active revegetation*

Active revegetation through planting was not undertaken due to the dense vegetation cover and difficulties in managing Blackberry. Further, revegetation has been 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. The current monitoring supports this approach as the native vegetation cover is generally high (up to 80%) and mostly attributable to Swamp Paperbark. Further, the vegetation in the swales and drainage channels was usually dominated by native aquatic plants.

### *Weed management*

As described in the results, the current level of weeds in the study area indicates that the EPBC Act approval benchmark has not been met as six of the 16 quadrats had weed covers of 40% or more (due to Blackberry) – these are quadrats 3, 7, 9, 10, 11 and 13.

The original target of less than 5% weed cover within 2 years from construction commencement has recently been revised to less than 40% weed cover within 5 years from construction commencement, following agreement with the Australian Department of Agriculture, Water and Environment (DAWE). This is mainly due to the high prevalence of Blackberry throughout the study area. 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 native vegetation 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 currently pose an obstacle to meeting the EPBC Benchmark target for weed cover, as the recorded weed covers of 40% or more at six quadrats are due to Blackberry. Unless the current levels of Blackberry can be accepted (and maintained), reduction of Blackberry will be required. It is therefore recommended that potential options to reduce Blackberry be investigated despite the challenges, or further discussion may be required with DAWE regarding further review of Condition 4. It is also relevant to note that the potential issue of Swamp Paperbark dieback may further increase the difficulty in reducing Blackberry in the habitat buffers (see recommendation for dieback monitoring below).

Notwithstanding the above, Nature Advisory recommend that weed control efforts should also continue to remove the other woody weeds in the study area, namely Montpelier Broom, Flax-leaf Broom, Hawthorn and Desert Ash, that can be easily treated via the cut and paint method, providing they can be accessed. Treatment of herbaceous and grassy weeds along the edges of the swales/drainage channels around the habitat buffers should be continued. Weed treatment should include the recruiting Flax-leaf Broom and Patterson's Curse located on the slope of the drainage channel west of quadrat 15. The high-threat herbaceous weeds Spear Thistle and Ox-tongue should also be treated via spot-spraying.

For all weed species, weed management within the habitat buffers would be difficult to achieve given the access issues and weed management would be required to be undertaken by boat.

#### *Monitoring of Swamp Paperbark dieback*

As previously described, the Swamp Paperbark at quadrats 7, 9, 19 and 20 appeared to have dieback occurring. Concurrently, quadrats 7 and 9 also had the highest weed covers of the 16 quadrats (50%) due to Blackberry. There may have been less Blackberry at quadrats 19 and 20 due to very dense Swamp Paperbark and/or very wet conditions indicated by the presence of Common Reed.

The cause(s) of the dieback are not evident and it is possible that the lost foliage cover from Swamp Paperbark may return. However, it is strongly recommended that dieback in the habitat buffers be monitored regularly over the next year and at the next monitoring event, given the consequences of declining cover from Swamp Paperbark would be less native vegetation cover and likely increase of Blackberry. If this should occur, early detection would help support more effective intervention.

Regular visual monitoring should suffice and could be conducted as part of the ongoing weed control works or as a separate program.

#### *Rubbish removal*

Rubbish should be removed from the study area as soon as possible. This is to be undertaken by the proponent within private land and by Council along Centre Road. It is strongly recommended that signage should be employed along the drainage channels, particularly along Centre Road where there is a public walking path, to deter rubbish dumping and littering. Rubbish management should be undertaken at regular intervals.

### *Sediment fencing*

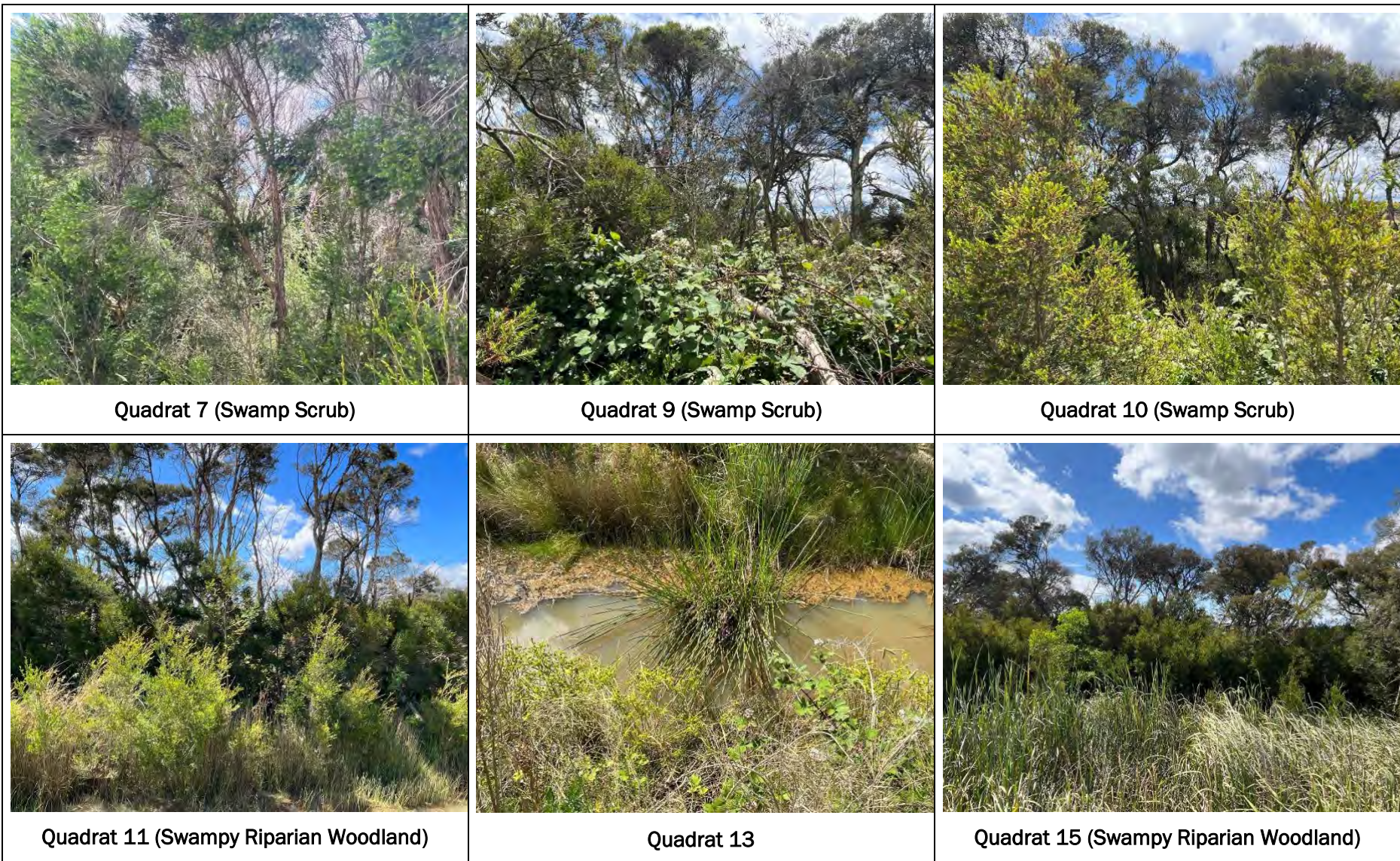
Collapsed or damaged sediment fencing (as mapped on Figure 1) should be rectified to prevent further sedimentation and run-off into the swales/drains. It is strongly recommended that all sediment fencing surrounding the habitat buffers are regularly checked and any collapsed/damaged fencing rectified in a timely manner, as part of routine on-ground works. Any sediment fencing that is no longer serving its purpose is to be removed to avoid the fencing becoming litter.

### *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 soil erosion and run-off into the habitat buffers, as well as maintaining vegetation cover, will help to reduce algal blooms. In particular, sediment fencing around the habitat buffers will be required to be effective in controlling soil erosion and run-off (discussed above). Rubbish management will also support reduction of algal blooms.

**Appendix 1: Representative photos of general quadrat locations**







**Quadrat 16 (Swamp Scrub)**



**Quadrat 17**



**Quadrat 19 (Swamp Scrub)**



**Quadrat 20 (Swamp Scrub)**

**Appendix 2: General photos taken within the study area**



The drainage channel along Centre Road was full of water and contained algal bloom.



Sediment fencing in good condition, with efforts to control erosion through the use of rock fill, hay bales and sandbags along the northern edge of the swale in the central part of the study area.



Sediment fencing along the path south of Billy Buttons Drive was generally intact but portions of it had begun to break down. The broken-down fencing must be rectified as soon as possible.



Example of sediment fencing in good condition along the northern edge of the swale in the eastern part of the study area.