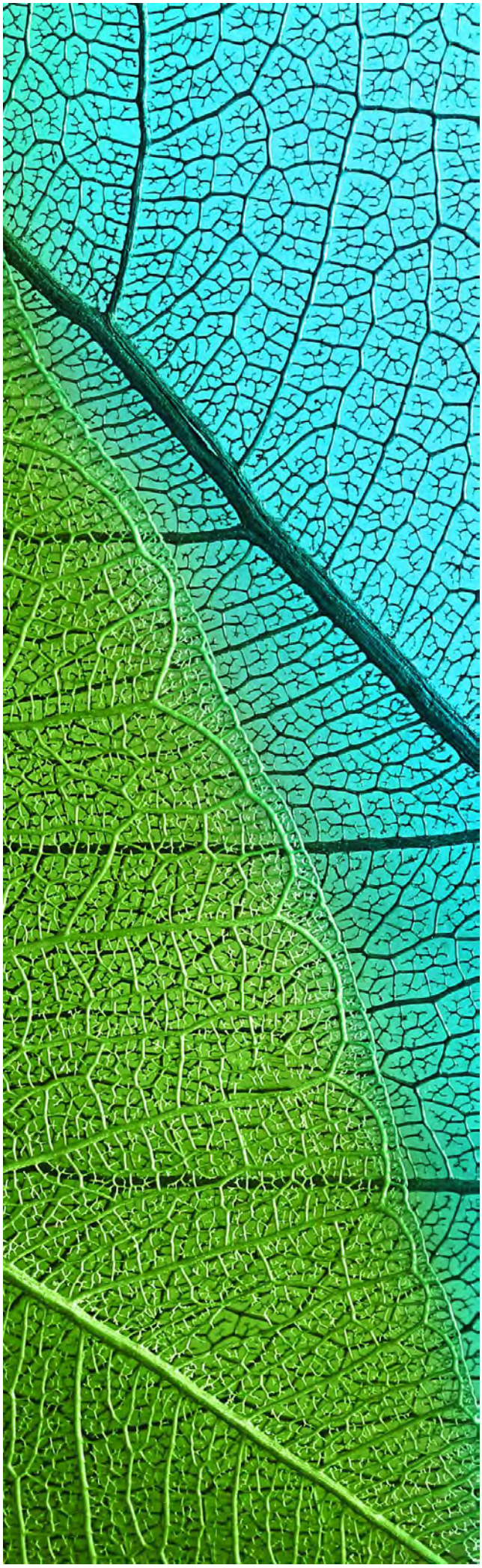

96-166 Centre Road, Narre Warren

Annual EPBC Compliance Report 2023 – EPBC 2014/7380

Prepared for
Narre Warren Central Pty Ltd

March 2023
Report No. 14090 (20.0)

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1. Introduction

This Compliance Report addresses the conditions of approval EPBC 2014/7380 under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) held by the approval holder Narre Warren Central Pty Ltd, ACN 600 509 064. This is for the approved action to undertake a residential estate development at 96-166 Centre Road, Narre Warren, Victoria.

The approval was dated 5th February 2016 and is effective until the 1st January 2031. Construction activities commenced on the 8th November 2016. This Compliance Report encompasses the year 2023 (Year 7 after construction).

This report provides evidence of compliance with the thirteen (13) conditions of the approval, outlined in Section 3 and Table 1.

This report draws together information from the following sources:

- Onsite monitoring and reporting undertaken by Nature Advisory;
- Monitoring and reporting undertaken by Aquatica Environmental; and
- Correspondence from the approval holder.

This report was prepared by a team from Nature Advisory comprising Caroline Tan (Senior Botanist & Project Manager) and Inga Kulik (Director).

The approval holder, Narre Warren Central Pty Ltd, accepts responsibility for this report.

Declaration of accuracy

In making this declaration, I am aware that sections 490 and 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) make it an offence in certain circumstances to knowingly provide false or misleading information or documents. The offence is punishable on conviction by imprisonment or a fine, or both. I declare that all the information and documentation supporting this compliance report is true and correct in every particular. I am authorised to bind the approval holder in this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signed		
Full name	Caroline Tan	
Position	Senior Botanist and Project Manager	
Organisation	Nature Advisory Pty Ltd	ABN 12 095 541 334
Date	19/03/2024	

2. Compliance with approval conditions

The approval conditions (Appendix 1) relate to the controlling condition *Listed threatened species and communities.* Specifically, they relate to the EPBC Act listed vulnerable Dwarf Galaxias (*Galaxiella pusilla*). Dwarf Galaxias are located in suitable habitat in the drainage channels along Centre Road and internally (Figure 1).

All conditions of the EPBC approval have been considered and addressed.

In 2020, the approval holder applied for variations to the EPBC conditions. The revised conditions of the EPBC approval (changes marked in red), and whether compliance or non-compliance with each condition has been achieved, are listed below. The definitions from the approval that apply to the terms shown in bold throughout this document are listed in Appendix 1 of this report.

2.1. Conditions 1 to 4 – Mitigation

1. To avoid mortality of **Dwarf Galaxias**, prior to **construction activities** occurring within 30 metres of **Dwarf Galaxias habitat**, the **Approval Holder** must salvage and translocate **Dwarf Galaxias** in accordance with a **Salvage and Translocation Plan** approved by the **Victorian Government**.

2. To mitigate impacts on **Dwarf Galaxias** movement and dispersal in the local area, the **Approval Holder** must ensure flow connectivity is maintained between the **Dwarf Galaxias habitat retained**, Troups Creek East Branch, and Hallam Main Drain as indicated in Annex 2.

3. To mitigate impacts on **Dwarf Galaxias** due to stormwater runoff in **Dwarf Galaxias habitat retained**, there must be no **impact on water quality** between upstream and downstream water sampling points, noting that background fluctuation may impact the overall water quality, and no **impact on the water level**, during **construction activities** and 1 year after the completion of **construction activities**.
   The Approval Holder must undertake the following monitoring to determine if these outcomes are being achieved:
   a) prior to the **commencement of construction** to gain baseline data;
   b) once per fortnight throughout **construction activities**;
   c) once every 3 months for the year following completion of **construction activities**; and
   d) after significant rainfall events of greater than 10mm, during both construction and the year following the completion of **construction activities**.

4. To mitigate impacts on **Dwarf Galaxias**, the **Approval Holder** must ensure that buffer areas identified in Annex 3 are revegetated within 5 years of **commencement of construction** and that vegetation cover is retained until the expiry of the approval. This outcome must meet the following milestones:
   a) less than 40% weed cover 5 years from the **commencement of construction**; and
   b) less than 30% weed cover and at least 70% native vegetation cover 7 years from the **commencement of construction**.
   The **Approval Holder** must undertake the following monitoring to determine if these outcomes are being achieved:
   a) prior to the **commencement of construction** to gain baseline data;

b) 6 months after the **commencement of construction**;
c) 12 months after the **commencement of construction**;
d) 2, 3, 5, 7 and 10 years after the **commencement of construction**.

Condition 1 compliance

Compliant

The approved Dwarf Galaxias Salvage and Translocation Plan was implemented on the 5th/6th October 2016 (prior to commencement of construction), with Dwarf Galaxias being salvaged from planned removed habitat and translocated to retained habitat.

Condition 2 compliance

Compliant

The Dwarf Galaxias retained habitat connection to the Centre Road drain has been maintained, as was the case prior to commencement of the project. The Centre Road drain also maintains all of its pre-construction connectivity with upstream inputs and downstream receiving waterways.

Note that the actual connectivity pathway is that the Dwarf Galaxias retained habitat connects to the Centre Road roadside drain, which then passes under Troupes Creek East Branch to the western side of Troupes Creek East Branch (via a syphon culvert), then passes via another culvert to the southern side of Centre Road and into the Hallam Main Drain floodplain.

There has been no loss or change to pre-existing connectivity due to the project.

Condition 3 compliance

Compliant

Water quality monitoring occurred during 2021 to 2023 on a fortnightly basis and after >10mm rainfall events. The overall data of the water quality shows that the project has not resulted in an ecologically significant impact to water quality between upstream and downstream sites. (Note that water temperature, pH, electrical conductivity, dissolved oxygen levels and turbidity in the retained Dwarf Galaxias habitat and Centre Road roadside drain are highly variable due to natural seasonal variations and upstream impacts/inputs.)

Further, annual Dwarf Galaxias monitoring by Aquatica Environmental since the translocation event showed that the retained habitat population is thriving. The 2023 annual Dwarf Galaxias monitoring event detected 18 individual Dwarf Galaxias in the retained habitat drain (compared to 11 in 2022, 17 in 2021, 25 in 2020, 12 in 2019 and 3 in 2018). These results indicate that conditions for the species are being maintained and likely continuing to improve, due to the establishment of further suitable habitat in the constructed swales leading to overall increase in the quality and area of available habitat for Dwarf Galaxias.

Based on the 2021 to 2023 annual survey results, the development of the Casey Green site has been undertaken in accordance the Dwarf Galaxias Salvage and Translocation Plan and associated approvals. No ecologically significant impacts have been observed to the retained habitat, with the constructed swales having improved overall conditions for Dwarf Galaxias on site and in the region.

The water quality and Dwarf Galaxias monitoring report by Aquatica Environmental for 2023 is provided in Appendix 2.

Condition 4 compliance

Compliant

This condition was varied to achieve less than 30% weed cover and at least 70% native vegetation cover 7 years from construction. The Year 7 monitoring of native vegetation and weed cover was undertaken in November 2023.

This monitoring determined that the habitat buffers for Dwarf Galaxias met the target for less than 30% weed cover and at least 70% native vegetation cover overall. This increased native vegetation cover from previous years has contributed to the improved conditions for Dwarf Galaxias (overall increase in the quality and area of available habitat, as noted during the Dwarf Galaxias monitoring for Condition 3 compliance). In addition, the aquatic vegetation in the swales and drainage channels along the buffers were dominated by native plants, i.e. Narrow-leaf Cumbungi and Common Reed.

Sixteen sample quadrats were surveyed in 2023. 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 was originally prevalent inside the buffers prior to the Casey Green development.

Nine of the quadrats meet the target of 70% native vegetation cover, six quadrats being very close at 60-65% native vegetation cover and one quadrant with 45% native vegetation cover. (Note that the habitat buffers as a whole were able to meet the target despite the quadrats with lower cover, as most of the buffer areas have very high native vegetation cover. Furthermore, the current result is a clear improvement from the previous year.) This quadrant method helps to provide supporting data to indicate specific areas where management works should be prioritised in the future. In addition, suggested native planting areas were also recommended and at the time of writing this Compliance Report, site preparation for native plantings was being undertaken.

Australian Ecosystems was appointed in 2023 to undertake weed management and native plantings in the habitat buffers. The work also included rubbish pick up where littering or illegal waste dumping by the public had occurred on the approval holder's land.

The vegetation monitoring report by Nature Advisory for Year 7 is provided in Appendix 3.

2.2. Conditions 5 to 8 – Offsets

5. To compensate for the loss of **Dwarf Galaxias habitat** at the **project area**, prior to the **commencement of construction**, the **Approval Holder** must enter into an **Agreement** to ensure the long term security of the **offset site**. The **Approval Holder** must:
   a) provide the **Department** with a signed copy of the **Agreement**, within 2 weeks of confirmation of the **Agreement**; and
   b) provide the **Department** with the **offset attributes**, **shapefile** and map(s) clearly defining the location and boundaries of the **offset site**, within 2 weeks of confirmation of the **Agreement**.

6. Prior to **commencement of construction**, the **Approval Holder** must secure the **offset site** with an appropriate **legal conservation mechanism**. Any proposal for an alternative offset must be agreed to in writing with the **Department**.

7. After a period of 10 years from the **commencement of construction**, the **offset site** must contain at least 2 hectares of **Dwarf Galaxias habitat** which contains a self sustaining

population of **Dwarf Galaxias** and is connected to known **Dwarf Galaxias habitat** in the local area. This outcome must meet the following milestones:

a) **Dwarf Galaxias habitat** in the **offset site** must be constructed within 5 years of **commencement of construction**;

b) **Dwarf Galaxias** must be identified as present in the **Dwarf Galaxias habitat** in the **offset site** within 6 years of **commencement of construction**; and

c) **Dwarf Galaxias** presence and abundance must be consistent with that of **control sites** from after 7 years of **commencement of construction** and for the life of the approval.

8. The **Approval Holder** must undertake a monitoring program, which includes the newly constructed **Dwarf Galaxias habitat** in the **offset site** and **control sites**. The monitoring program must ensure the data gathered is adequate to: inform adaptive management; and demonstrate whether the milestones and outcomes described in condition 7 have been met. Monitoring must be undertaken by a **suitably qualified person**.

Condition 5 compliance

Completed, not applicable to 2023 compliance

The agreement securing Dwarf Galaxias Offset Site was entered into and was provided to the Department. Shapefiles of the offset site and an offset site assessment report (Nature Advisory Report 14090 (10.2)) including a description of the attributes and maps were provided to the Department. Not relevant for 2023 compliance.

Condition 6 compliance

Completed, not applicable to 2023 compliance

A S173 Agreement securing Dwarf Galaxias Offset Site was entered into before commencement of construction. This Agreement was provided to the Department in June and September 2016. – Not relevant for 2023 compliance.

Condition 7 compliance

Unable to comply with yearly timeframes due to unforeseen events, however construction of dwarf Galaxias habitat now complete

The milestones in Condition 7 could not be met at the 5-year, 6-year and 7-year timelines due to the unforeseen events below, which occurred outside of the approval holder's control. Note that Year 5 would have started in November 2021.

The Casey Shire Council had issued a planning permit (PlnA00545/16) on 22nd December 2016 for vegetation removal for the Dwarf Galaxias offset site. However, in March 2017, Council suggested that the offset site had the possibility of supporting the EPBC Act listed community *Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains.*

Despite the advice given by Nature Advisory and confirmation by the federal Department of Environment that the offset site does not support the listed community, Melbourne Water asked to review the conceptual design to maximise the retention of vegetation that exist within *Seasonal Herbaceous Wetlands*. An application for conditions for Dwarf Galaxias works was submitted to Melbourne Water in May 2017. The extent of vegetation to be retained was finalised by Melbourne Water in September 2017 and a completed functional design was submitted to Melbourne Water in November 2017. This was accepted by Melbourne Water in May 2018.

The Council issued planning permit expired on 22nd December 2017 and it was advised in May 2019 that a new permit for the Dwarf Galaxias offset site be applied for. A new permit application for vegetation removal was lodged with Council in July 2019 and a new permit (PlnA00539/19) was issued on 19th February 2020. The required vegetation offsets were paid in May 2020.

Works commenced in summer 2020 when the area had sufficiently dried out. Preparatory works (slashing and vegetation removal) on the Dwarf Galaxias offset site officially commenced on 10/2/2020. It was expected that the Dwarf Galaxias offset site construction be finalised by the end of 2021, within 5 years of commencement of construction. The approval holder advised that the infrastructure works were about 80% completed in 2022, however due to Covid and the adverse weather (record rainfalls in 2022), it was not possible to complete the balance of the works to 100% in 2022. The site became dry enough for works to recommence in January 2023.

The infrastructure works were completed as early as possible, however the landscaping contractor advised that the most appropriate planting season is from April to September for the terrestrial plantings and from December 2023 to February 2024 for the aquatic plants plantings. As such, the plantings were undertaken during the appropriate times of the year.

Due to the above, the construction works for the offset site (including wetland construction and revegetation works) were completed on 7th December 2023, whereupon Melbourne Water inspected the offset site and the establishment period officially began on this date.

The offset site is approximately 3.35 hectares in area and contains at least 2 hectares of Dwarf Galaxias habitat as required under Condition 7. The offset site is now also connected to Dwarf Galaxias habitat in the local area as required under Condition 7, i.e. connectivity to the Melbourne Water managed site for Eastern Dwarf Galaxias located west of the offset site on the opposite side of Hallam Road (the offset site was not connected to this western habitat previously).

Condition 8 compliance

Compliant

The monitoring program for the offset site is contained in the Offset Management Plan (OMP) prepared by Nature Advisory in November 2015.

Under the OMP, the weed and revegetation monitoring are to occur at:

- 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.

Accordingly, the first weed and revegetation monitoring event was conducted by Nature Advisory on 18th December 2023, at the completion of all construction works. This monitoring event provided the baseline information for the offset site. The weed and revegetation monitoring report for December 2023 is provided in Appendix 4. The next weed and revegetation monitoring event is to occur in June 2024 and is not relevant to 2023 compliance.

Under the OMP, Dwarf Galaxias and water quality monitoring (including the offset site and control sites) are to occur at:

- A quarterly basis for the first year;

- Biannually for years 2-3; and
- Annually to year 10.

Accordingly, the first Dwarf Galaxias and water quality monitoring event have been conducted by Aquatic Environmental in March 2024, at the first quarter post-completion of the construction works. This monitoring and further monitoring is not relevant to 2023 compliance.

2.3. Conditions 9 to 13 – Administrative conditions

9. Within 7 calendar days after the **commencement of construction**, the **Approval Holder** must advise the **Department** in writing of the actual date of **commencement of construction**.

10. The **Approval Holder** must maintain accurate records substantiating all activities associated with or relevant to the conditions of approval, including measures taken to implement plans/programs and measures taken to achieve outcomes and milestones required by this approval and make them available upon request to the **Department**. Such records may be subject to audit by the **Department** or an independent auditor in accordance with section 458 of the **EPBC Act**, or used to verify compliance with the conditions of approval. Summaries of audits will be posted on the **Department's** website. The results of audits may also be publicised through the general media.

11. Within 3 months of every 12 month anniversary of the **commencement of construction**, the **Approval Holder** must publish an annual report of compliance on their website addressing compliance with each of the conditions of this approval, including the implementation of any plans/programs specified in the conditions and whether outcomes and milestones required by these conditions have been or are on track to being met. The compliance report must consider the **Department's** *Annual Compliance Report Guidelines*. Documentary evidence providing proof of the date of publication and non-compliance with any of the conditions of this approval must be provided to the **Department** at the same time as the annual report of compliance is published.

12. Upon the direction of the **Minister**, the **Approval Holder** must ensure that an independent audit of compliance with the conditions of approval is conducted and a report submitted to the **Minister**. The independent auditor must be approved by the **Minister** prior to the commencement of the audit. Audit criteria must be agreed to by the **Minister** and the audit report must address the criteria to the satisfaction of the **Minister**.

13. If, at any time after 5 years from the date of this approval, the **Approval Holder** has not **substantially commenced the action**, then the **Approval Holder** must not **substantially commence the action** without the written agreement of the **Minister**.

Condition 9 compliance

Completed, not applicable to 2023 compliance

Construction has been commenced. No longer relevant to compliance in 2023.

Condition 10 compliance

Compliant

Records regarding water quality, fish and vegetation monitoring are being kept and can be made available upon request to the department.

All monitoring reports providing details of the measurements and monitoring events are available on this website: https://natureadvisory.com.au/notifications

Condition 11 compliance

Compliant

This is the annual compliance report for 2023 that will be provided to the Department and published on this website: https://natureadvisory.com.au/notifications

Condition 12 compliance

Not applicable

There has been no direction from the Minister to undertake an independent audit of compliance.

Condition 13 compliance

Completed, not applicable to 2023 compliance

The action has been commenced. No longer relevant to compliance in 2023.

Legend

- Property boundary
- Drain
- Buffer with retained native vegetation
- Buffer to be revegetated

0 50 100 200 Metres

Figure 1: Dwarf Galaxias habitat buffer areas

Project: 96-166 Centre Rd, Narre Warren

Client: Narre Warren Central Pty Ltd

Project No.:14090	Date: 14/01/2016	Created By: M. Ghasemi / D. Coppolino

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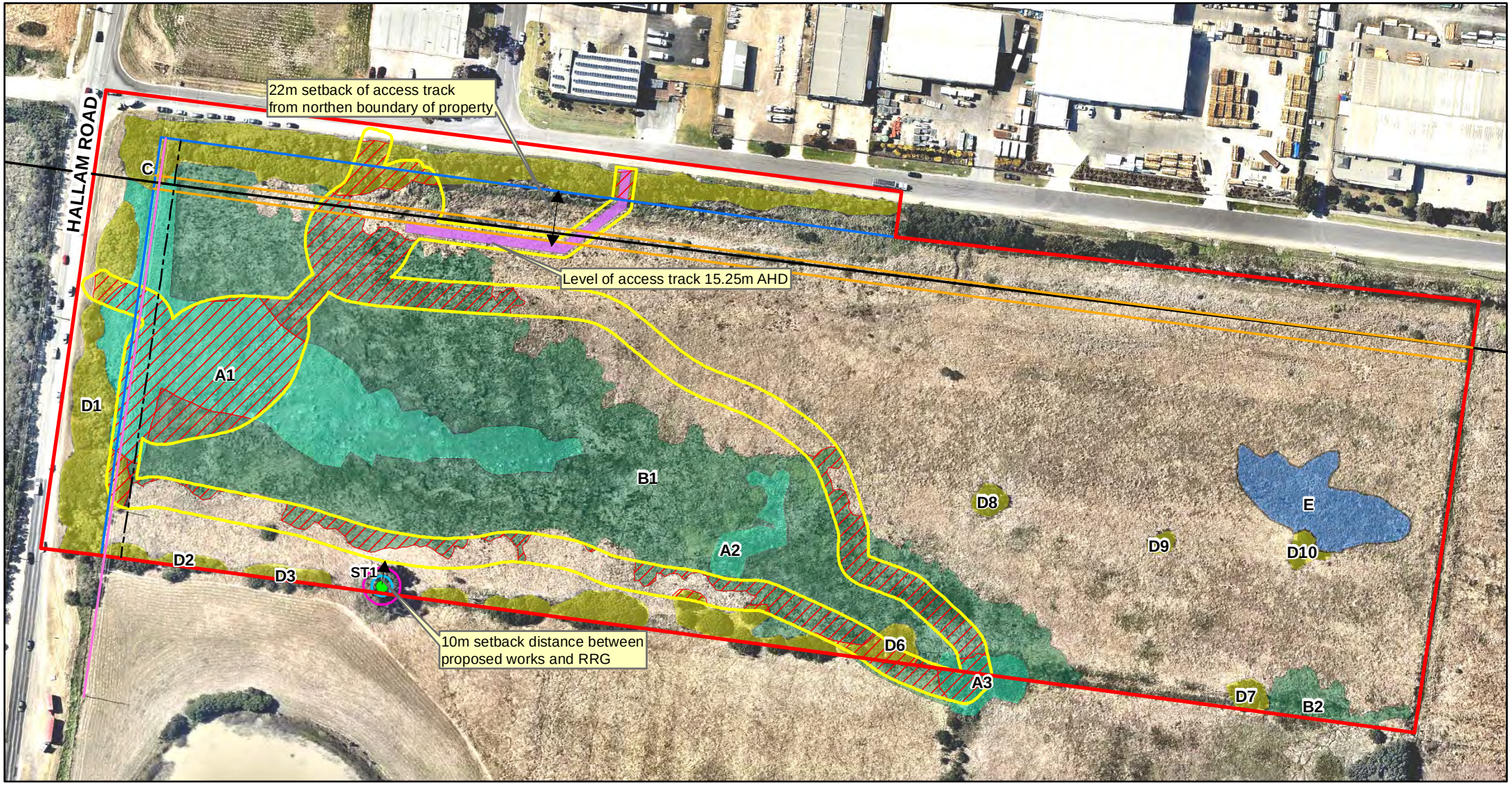

Legend

- Study area
- Title boundary
- Development layout
- Electricity easement
- Overhead powerline
- Sewer pipe (1.5m pipe; approx. 7.4m below ground)
- Existing 5.5m wide sewerage easement
- Access track (4m wide)
- Structural Root Zone (SRZ) - 4.08m
- Tree Protection Zone (TPZ) - 7.44m
- Native vegetation removal

Native vegetation

- Plains Grassy Wetland - EVC 125
- Swampy Riparian Woodland - EVC 83
- Swamp Scrub - EVC 53
- Tall Marsh - EVC 821
- Scattered tree

Metres
0 25 50

N

Figure 2: Offset site study area and native vegetation

Project: 1-39 Centre Road and 120-130 Hallam South Road HAMPTON PARK VIC 3976

Client: Narre Warren Central Pty Ltd

Project No.:14090	Date: 14/08/2019	Created By: N. May / I. Kulik

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3. EBPC approval conditions compliance table

Table 1: EPBC approval conditions compliance table – summary of compliance

Condition Number	EPBC Approval condition	Is the project compliant with this condition?
1	To avoid mortality of Dwarf Galaxias, prior to construction activities occurring within 30 metres of Dwarf Galaxias habitat, the Approval Holder must salvage and translocate Dwarf Galaxias in accordance with a Salvage and Translocation Plan approved by the Victorian Government.	Compliant
2	To mitigate impacts on Dwarf Galaxias movement and dispersal in the local area, the Approval Holder must ensure flow connectivity is maintained between the Dwarf Galaxias habitat retained, Troups Creek East Branch, and Hallam Main Drain as indicated in Annex 2.	Compliant
3	To mitigate impacts on Dwarf Galaxias due to stormwater runoff in Dwarf Galaxias habitat retained, there must be no impact on water quality between upstream and downstream water sampling points and no impact on the water level, during construction activities and 1 year after the completion of construction activities. The Approval Holder must undertake the following monitoring to determine if these outcomes are being achieved: a) prior to the commencement of construction to gain baseline data; b) once per fortnight throughout construction activities; c) once every 3 months for the year following completion of construction activities; and d) after significant rainfall events of greater than 10mm, during both construction and the year following the completion of construction activities.	Compliant
4	To mitigate impacts on Dwarf Galaxias, the Approval Holder must ensure that buffer areas identified in Annex 3 are revegetated within 5 years of commencement of construction and that vegetation cover is retained until the expiry of the approval. This outcome must meet the following milestones: a) less than 40% weed cover 5 years from the commencement of construction; and	Compliant

Condition Number	EPBC Approval condition	Is the project compliant with this condition?
	b) less than 30% weed cover and at least 70% native vegetation cover 7 years from the commencement of construction. The Approval Holder must undertake the following monitoring to determine if these outcomes are being achieved: a) prior to the commencement of construction to gain baseline data; b) 6 months after the commencement of construction; c) 12 months after the commencement of construction; d) 2, 3, 5, 7, 10 and 15 years after the commencement of construction.	
5	To compensate for the loss of Dwarf Galaxias habitat at the project area, prior to the commencement of construction, the Approval Holder must enter into an Agreement to ensure the long term security of the offset site. The Approval Holder must: a) provide the Department with a signed copy of the Agreement, within 2 weeks of confirmation of the Agreement; and b) provide the Department with the offset attributes, shapefile and map(s) clearly defining the location and boundaries of the offset site, within 2 weeks of confirmation of the Agreement.	Completed, not applicable to 2023 compliance
6	Prior to commencement of construction, the Approval Holder must secure the offset site with an appropriate legal conservation mechanism. Any proposal for an alternative offset must be agreed to in writing with the Department.	Completed, not applicable to 2023 compliance
7	After a period of 10 years from the commencement of construction, the offset site must contain at least 2 hectares of Dwarf Galaxias habitat which contains a self sustaining population of Dwarf Galaxias and is connected to known Dwarf Galaxias habitat in the local area. This outcome must meet the following milestones: a) Dwarf Galaxias habitat in the offset site must be constructed within 5 years of commencement of construction; b) Dwarf Galaxias must be identified as present in the Dwarf Galaxias habitat in the offset site within 6 years of commencement of construction; and c) Dwarf Galaxias presence and abundance must be consistent with that of control sites from after 7 years of commencement of construction and for the life of the approval.	Was unable to comply with yearly timeframes due to unforeseen events (as discussed in detail in Section 2.2 above). The offset site has been constructed and provides (1) at least 2 hectares of Dwarf Galaxias habitat and (2) connectivity to other habitat in the local area, compliant with this condition.

Condition Number	EPBC Approval condition	Is the project compliant with this condition?
8	The Approval Holder must undertake a monitoring program, which includes the newly constructed Dwarf Galaxias habitat in the offset site and control sites. The monitoring program must ensure the data gathered is adequate to: inform adaptive management; and demonstrate whether the milestones and outcomes described in condition 7 have been met. Monitoring must be undertaken by a suitably qualified person.	Compliant
9	Within 7 calendar days after the commencement of construction, the Approval Holder must advise the Department in writing of the actual date of commencement of construction.	Completed, not applicable to 2023 compliance
10	The Approval Holder must maintain accurate records substantiating all activities associated with or relevant to the conditions of approval, including measures taken to implement plans/programs and measures taken to achieve outcomes and milestones required by this approval and make them available upon request to the Department. Such records may be subject to audit by the Department or an independent auditor in accordance with section 458 of the EPBC Act, or used to verify compliance with the conditions of approval. Summaries of audits will be posted on the Department's website. The results of audits may also be publicised through the general media.	Compliant
11	Within 3 months of every 12 month anniversary of the commencement of construction, the Approval Holder must publish an annual report of compliance on their website addressing compliance with each of the conditions of this approval, including the implementation of any plans/programs specified in the conditions and whether outcomes and milestones required by these conditions have been or are on track to being met. The compliance report must consider the Department's *Annual Compliance Report Guidelines*. Documentary evidence providing proof of the date of publication and non-compliance with any of the conditions of this approval must be provided to the Department at the same time as the annual report of compliance is published.	Compliant
12	Upon the direction of the Minister, the Approval Holder must ensure that an independent audit of compliance with the conditions of approval is conducted and a report submitted to the Minister. The independent auditor must be approved by the Minister prior to the commencement of the audit. Audit criteria must be agreed to by the Minister and the audit report must address the criteria to the satisfaction of the Minister.	Not applicable

Condition Number	EPBC Approval condition	Is the project compliant with this condition?
13	If, at any time after 5 years from the date of this approval, the Approval Holder has not substantially commenced the action, then the Approval Holder must not substantially commence the action without the written agreement of the Minister.	Completed, not applicable to 2023 compliance

Appendix 1: Varied EPBC Approval 2014/7380

Australian Government
Department of Agriculture, Water and the Environment

VARIATION OF CONDITIONS ATTACHED TO APPROVAL

Residential development, 96-166 Centre Road, Narre Warren, Victoria (EPBC 2014-7380)

This decision to vary conditions of approval is made under section 143 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

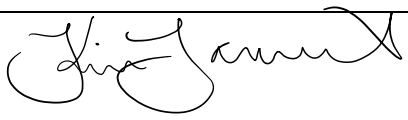
Approved action

Person to whom the approval is granted	Narre Warren Central Pty. Ltd. ACN: 600 509 064
Approved action	To undertake a residential estate development at 96-166 Centre Road, Narre Warren, Victoria (see EPBC Act referral 2014/7380).

Variation

Variation of conditions attached to approval	The variation is: Delete conditions 3, 4 and 7 attached to the approval and substitute with the conditions specified in the table below
Date of effect	This variation has effect on the date the instrument is signed

Person authorised to make decision

Name and position	Kim Farrant Assistant Secretary Assessments (Vic, Tas) and Post Approvals Branch
Signature	
Date of decision	4 / 3 / 2021

Date of decision	Conditions attached to approval
Original dated 5/2/2016	*Mitigation* 1. To avoid mortality of **dwarf galaxias**, prior to **construction activities** occurring within 30 metres of **dwarf galaxias habitat**, the **Approval Holder** must salvage and translocate **dwarf galaxias** in accordance with a **Salvage and Translocation Plan** approved by the **Victorian Government**.
Original dated 5/2/2016	2. To mitigate impacts on **dwarf galaxias** movement and dispersal in the local area, the **Approval Holder** must ensure flow connectivity is maintained between the **dwarf galaxias habitat retained**, Troups Creek East Branch, and Hallam Main Drain as indicated in Annex 2.
As varied on the date of signing this instrument	3. To mitigate impacts on **dwarf galaxias** due to stormwater runoff in **dwarf galaxias habitat retained**, there must be no **impact on water quality** between upstream and downstream water sampling points, noting that background fluctuation may impact the overall water quality, and no **impact on the water level**, during construction activities and 1 year after the completion of **construction activities**. The **Approval Holder** must undertake the following monitoring to determine if these outcomes are being achieved: a. prior to the **commencement of construction** to gain baseline data; b. once per fortnight throughout **construction activities**; c. once every 3 months for the year following completion of **construction activities**; and d. after significant rainfall events of greater than 10mm, during both construction and the year following the completion of **construction activities**.
As varied on the date of signing this instrument	4. To mitigate impacts on **dwarf galaxias**, the **Approval Holder** must ensure that buffer areas identified in Annex 3 are revegetated within 5 years of **commencement of construction** and that vegetation cover is retained until the expiry of the approval. This outcome must meet the following milestones: a. less than 40% weed cover 5 years from the **commencement of construction**; and b. less than 30% weed cover and at least 70% native vegetation cover 7 years from the **commencement of construction**. The **Approval Holder** must undertake the following monitoring to determine if these outcomes are being achieved: a. prior to the **commencement of construction** to gain baseline data; b. 6 months after the **commencement of construction**; c. 12 months after the **commencement of construction**; and d. 2, 3, 5, 7 and 10 years after the **commencement of construction.**
Original dated 5/2/2016	*Offsets* 5. To compensate for the loss of **dwarf galaxias habitat** at the **project area**, prior to the **commencement of construction**, the **Approval Holder** must enter into an **Agreement** to ensure the long term security of the **offset site**. The **Approval Holder** must: a. provide the **Department** with a signed copy of the **Agreement**, within 2 weeks of confirmation of the **Agreement**; and b. provide the **Department** with the **offset attributes**, **shapefile** and map(s) clearly defining the location and boundaries of the **offset site**, within 2 weeks of confirmation of the **Agreement**.
Original dated 5/2/2016	6. Prior to **commencement of construction**, the **Approval Holder** must secure the **offset site** with an appropriate **legal conservation mechanism**. Any proposal for an alternative offset must be agreed to in writing with the **Department**.

Date of decision	Conditions attached to approval
As varied on the date of signing this instrument	7. After a period of 10 years from the **commencement of construction**, the **offset site** must contain at least 2 hectares of **Dwarf Galaxias habitat** which contains a self-sustaining population of **Dwarf Galaxias** and is connected to known **Dwarf Galaxias habitat** in the local area. This outcome must meet the following milestones: a. **Dwarf Galaxias habitat** in the **offset site** must be constructed within 5 years of **commencement of construction**; b. **Dwarf Galaxias** must be identified as present in the **Dwarf Galaxias habitat** in the **offset site** within 6 years of **commencement of construction;** and c. **Dwarf Galaxias** presence and abundance must be consistent with that of **control sites** from after 7 years of **commencement of construction** and for the life of the approval.
Original dated 5/2/2016	8. The **Approval Holder** must undertake a monitoring program, which includes the newly constructed **Dwarf Galaxias habitat** in the **offset site** and **control sites**. The monitoring program must ensure the data gathered is adequate to: inform adaptive management; and demonstrate whether the milestones and outcomes described in condition 7 have been met. Monitoring must be undertaken by a **suitably qualified person**.
Original dated 5/2/2016	*Administrative conditions* 9. Within 7 calendar days after the **commencement of construction**, the **Approval Holder** must advise the **Department** in writing of the actual date of **commencement of construction**.
Original dated 5/2/2016	10. The **Approval Holde**r must maintain accurate records substantiating all activities associated with or relevant to the conditions of approval, including measures taken to implement plans/programs and measures taken to achieve outcomes and milestones required by this approval and make them available upon request to the **Department**. Such records may be subject to audit by the **Department** or an independent auditor in accordance with section 458 of the **EPBC Act**, or used to verify compliance with the conditions of approval. Summaries of audits will be posted on the **Department's** website. The results of audits may also be publicised through the general media.
Original dated 5/2/2016	11. Within 3 months of every 12 month anniversary of the **commencement of construction**, the **Approval Holder** must publish an annual report of compliance on their website addressing compliance with each of the conditions of this approval, including the implementation of any plans/programs specified in the conditions and whether outcomes and milestones required by these conditions have been or are on track to being met. The compliance report must consider the **Department's** *Annual Compliance Report Guidelines*. Documentary evidence providing proof of the date of publication and non - compliance with any of the conditions of this approval must be provided to the **Department** at the same time as the annual report of compliance is published.
Original dated 5/2/2016	12. Upon the direction of the **Minister**, the **Approval Holder** must ensure that an independent audit of compliance with the conditions of approval is conducted and a report submitted to the **Minister**. The independent auditor must be approved by the **Minister** prior to the commencement of the audit. Audit criteria must be agreed to by the **Minister** and the audit report must address the criteria to the satisfaction of the **Minister**.
Original dated 5/2/2016	13. If, at any time after 5 years from the date of this approval, the **Approval Holder** has not **substantially commenced the action**, then the **Approval Holder** must not **substantially commence the action** without the written agreement of the **Minister.**

Date of decision	Definitions attached to approval
Original dated 5/2/2016	**Agreement** - the executed agreement between the Approval Holder and the relevant **landowner** or organisation, to legally secure the land for conservation for the long term.
Original dated 5/2/2016	**Approval Holder** - means the person to whom this approval is granted or the person as transferred under section 145B of the EPBC Act.

Date of decision	Definitions attached to approval
Original dated 5/2/2016	**Commencement of construction** - the date that preparatory works are first undertaken, including, but not limited to, the clearing of vegetation, the erection of any onsite temporary structures and the use of heavy duty equipment for the purpose of breaking the ground for fencing, buildings or infrastructure, including any works for the creation of vegetation buffers.
Original dated 5/2/2016	**Construction activities** - includes but is not limited to clearing of vegetation, the erection of any onsite temporary structures and the use of heavy duty equipment for the purpose of breaking the ground for infrastructure or earthworks. This does not include maintenance or use of existing access tracks, erection or construction of security fencing and signage, remediation/corrective actions or investigative activities such as accessing the site for surveying or planning purposes.
Original dated 5/2/2016	**Control sites** - existing known **Dwarf Galaxias habitat** sites in the local area to be monitored concurrently with the **offset site**, to provide evidence of the relative presence and abundance in the local area.
Original dated 5/2/2016	**Department** - the Australian Government Department administering the **EPBC Act**.
Original dated 5/2/2016	**Dwarf Galaxias** – means the EPBC Act listed vulnerable species *Galaxiella pusilla*
Original dated 5/2/2016	**Dwarf Galaxias habitat** – habitat identified as suitable for the persistence of **Dwarf Galaxias**, including: slow flowing and still, shallow, permanent and temporary freshwater habitats such as swamps, drains and the backwaters of streams and creeks and containing aquatic and terrestrial native vegetation.
Original dated 5/2/2016	**Dwarf galaxias habitat removed** – habitat to be removed as part of the proposed action, as identified in Annex 1.
Original dated 5/2/2016	**Dwarf galaxias habitat retained** – habitat to be retained as part of the proposed action, as identified in Annex 1.
Original dated 5/2/2016	**EPBC Act** - the *Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)*.
Original dated 5/2/2016	**Impact on the water level** - changes that result in unsuitable water levels for the persistence of the **Dwarf Galaxias**. Suitable water levels range between 0.5 m to 1.5 m or within 10% of the measured water level of **control sites** if less than 0.5 m.
Original dated 5/2/2016	**Impact on water quality** - compared to baseline data: a change of 1.0 pH unit, a 10% increase in total suspended solids, a 5% decrease in dissolved oxygen, a 20% change to electrical conductivity, any waste or visible hydrocarbons.
Original dated 5/2/2016	**Landowner** – the person(s) and/or company who legally owns the property that is secured as an offset site for the long-term management and protection of **EPBC Act** listed matters.
Original dated 5/2/2016	**Legal conservation mechanism** - A **Trust for Nature** covenant under the *Victorian Conservation Trust Act 1972* or a covenant under section 173 of the *Planning and Environment Act 1987.*
Original dated 5/2/2016	**Minister** - the Minister administering the **EPBC Act** and includes a delegate of the Minister.
Original dated 5/2/2016	**Offset attributes** - an '.xls' file capturing relevant attributes of the offset site, including the EPBC Act reference ID number, the physical address of the offset site, coordinates of the boundary points in decimal degrees, the **EPBC Act** protected matters that the offset compensates for, any additional **EPBC Act** protected matters that are benefiting from the offset, and the size of the offset in hectares.
Original dated 5/2/2016	**Offset site** – The 3.35 hectare site at 1-39 Centre Road, Hampton Park, Victoria as identified at Annex 4.
Original dated 5/2/2016	**Salvage and Translocation Plan** – A plan detailing specific actions and management measures of the proposed salvage and translocation of the **Dwarf Galaxias** present in **Dwarf**

Date of decision	Definitions attached to approval
	Galaxias habitat to be removed as indicated in Annex 1, to be prepared by a qualified freshwater ecologist.
Original dated 5/2/2016	**Shapefile** - an ESRI Shapefile containing '.shp', '.shx' and '.dbf' files and other files capturing attributes including at least the EPBC Act reference ID number and EPBC Act protected matters present at the relevant site. Attributes should also be captured in '.xls' format.
Original dated 5/2/2016	**Substantially commence(d)** - commencement of construction of clearing the land including associated infrastructure (i.e. sewerage, power, water, stormwater) associated with development. This does not include preparatory works.
Original dated 5/2/2016	**Suitably qualified person** means a real person with relevant tertiary qualifications and/or a minimum of three years demonstrated experience relevant to the task in question.
Original dated 5/2/2016	**Trust for Nature** – The organisation established under the *Victorian Conservation Trust Act 1972*. ABN: 60 292 993 543
Original dated 5/2/2016	**Victorian Government** –the Victorian Government Department administering the *Flora and Fauna Guarantee Act 1988* and the *Fisheries Act 1995*

Date of decision	**Annexes**
Original dated 5/2/2016	Annex 1 - Figure 3: Dwarf Galaxias habitat areas
Original dated 5/2/2016	Annex 2 - Figure 1: Flow connectivity
Original dated 5/2/2016	Annex 3 - Figure 2: Dwarf Galaxias habitat buffer areas
Original dated 5/2/2016	Annex 4 - Figure 3: Offset site location

Annex 1

Legend

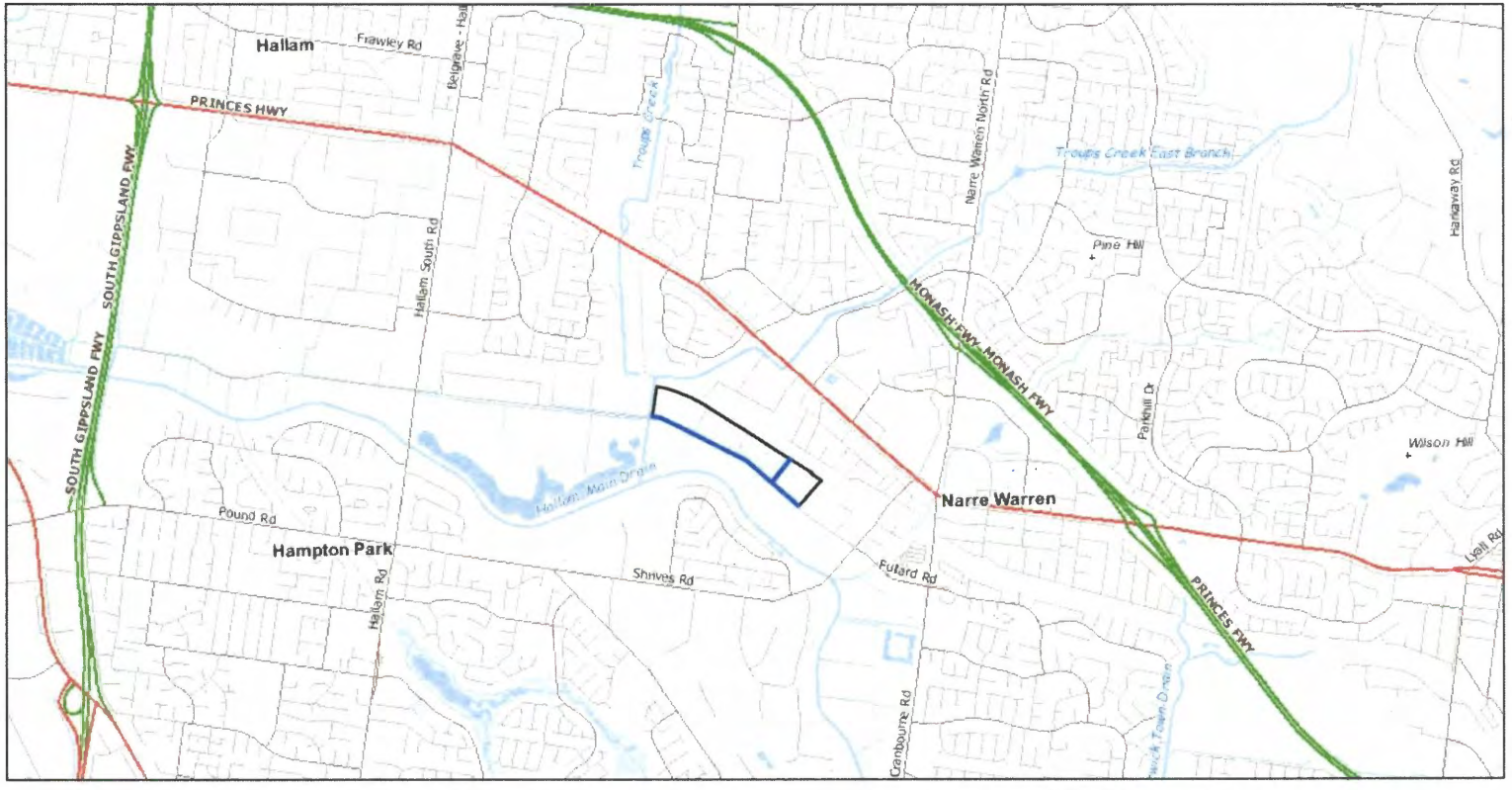
- Property boundary
- Dwarf Galaxias habitat removed
- Dwarf Galaxias habitat retained

Metres
0 50 100 200

Figure 3: Dwarf Galaxias habitat areas		
Project: 96-166 Centre Rd, Narre Warren		
Client: Narre Warren Central Pty Ltd		
Project No.:14090	Date: 17/11/2015	Created By: M. Ghasemi / D. Coppolino

BL&A Brett Lane & Associates Pty. Ltd.

Annex 2



Legend

- Property boundary
- Retained Dwarf Galaxias Habitat
- Existing drains, creeks and wetlands

Metres
0 250 500 1,000

Figure 1: Flow connectivity		
Project: 96-166 Centre Rd, Narre Warren		
Client: Narre Warren Central Pty Ltd		
Project No.:14090	Date: 17/11/2015	Created By: M. Ghasemi / D. Coppolino

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Annex 3

Legend

- Property boundary
- Drain
- Buffer with retained native vegetation
- Buffer to be revegetated

0 50 100 200 Metres

Figure 2: Dwarf Galaxias habitat buffer areas		
Project: 96-166 Centre Rd, Narre Warren		
Client: Narre Warren Central Pty Ltd		
Project No.:14090	Date: 19/01/2016	Created By: M. Ghasemi / D. Coppolino

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Annex 4

Legend

- Offset site boundary
- Development site
- Existing Melb Water Eastern Dwarf Galaxias site

Metres
0 50 100 200

Figure 3: Offset site location		
Project: 96-166 Centre Rd, Narre Warren		
Client: Narre Warren Central Pty Ltd		
Project No.:14090	Date: 27/10/2015	Created By: M. Ghasemi / I. Kulik

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Appendix 2: Water quality and Dwarf Galaxias monitoring report for the habitat buffers (2023) by Aquatica Environmental

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Our Ref: 000118.10

21 February 2024

Narre Warren Central Pty Ltd
52-54 Rathdowne Street
Carlton VIC 3053

Attention: Mr Paul Nio
Via email: pnio@osanrae.com.au
CC: cmistica@fidus.com.au; inga@natureadvisory.com.au

Dear Paul

Re: 2023 Annual Report of Water Quality, Habitat and Dwarf Galaxias Monitoring for Casey Green

Aquatica Environmental was engaged by Narre Warren Central Pty Ltd to undertake the 2023 annual monitoring of water quality and Dwarf Galaxias (*Galaxiella pusilla*) at the site of the Casey Green residential development at 96-166 Centre Road, Narre Warren, Victoria (the project).

The annual monitoring was undertaken to meet specific management actions outlined in the project's commonwealth, state and locally approved Dwarf Galaxias Management Plan (DGMP; BL&A 2015) and Dwarf Galaxias Salvage and Translocation Plan (DGSTP; Aquatica Environmental 2015). These actions were interpreted by the federal then Department of Environmental (DE 2016) to include the following monitoring requirements:

- **Dwarf Galaxias**: Survey for Dwarf Galaxias and predatory fish populations at established sites in November/December annually during construction and for least five years during and post completion of construction on the site (DE Condition 1; referenced to BL&A 2015 Section 6.5 and Aquatica Environmental 2015 Section 4.5).
- **Aquatic and riparian habitat condition**: Assess Dwarf Galaxias habitat condition in conjunction with the dwarf galaxias survey (DE Condition 1, referenced to Aquatica Environmental 2015 Section 4.5).
- **Water quality**: Assess water quality at established sites fortnightly and after rainfall events >10mm during construction, and during Dwarf Galaxias monitoring (DE Condition 3b and 3d).

This report has been produce to provide a summary record of the 2023 water quality, habitat and dwarf galaxias monitoring in accordance with the DGMP and DGSTP.

1. METHODOLOGIES

1.1 Rainfall Monitoring

There is no rainfall gauge located on the site. The nearest Bureau of Meteorology (BOM) weather stations, with current / live rainfall monitoring data, are located at Ferny Creek (16km north), Frankston (Ballam Park, 18km southwest), Moorabbin (20km west northwest) and Scoresby (14km north northwest)(Figure 1). To determine whether an approximately >10mm rainfall event had occurred at the site the average of the daily totals from the four BOM weather stations was used as the trigger.

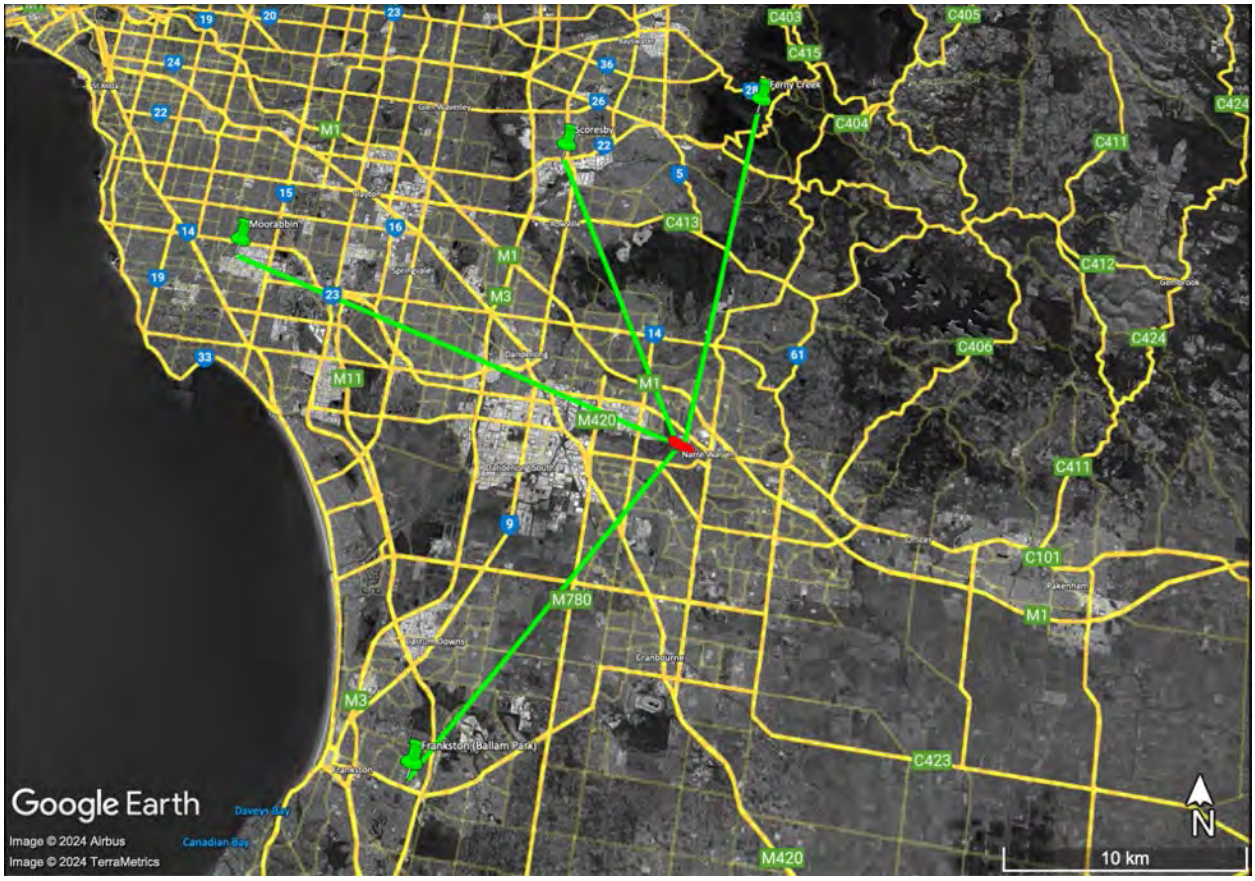

Figure 1 Bureau of meteorology weather station locations (green) relative to the site (red)

1.2 Sampling Sites

During initial baseline and salvage surveys in 2016-17 a number of water quality and Dwarf Galaxias survey sites were established (Aquatica Environmental 2017). However, in the time since these initial surveys were undertaken development of the site (and neighbouring sites) has progressed significantly and not all of the originally established site still exist and / or can be reached. Accordingly, new sites have been added. Figure 2 shows the sites that were monitored during the 2023 monitoring year, which were the same as the 2022 and 2021 monitoring years..

0 50 100 200
Metres

Spatial Reference
Name: GDA2020 MGA Zone 55
PCS: GDA2020 MGA Zone 55
GCS: GDA2020
Datum: GDA2020
Projection: Transverse Mercator

N

- Water Quality (WQ) monitoring sites
- DG monitoring
- Retained Habitat
- Site
- Structure
- Connector or drain
- River
- Stream
- Wetland

Casey Green, 96-166 Centre Road, Narre Warren

Dwarf Galaxias and Water Quality monitoring sites

AQUATICA ENVIRONMENTAL

Date Exported:
9/12/2022 10:42 AM

1.3 Dwarf Galaxias and Predatory Fish Monitoring

Dwarf Galaxias and predatory fish monitoring was undertaken at Dwarf Galaxias retained habitat monitoring location shown in Figure 1. This sites aligns with pre-2021 monitoring sites Sites DG1 and DG2 corresponding to where Dwarf Galaxia were released during the 2016 salvage and translocation program (Aquatica Environmental 2017). These sites are now effectively merged into one larger retained habitat and therefore monitoring location, representative of the fully connected and wetted portion of the retained habitat and newer swales.

Sampling for adult Dwarf Galaxias and predatory fish was undertaken using hand-held dip-nets, sampling in and around areas of suitable habitat, and bait traps set overnight with phosphorescent baits. Sampling for larval Dwarf Galaxias was also undertaken by collecting a sample of water (approximately 10 litres) and placing it in a shallow white tray, where any larva would have been visible.

Active searching using dip-nets and bait-trapping are standard methods for sampling Dwarf Galaxias and are the most effective methods outlined in the Survey Guidelines for Australia's Threatened Fish (DSEWPaC 2004) and Biodiversity Precinct Structure Planning Kit (DSE 2010). They are also most appropriate method for sampling in the small and heavily vegetated water bodies, like those at the site.

Dwarf Galaxias sampling was undertaken by Aquatica Environmental at another nearby site, where Dwarf Galaxias also occur and as reference/baseline as to whether Dwarf Galaxias should have been detectable on the site.

1.4 Aquatic and Riparian Habitat Condition Monitoring

Aquatic and riparian habitat condition was visually assessed during the annual Dwarf Galaxias survey. The assessment was primarily based on a comparison of the aquatic and riparian vegetation condition during this survey as compared to previous surveys (i.e. temporal comparison).

1.5 Water Quality Monitoring

Water quality monitoring was undertaken fortnightly and/or following rainfall events >10 millimetres, and during the annual Dwarf Galaxias survey. In situ water quality data was collected by using a calibrated Hanna Instruments HI9829 multiparameter water quality metre. The parameters collected included temperate, electrical conductivity, pH, dissolved oxygen and turbidity.

A water depth gauge was also installed at the Dwarf Galaxias monitoring location in June 2023 in response to feedback from the Department of Environment as part of a site audit (Photo 1). The installed gauge was a steel picket, with the initial/installing water depth (i.e. water depth to sediment base) and height of picket above water measured to set the baseline.

Litter monitoring is undertaken by Narre Warren Central, however, where notable litter was observed during water quality monitoring it was noted and Narre Warren Central advised.

Photo 1 Water measuring gauge

2. RESULTS

1.6 Sampling Frequency and Conditions

During the 20232 monitoring year[1] a total of 29 water quality sampling events had occurred, including 13x scheduled, 15x post >10mm rainfall events and 1x during annual Dwarf Galaxias monitoring (Table 1).

The overall number of post >10mm rainfall events sampling was slightly lower than the previous years (i.e. 18x in 2022), namely due to a return to slight less wet conditions. For the 2023 monitoring year there was a total of 22 days with >10mm rain (Figure 3), as compared to 35 days in 2022 and 24 days in 2021. The raw water rainfall monitoring data are provided in Appendix 2.

[1] The final water quality monitoring event, scheduled for 29th December will be included in the 2023 monitoring data.

Table 1 2023 sampling schedule

DAY	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	KEY
Sunday	1/1/2023									1/10/2023			Standard WQ Monitoring Event
Monday	2/1/2023				1/5/2023					2/10/2023			Next scheduled
Tuesday	3/1/2023				2/5/2023			1/8/2023		3/10/2023			Post >10mm rainfall event
Wednesday	4/1/2023	1/2/2023	1/3/2023		**3/5/2023**			2/8/2023		**4/10/2023**	1/11/2023		**Incident**
Thursday	5/1/2023	2/2/2023	2/3/2023		4/5/2023	1/6/2023		3/8/2023		5/10/2023	2/11/2023		Annual DG Survey
Friday	6/1/2023	**3/2/2023**	3/3/2023		5/5/2023	2/6/2023		4/8/2023	1/9/2023	6/10/2023	3/11/2023	1/12/2023	Other
Saturday	7/1/2023	4/2/2023	4/3/2023	1/4/2023	**6/5/2023**	3/6/2023	1/7/2023	5/8/2023	2/9/2023	7/10/2023	4/11/2023	2/12/2023	**Rainfall > 10mm**
Sunday	8/1/2023	5/2/2023	5/3/2023	2/4/2023	7/5/2023	4/6/2023	2/7/2023	6/8/2023	3/9/2023	8/10/2023	5/11/2023	**3/12/2023**	Salvage Event
Monday	9/1/2023	6/2/2023	**6/3/2023**	3/4/2023	8/5/2023	5/6/2023	3/7/2023	7/8/2023	4/9/2023	9/10/2023	6/11/2023	4/12/2023	
Tuesday	10/1/2023	7/2/2023	7/3/2023	4/4/2023	**9/5/2023**	6/6/2023	4/7/2023	8/8/2023	5/9/2023	10/10/2023	7/11/2023	5/12/2023	
Wednesday	11/1/2023	8/2/2023	8/3/2023	5/4/2023	10/5/2023	7/6/2023	5/7/2023	9/8/2023	6/9/2023	11/10/2023	8/11/2023	6/12/2023	
Thursday	12/1/2023	9/2/2023	9/3/2023	6/4/2023	11/5/2023	**8/6/2023**	6/7/2023	10/8/2023	7/9/2023	12/10/2023	9/11/2023	7/12/2023	
Friday	13/1/2023	10/2/2023	10/3/2023	7/4/2023	12/5/2023	9/6/2023	7/7/2023	11/8/2023	8/9/2023	**13/10/2023**	10/11/2023	8/12/2023	
Saturday	14/1/2023	11/2/2023	11/3/2023	**8/4/2023**	13/5/2023	10/6/2023	8/7/2023	12/8/2023	9/9/2023	14/10/2023	11/11/2023	9/12/2023	
Sunday	15/1/2023	12/2/2023	12/3/2023	**9/4/2023**	14/5/2023	11/6/2023	9/7/2023	13/8/2023	10/9/2023	15/10/2023	12/11/2023	10/12/2023	
Monday	16/1/2023	13/2/2023	13/3/2023	10/4/2023	15/5/2023	12/6/2023	10/7/2023	14/8/2023	11/9/2023	**16/10/2023**	13/11/2023	11/12/2023	
Tuesday	17/1/2023	14/2/2023	14/3/2023	11/4/2023	16/5/2023	13/6/2023	11/7/2023	15/8/2023	12/9/2023	17/10/2023	14/11/2023	12/12/2023	
Wednesday	18/1/2023	15/2/2023	15/3/2023	12/4/2023	17/5/2023	14/6/2023	12/7/2023	16/8/2023	13/9/2023	18/10/2023	15/11/2023	13/12/2023	
Thursday	19/1/2023	16/2/2023	16/3/2023	13/4/2023	18/5/2023	15/6/2023	13/7/2023	17/8/2023	14/9/2023	19/10/2023	16/11/2023	14/12/2023	
Friday	20/1/2023	17/2/2023	17/3/2023	14/4/2023	19/5/2023	16/6/2023	14/7/2023	18/8/2023	15/9/2023	20/10/2023	17/11/2023	15/12/2023	
Saturday	21/1/2023	18/2/2023	18/3/2023	15/4/2023	20/5/2023	17/6/2023	15/7/2023	19/8/2023	16/9/2023	21/10/2023	18/11/2023	16/12/2023	
Sunday	22/1/2023	19/2/2023	19/3/2023	**16/4/2023**	**21/5/2023**	**18/6/2023**	16/7/2023	20/8/2023	17/9/2023	22/10/2023	19/11/2023	17/12/2023	Offset Site construction complete
Monday	23/1/2023	20/2/2023	20/3/2023	17/4/2023	22/5/2023	**19/6/2023**	17/7/2023	21/8/2023	18/9/2023	23/10/2023	20/11/2023	18/12/2023	
Tuesday	24/1/2023	21/2/2023	21/3/2023	18/4/2023	23/5/2023	20/6/2023	18/7/2023	22/8/2023	19/9/2023	24/10/2023	21/11/2023	19/12/2023	
Wednesday	25/1/2023	22/2/2023	22/3/2023	19/4/2023	24/5/2023	21/6/2023	19/7/2023	23/8/2023	20/9/2023	25/10/2023	22/11/2023	20/12/2023	
Thursday	26/1/2023	23/2/2023	23/3/2023	20/4/2023	25/5/2023	22/6/2023	20/7/2023	24/8/2023	21/9/2023	26/10/2023	23/11/2023	21/12/2023	
Friday	27/1/2023	24/2/2023	24/3/2023	21/4/2023	26/5/2023	23/6/2023	21/7/2023	25/8/2023	22/9/2023	27/10/2023	24/11/2023	22/12/2023	
Saturday	28/1/2023	25/2/2023	25/3/2023	22/4/2023	27/5/2023	24/6/2023	22/7/2023	26/8/2023	23/9/2023	28/10/2023	**25/11/2023**	23/12/2023	
Sunday	29/1/2023	26/2/2023	26/3/2023	23/4/2023	28/5/2023	25/6/2023	23/7/2023	27/8/2023	24/9/2023	29/10/2023	**26/11/2023**	24/12/2023	
Monday	30/1/2023	27/2/2023	27/3/2023	24/4/2023	29/5/2023	26/6/2023	24/7/2023	28/8/2023	25/9/2023	30/10/2023	27/11/2023	25/12/2023	
Tuesday	31/1/2023	28/2/2023	28/3/2023	25/4/2023	30/5/2023	27/6/2023	25/7/2023	29/8/2023	26/9/2023	31/10/2023	28/11/2023	26/12/2023	
Wednesday			29/3/2023	26/4/2023	31/5/2023	28/6/2023	26/7/2023	30/8/2023	27/9/2023		29/11/2023	27/12/2023	
Thursday			**30/3/2023**	27/4/2023		29/6/2023	27/7/2023	31/8/2023	28/9/2023		30/11/2023	**28/12/2023**	
Friday			31/3/2023	28/4/2023		30/6/2023	28/7/2023		29/9/2023			29/12/2023	
Saturday				**29/4/2023**			29/7/2023		30/9/2023			30/12/2023	
Sunday				30/4/2023			30/7/2023					31/12/2023	

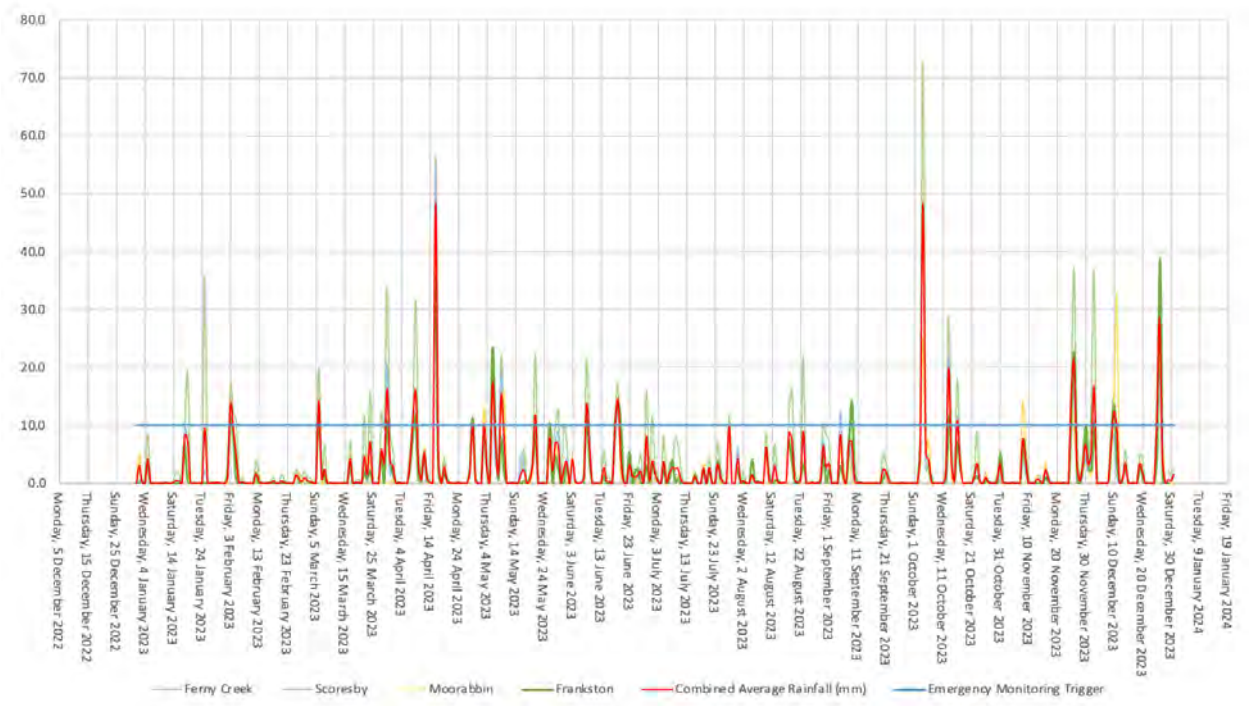

Figure 3 2023 rainfall chart

1.7 Aquatic and Riparian Habitat Condition

During the 2023 Dwarf Galaxias survey the vegetation within the retaining habitat (WQ6) increased in overall density as compared to previous rounds of monitoring (Photo 2). This increased appears to be particularly beneficial for dwarf galaxias, with numerous individuals being recorded in the more open exposed area near the concrete retaining wall compared to previous rounds of monitoring with they were mostly found most centralised within the dense stands of paperbark (*Melaleuca* spp.)(i.e. there appears to have been an increase in their area of habitation). The difference was markedly observable compared to the 2022 annual survey, when retained habitat was significantly inundated due to recent rainfall and seasonal vegetation growth impeded (Photo 3). Another marked variation was the increase in

the area and density of common reed (*Phragmites australis*) in the more open area between the melaleuca and concrete retaining wall.

Error! Reference source not found. is provided for additional temporal comparison of the quality and condition of the retained habitat in November 2020 (i.e. prior to the approved construction of the concrete retaining wall and swales), when the habitat was inclined to dry quite extensively second during the summer months. Compared to the 2022 and 2023 monitoring it is visually clear that the size of individual melaleuca plants has increased, as well as their overall area of coverage and shading (i.e. beneficial to the species).

Aquatic and riparian habitat condition at the other five water quality monitoring sites along Centre Road norther drain (WQ1-5) remained mostly the same compared previous surveys.

Photo 2 Habitat vegetation and inundation at Site Dwarf Galaxias survey location in December 2023 during the dwarf galaxias survey

Photo 3 Habitat vegetation and inundation at Site Dwarf Galaxias survey location in November 2022

Photo 4 Habitat vegetation at Site Dwarf Galaxias survey location in November 2020

1.8 Water Quality

The raw water quality data are provided in Appendix B.

Table 1 provides a summary of the relevant statistical analysis and/or relevant Environmental Reference Standard (ERS; EPA 2021) objectives for the Urban segment, Lowlands of Western Port catchment.

Review and assessment of the water quality data should be considered in light of the following minor water sampling observations and / or events:

- 25th January 2023 – Turbidity results at Site 4 and 6 were higher than actual due to shallow water and the water quality monitoring maker probe disturbing and suspending some sediment.
- 3rd March 2023 – Due to an unidentified water quality meter fault electrical conductivity and dissolved oxygen result were not recorded by the meter.
- 19th June 2023 – Following approximately 25 mm of rain falling in the 24 hours prior to the monitoring event, elevated turbidity was identified at Site 5. Upon on investigation it was found that a sediment fence had unknowingly breached allowing an unquantifiable volume sentiment-laden surface water to discharge into the nearest swale and then the Centre Road northern and drain. The site manager was immediately notified and the fence repaired and upgraded with the installation of new geofab sediment logs by Statewide Environmental. The impact was considered to be not ecologically significant with the turbidity reading at Site 5 at about the upper limit of that observed throughout the monitoring year but not at a level that would be deemed a risk dwarf galaxias.

Overall the 2023 water quality monitoring data showed the following patterns:

- Temperature was on average very consist across the sites across the year, showing expected heating and cooling phases in summer and winter. The highest temperatures across the sites were experienced in January to April and again in December. The lowest temperatures were observed in July.

  The highest individual temperature recorded was 22.73 °C at Site 5 on 29th December (the most open/exposed site, but still less than the previous year's high of 26.39°C). the lowest observed temperature was 8.60 °C at Site 6 on 18th July (the most shaded site but higher than the 2022 low of 6.34 °C.

  Overall Site 1 had the highest average temperature (mean=16.2), likely due to the discharge of warmer industrial/residential stormwater from the culvert. Site 6 had the lowest, again due to being the most shaded by the dense vegetation at the site.

  There is no ERS objective for temperature.

- pH was on average consistent across all five Centre Road sites (mean range=7.13 to 7.2-60) and higher at the dwarf galaxias retained habitat site (Site 6; mean=7.35). There appears no seasonal variation to pH across the sites and slightly higher pH results at Site 6 unlikely due to natural biological and chemical processes (i.e. the variation is not ecologically significant and there is no indication that the variation is caused through development of the site).

  The ERS objective was met at all sites.

- As has been consistently observed during previous rounds of monitoring electrical conductivity was consistently higher at Sites 6 (mean=1,012 µS/cm compared to Site 1 to 5 mean range=548 µS/cm to 628 µS/cm). As has been previously concluded the higher electrical conductivity levels at, Site 6 are likely reflective of the lack of direct flows and the concentration of salts due to evaporation.

  The ERS objective of ≤500 µS/cm was exceeded at all sites. The levels observed are not attributable to the development of the site, rather occurred naturally and/or from other upstream inputs/influences, and were clearly of no concern for dwarf galaxias due to their ongoing presence and abundance at the site.

- Dissolved oxygen was again consistently low across all sites (mean range=33.9% to 62.5%). Dissolved oxygen was consistently higher at the dwarf galaxias retained habitat site, likely due to the sampling usually occurring around the middle of the day and the high vegetation and algae content of the site likely producing oxygen as a result

of photosynthesis. In particular dissolved oxygen at Site 6 was very high through the cooler months of the year between about July and September.

The ERS objective of ≥70% was not met at any site, and the ERS upper limit objective of 130% was exceeded at Site 6 across three sequential rounds of sampling in August and September.

Similarly to electrical conductivity, the levels observed were not attributable to the development of the site, rather occurred naturally and/or due to other influences, and were clearly of no concern for the resident dwarf galaxias population.

- **Turbidity** was yet again on average highest at Site 1 (mean=34.89 NTU), indicating a high turbidity input from the culvert and unknown upstream sources. Site 5 had the lowest average turbidity (mean=16.75 NTU) indicating the effectiveness of the retained vegetation along the centre Rd north and rain in terms of its ability to philtre water as it flows past the site (i.e. from Sites 1 to 5). . This indicated that the retained Centre Road drain vegetation and construction/vegetation of the project's swales are functioning as designed and resulting in an overall reduction turbidity as surface waters pass by the site.

  The ERS of ≤35 NTU was only not met at Site 1, again due to unknown inputs upstream of the project area, as compared to none of the sites meeting the objective in 2022. Is further supports that retained vegetation, the constructed swales and the proper management of surface water and sediments from the site are all occurring as required.

Table 2 2023 water quality sampling summary

Parameter		ERS Objective	Centre Road Drain Sites					Habitat Site
			Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Temperature (°C)	Min.	NA	10.70	9.22	9.13	8.60	9.37	8.03
	Max.		21.90	22.19	21.69	22.50	22.73	22.51
	Mean		16.12	15.26	15.28	15.11	15.88	14.84
pH	25th %tile	≥6.4	6.89	7.00	7.03	6.96	6.99	7.16
	75th %tile	≤7.9	7.38	7.35	7.19	7.27	7.40	7.66
	Mean	NA	7.21	7.16	7.13	7.13	7.20	7.35
Electrical Conductivity (µS/cm)	75th %	≤500	709	706	735	693	598	1205
	Mean	NA	597	628	627	619	548	1012
Dissolved Oxygen (%)	75th %tile	≥70	48.1	43.0	42.3	42.4	59.7	69.0
	Max.	130	64.4	61.9	61.5	65.9	74.1	164.2
	Mean	NA	35.3	36.1	33.9	34.9	49.2	62.5
Turbidity (NTU)	75th %tile	≤35	41.3	34.2	30.2	22.4	21.4	29.3
	Mean	NA	34.9	22.5	22.2	19.6	16.8	23.4

Orange highlight = parameter did not meet the ERS objective

1.9 Retained Habitat Water Height

In accordance with them following feedback from the 2023 audit and review conducted by the Department of Environment, a water depth gauge was installed in June 2023 at Site 6 (the retained habitat site) to measure and monitor the height of the water in the habitat.

Figure 4 shows the retained habitat water height from between June to December 2023. Monitoring shows that although there is some variation in water height at times, it consistently returns to its baseline at about 30 centimetres of depth at the location gauge.

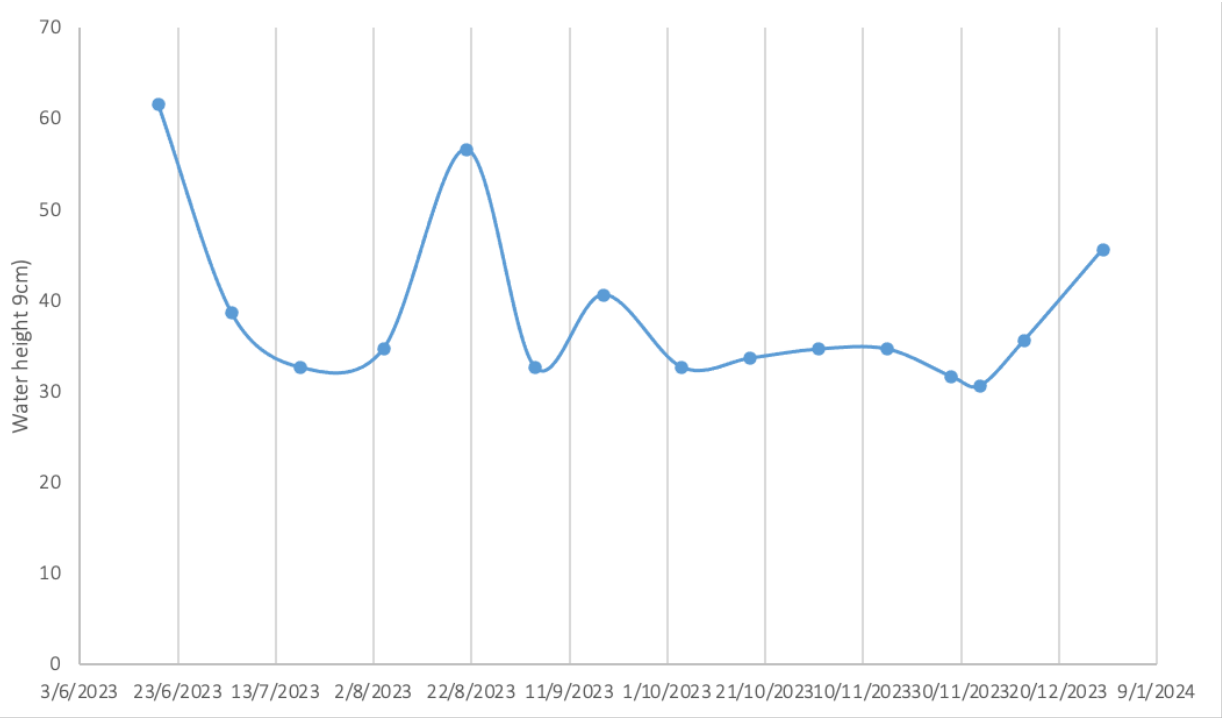

Figure 4 Site 6 water height

1.10 Dwarf Galaxias and Predatory Fish

The annual Dwarf Galaxias monitoring and associated water quality sampling occurred on the 13th and 14th December 2023. The weather during the survey was warm to hot with temperatures ranging between 34.2°C (day time maximum) and 14.7°C (night time minimum) at Scoresby (BOM 2024). Based on the four BOM weather monitoring stations data, an average of 4.0 mm rain fell during the survey, with 29.1 mm of rain falling in the week prior to the survey (BOM 2024).

The results of the December 2023 survey are provided in Table 3 and compared to previous rounds of monitoring.

A total of 18 Dwarf Galaxias (Photo 5 and Photo 6) were recorded during the November survey, including 10 adult males and 8 juveniles/sub-adults from the most recent breeding season, which likely occurred through August to October.

Large numbers of Mosquitofish (*Gambusia holbrooki*; Photo 6) were also recorded, much higher than previous years. Most appeared to be residing near the concrete retaining wall, where there is less shading and therefore warmer water (Photo 7). Though Dwarf Galaxias were also caught in this location.

Based on the number and condition of the individuals, and despite the increased number of Mosquitofish recorded during this survey, it appears there has been another good year for the on-site population, with successful breeding. This has also been our experience at other sites in the region, mostly due to above average winter/spring rains and mild temperatures.

The results also confirm that the constructed swales are continuing to function well and as intended, by supplying more consistent water levels to the retained habitat (i.e. the heavily vegetated *Melaleuca* areas), but limiting pest fish ingress to the retained habitat drain.

Table 3 Species and number of individuals recorded

Common Name	Scientific Name	Sampling Event						
		2023	2022	2021	2020	2019	2018	2017
Dwarf Galaxias	*Galaxiella pusilla*	18	11	17	25	12	3	2
Mosquitofish	*Gambusia holbrooki*	209	10s	10s	12	6	3	-
Common Galaxias	*Galaxias maculatus*	2	-	-	-	-	-	-
Goldfish	*Carassius auratus*		-	-	-	2	4	-
Freshwater Burrowing Crayfish	*Engeus spp.*	1	-	-	-	1	1	-
Oriental Weatherloach	*Misgurnus anguillicaudatus*	-	1	-	1	-	-	-

Photo 5 Dwarf Galaxias adult male (top and juvenile (bottom)

Photo 6 Dwarf Galaxias adult male, female Mosquitofish and dragonfly/damselfly larvae

Photo 7 More open habitat at the concrete retaining wall.

Photo 8 Oriental Weatherloach

3. SUMMARY

The 2023 annual Dwarf Galaxias monitoring event detected 18 individual Dwarf Galaxias in the retained habitat drain (compared to 11 in 2022, 17 in 2021, 25 in 2020, 12 in 2019 and 3 in 2018). This was the second highest numbers observed to date indicating that conditions for the species are being maintained and likely continuing to improve, due to the establishment of further suitable habitat in the constructed swales (i.e. increased area and density of vegetation). The primary reason for this is that the constructed swales result in more water and a more constant water levels in the retained habitat drain (comparing anecdotally) and in a manner that is clearly suited to the resident Dwarf Galaxias population (i.e. still maintaining ephemerality but not allowing complete drying).

Considering this and previous rounds of sampling for the project and historical records (Aquatica Environmental 2017, 2019, 2020, 2021 and 2022a/b), it is considered likely the abundance and distribution of the Dwarf Galaxias population in the habitat areas is somewhat dynamic, varying between years and due to seasonal influenced on water availability and therefore habitat. However, with the continued improvement of the retained habitat and expansion of suitable habitat into the constructed swales it is clearly resulting in an overall increase in the quality and area of available habitat for Dwarf Galaxias. This appears to have also correlated with an increase in the number of predatory fish species (i.e. Mosquitofish), however their presence doesn't appear to have impacted the successful breeding and increasing numbers and area of habitation of Dwarf Galaxias.

Based on the results of the 2023 annual survey and data, it is our option that development of the Casey Green site to date has been undertaken in accordance the DGSTP and associated approvals. No ecologically significant impacts have been observed to the retained habitat, with the constructed swales having improved overall conditions for Dwarf Galaxias on the site and in the region.

The 2024 monitoring year commenced on 1st January 2024, will include all required monitoring in accordance with approved DGSTP (and the project DGMP; BL&A 2015) including:

- Water quality monitoring: Fortnightly and/or after rainfall events > 10 millimetres until all construction is completed (i.e. all works on site completed), including the monitoring of water heights at the retained Dwarf Galaxias habitat site (Site 6).
- Dwarf Galaxias monitoring: Annually in November/December for at least five years post construction.

Please note, we interoperate the "completion of construction" to be the point at all major works including site clean-up, landscaping, etc. Have been completed and there is not further risk to the Dwarf Galaxias and their habitat (i.e. all possible sources of sediment/contaminant runoff have been mitigated.

If you have any questions or would like to discuss this assessment, report or any other matter further, please do not hesitate to call me on 0413 935 497.

Kind Regards,

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APPENDIX A: RAW WATER QUALITY RESULTS

Temperature (°C)

Sample Date	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
11/1/2023	21.68	22.19	21.40	20.91	22.39	22.51
25/1/2023	21.90	19.32	19.51	19.17	21.14	19.73
6/2/2023	19.93	18.07	19.33	17.00	19.51	17.03
15/2/2023	18.10	18.10	17.40	19.00	18.50	18.10
3/3/2023	20.00	19.00	19.00	19.00	21.00	20.00
7/3/2023	18.40	16.31	16.74	16.05	16.89	16.03
21/3/2023	19.55	18.60	19.60	19.60	20.80	17.30
31/3/2023	18.11	17.43	16.04	16.05	17.36	14.02
10/4/2023	18.66	18.50	18.64	18.55	18.54	15.20
17/4/2023	15.10	15.45	15.18	14.72	14.20	13.90
1/5/2023	14.85	12.40	13.15	11.99	12.98	11.89
9/5/2023	12.65	12.82	13.02	12.92	13.17	12.58
22/5/2023	14.56	13.33	13.35	13.27	13.55	12.20
9/6/2023	13.81	12.07	12.59	12.03	12.90	11.95
19/6/2023	10.70	11.30	11.12	10.67	10.94	9.92
4/7/2023	11.96	10.41	10.21	10.04	10.30	10.17
18/7/2023	12.20	9.22	9.13	8.60	9.37	8.03
4/8/2023	11.88	11.73	11.39	11.83	11.39	11.76
21/8/2023	11.23	11.56	11.33	11.18	11.77	12.31
4/9/2023	12.69	11.14	10.62	11.05	12.09	13.66
18/9/2023	13.26	13.12	13.22	12.95	13.20	13.65
4/10/2023	15.07	14.67	14.84	14.73	14.64	13.61
18/10/2023	15.85	13.90	14.02	14.62	15.52	14.62
1/11/2023	15.69	13.98	13.95	13.95	14.75	13.54
15/11/2023	18.41	16.13	16.33	15.94	17.75	18.67
28/11/2023	16.77	15.71	16.09	15.48	16.32	14.51
4/12/2023	16.65	16.16	15.54	15.64	17.11	15.87
13/12/2023	18.40	18.70	18.63	18.80	19.65	18.10
29/12/2023	19.45	21.20	21.69	22.50	22.73	19.50

pH

Sample Date	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
11/1/2023	7.19	7.00	7.03	6.96	6.99	7.51
25/1/2023	7.29	7.06	6.93	6.70	6.81	7.41
6/2/2023	7.35	7.64	7.06	7.01	6.98	7.66
15/2/2023	7.20	7.35	7.04	7.09	7.05	7.60
3/3/2023	7.38	7.40	7.50	7.50	7.60	7.40
7/3/2023	7.25	7.39	7.46	7.61	7.45	7.33
21/3/2023	7.15	7.50	7.15	7.13	7.11	7.36
31/3/2023	7.45	7.17	7.19	7.12	7.06	7.16
10/4/2023	7.34	7.01	7.00	7.07	7.00	7.05
17/4/2023	7.67	7.04	7.09	6.93	7.45	7.26

Sample Date	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
1/5/2023	7.56	6.94	6.92	6.99	7.30	7.45
9/5/2023	7.34	7.19	7.17	7.23	7.03	7.31
22/5/2023	7.11	7.35	7.33	7.25	7.26	7.84
9/6/2023	7.67	7.10	7.11	6.95	6.91	7.56
19/6/2023	8.36	7.97	7.84	7.74	7.91	7.95
4/7/2023	8.07	7.67	7.52	7.46	7.53	8.04
18/7/2023	7.11	7.34	7.10	7.29	7.27	8.08
4/8/2023	6.88	7.14	7.16	7.12	7.24	7.75
21/8/2023	6.89	7.08	7.14	7.27	7.40	7.84
4/9/2023	6.87	7.08	7.17	7.13	7.45	8.59
18/9/2023	6.95	6.89	7.03	7.10	7.35	7.56
4/10/2023	6.70	6.91	6.96	6.93	6.98	7.22
18/10/2023	6.45	6.78	6.74	6.76	6.63	6.36
1/11/2023	7.61	7.24	7.20	7.09	7.22	7.30
15/11/2023	7.17	7.38	7.27	7.51	7.46	7.14
28/11/2023	6.55	7.21	7.07	7.27	6.95	6.29
4/12/2023	6.84	6.59	7.06	6.80	7.22	6.16
13/12/2023	6.62	6.47	6.55	6.82	6.98	6.13
29/12/2023	7.09	6.85	7.01	7.01	7.19	6.96

Electrical Conductivity (µS/cm)

Sample Date	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
11/1/2023	751	702	698	649	415	965
25/1/2023	1246	815	1101	1294	933	1211
6/2/2023	916	854	753	636	602	875
15/2/2023	621	603	577	654	626	903
3/3/2023						
7/3/2023	441	434	442	440	423	629
21/3/2023	434	447	426	436	402	675
31/3/2023	446	431	428	456	426	703
10/4/2023	392	510	484	511	399	832
17/4/2023	484	509	472	441	378	688
1/5/2023	496	516	493	526	589	701
9/5/2023	547	504	479	553	558	1055
22/5/2023	512	582	564	541	496	1357
9/6/2023	407	495	478	436	414	1096
19/6/2023	249	517	438	654	442	895
4/7/2023	699	838	807	807	762	1197
18/7/2023	1577	1108	1033	841	837	1252
4/8/2023	740	699	708	697	679	1360
21/8/2023	468	560	649	757	685	1327
4/9/2023	625	705	729	795	588	1238
18/9/2023	523	551	568	581	593	1201
4/10/2023	216	327	290	360	437	1191
18/10/2023	631	707	695	540	472	1165

Sample Date	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
1/11/2023	471	465	859	824	596	1203
15/11/2023	833	569	513	493	462	1210
28/11/2023	369	995	920	692	584	1006
4/12/2023	405	811	764	609	544	897
13/12/2023	461	647	568	546	463	748
29/12/2023	761	694	613	575	544	756

Dissolved Oxygen (%)

Sample Date	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
11/1/2023	38.3	37.8	37.9	32.0	40.2	54.2
25/1/2023	36.5	30.3	24.9	26.5	36.7	30.4
6/2/2023	48.3	47.8	26.9	42.0	50.2	64.1
15/2/2023	29.0	27.8	42.2	36.5	67.6	29.9
3/3/2023						
7/3/2023	27.5	33.3	43.6	43.7	67.3	42.0
21/3/2023	35.1	37.4	36.9	36.8	57.9	36.9
31/3/2023	35.6	41.5	42.6	40.7	50.4	35.7
10/4/2023	37.7	39.1	39.1	48.8	63.6	67.3
17/4/2023	41.1	51.0	47.9	50.0	57.3	56.1
1/5/2023	53.7	61.9	55.9	56.8	74.1	58.3
9/5/2023	44.2	37.8	36.9	38.8	41.3	45.9
22/5/2023	53.4	52.4	53.3	55.5	58.7	49.6
9/6/2023	50.5	59.7	61.5	65.9	68.1	73.3
19/6/2023	64.4	31.7	28.0	22.2	49.1	43.3
4/7/2023	19.6	20.7	13.7	18.1	23.6	94.2
18/7/2023	11.6	29.7	17.0	30.1	35.3	103.3
4/8/2023	14.2	47.3	38.5	48.5	58.1	144.0
21/8/2023	46.3	37.5	47.4	40.3	71.9	147.9
4/9/2023	9.7	27.8	39.8	32.7	62.8	164.2
18/9/2023	22.3	20.0	19.5	35.0	52.0	106.0
4/10/2023	58.5	33.6	25.4	17.7	16.4	29.5
18/10/2023	48.0	38.7	32.9	34.5	54.2	55.2
1/11/2023	17.5	21.0	23.8	20.4	43.4	26.9
15/11/2023	12.6	22.6	9.0	11.7	32.1	67.5
28/11/2023	57.4	59.0	29.7	26.1	50.3	24.2
4/12/2023	34.8	14.1	31.8	23.6	32.0	26.5
13/12/2023	2.2	11.2	3.8	11.1	23.7	18.8
29/12/2023	38.3	37.8	37.9	32.0	40.2	54.2

Turbidity (NTU)

Sample Date	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
11/1/2023	35.9	34.6	33.9	19.3	21.6	16.1
25/1/2023	5.60	5.0	9.1	15.4	4.1	11.8
6/2/2023	10.1	9.3	17.4	2.1	4.7	18.8

Sample Date	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
15/2/2023	16.80	10.3	17.4	11.8	10.2	16.0
3/3/2023	30.0	20.0	15.0	20.0	15.0	15.0
7/3/2023	32.2	13.8	13.4	10.6	17.6	38.9
21/3/2023	31.6	12.6	15.3	16.4	12.7	33.0
31/3/2023	26.8	22.3	18.4	15.8	12.8	26.0
10/4/2023	7.2	10.8	14.8	10.9	8.5	15.3
17/4/2023	26.8	22.3	18.4	15.8	12.8	26.0
1/5/2023	63.3	15.6	15.3	16.7	13.0	19.0
9/5/2023	40.2	41.6	45.3	40.9	27.1	29.3
22/5/2023	66.4	51.0	36.8	39.0	35.1	32.0
9/6/2023	64.0	51.7	44.3	33.9	35.1	20.5
19/6/2023	80.4	51.4	53.3	22.4	85.4	30.7
4/7/2023	41.3	14.8	16.8	21.1	9.9	19.7
18/7/2023	15.9	20.1	21.9	29.4	11.3	23.6
4/8/2023	18.4	11.7	11.7	27.0	6.8	41.7
21/8/2023	51.1	23.4	18.6	18.7	5.4	22.9
4/9/2023	9.3	13.3	9.0	11.5	4.5	18.3
18/9/2023	11.0	12.3	9.2	9.9	6.3	17.2
4/10/2023	34.5	48.4	39.7	36.6	21.4	19.4
18/10/2023	78.9	48.0	45.3	47.7	29.1	21.5
1/11/2023	37.7	7.4	8.4	10.9	5.1	16.7
15/11/2023	41.1	4.3	9.5	7.2	4.3	16.0
28/11/2023	28.8	13.1	27.8	15.6	19.3	23.0
4/12/2023	64.8	34.2	30.2	20.8	21.6	25.9
13/12/2023	19.8	12.6	11.6	6.9	12.8	29.7
29/12/2023	22.0	15.5	16.2	15.4	12.3	35.7
11/1/2023	35.9	34.6	33.9	19.3	21.6	16.1

APPENDIX A: RAW WATER QUALITY RESULTS

Date	Ferny Creek	Frankston	Moorabbin	Scoresby	Combined Average Rainfall (mm)	Emergency Monitoring Trigger
Sunday, 1 January 2023	0.2	0.0	0.0	0.0	0.1	10
Monday, 2 January 2023	4.4	0.2	5.2	2.2	3.0	10
Tuesday, 3 January 2023	0.4	0.4	0.0	0.0	0.2	10
Wednesday, 4 January 2023	0.0	0.0	0.0	0.0	0.0	10
Thursday, 5 January 2023	8.6	3.8	1.6	2.8	4.2	10
Friday, 6 January 2023	0.2	0.2	0.0	0.0	0.1	10
Saturday, 7 January 2023	0.0	0.0	0.0	0.0	0.0	10
Sunday, 8 January 2023	0.0	0.0	0.0	0.0	0.0	10
Monday, 9 January 2023	0.0	0.0	0.0	0.0	0.0	10
Tuesday, 10 January 2023	0.0	0.0	0.0	0.0	0.0	10
Wednesday, 11 January 2023	0.2	0.0		0.0	0.1	10
Thursday, 12 January 2023	0.0	0.0	0.0	0.0	0.0	10
Friday, 13 January 2023	0.0	0.0	0.0	0.0	0.0	10
Saturday, 14 January 2023	0.4	0.0	0.0	0.0	0.1	10
Sunday, 15 January 2023	2.0	0.0	0.0	0.0	0.5	10
Monday, 16 January 2023	1.6	0.0	0.0	0.2	0.5	10
Tuesday, 17 January 2023	0.0	0.0	0.0	0.0	0.0	10
Wednesday, 18 January 2023	10.6	7.0	6.4	9.4	8.4	10
Thursday, 19 January 2023	19.2	0.6	2.0	7.2	7.3	10
Friday, 20 January 2023	0.2	0.0	0.0	0.0	0.1	10
Saturday, 21 January 2023	0.0	0.0	0.0	0.0	0.0	10
Sunday, 22 January 2023	0.0	0.0	0.0	0.0	0.0	10
Monday, 23 January 2023	0.0	0.0	0.0	0.0	0.0	10
Tuesday, 24 January 2023	0.0	0.0	0.0	0.0	0.0	10
Wednesday, 25 January 2023	35.8	0.0	0.0	2.4	9.6	10
Thursday, 26 January 2023	0.4	0.0	0.0	0.0	0.1	10
Friday, 27 January 2023	0.4	0.0	0.0	0.0	0.1	10
Saturday, 28 January 2023	0.0	0.0	0.0	0.0	0.0	10
Sunday, 29 January 2023	0.2	0.0	0.2	0.2	0.2	10
Monday, 30 January 2023	0.2	0.0	0.0	0.0	0.1	10
Tuesday, 31 January 2023	0.0	0.0	0.0	0.0	0.0	10
Wednesday, 1 February 2023	0.0	0.0	0.0	0.0	0.0	10
Thursday, 2 February 2023	1.8	1.4	0.2	0.2	0.9	10
Friday, 3 February 2023	17.0	11.2	14.0	12.6	13.7	10
Saturday, 4 February 2023	12.2	8.8	7.4	9.6	9.5	10
Sunday, 5 February 2023	10.8	1.0	2.2	4.6	4.7	10
Monday, 6 February 2023	0.4	0.0	0.2	0.0	0.2	10
Tuesday, 7 February 2023	1.0	0.0	0.0	0.2	0.3	10
Wednesday, 8 February 2023	0.0	0.0	0.0	0.0	0.0	10
Thursday, 9 February 2023	0.0	0.0	0.0	0.0	0.0	10
Friday, 10 February 2023	0.0	0.0	0.0	0.0	0.0	10

Date	Ferny Creek	Frankston	Moorabbin	Scoresby	Combined Average Rainfall (mm)	Emergency Monitoring Trigger
Saturday, 11 February 2023	0.0	0.0	0.0	0.0	0.0	10
Sunday, 12 February 2023	3.8	1.8	0.4	0.6	1.7	10
Monday, 13 February 2023	1.4	0.0	0.0	0.4	0.5	10
Tuesday, 14 February 2023	0.0	0.0	0.0	0.0	0.0	10
Wednesday, 15 February 2023	0.0	0.0	0.0	0.0	0.0	10
Thursday, 16 February 2023	0.0	0.0	0.0	0.0	0.0	10
Friday, 17 February 2023	0.0	0.2	0.0	0.0	0.1	10
Saturday, 18 February 2023	1.2	0.0	0.2	0.2	0.4	10
Sunday, 19 February 2023	0.0	0.0	0.0	0.0	0.0	10
Monday, 20 February 2023	0.0	0.0	0.0	0.0	0.0	10
Tuesday, 21 February 2023	1.6	0.0	0.0	0.0	0.4	10
Wednesday, 22 February 2023	0.4	0.0	0.0	0.2	0.2	10
Thursday, 23 February 2023	0.0	0.0	0.0	0.0	0.0	10
Friday, 24 February 2023	0.0	0.0	0.0	0.0	0.0	10
Saturday, 25 February 2023	0.0	0.0	0.0	0.0	0.0	10
Sunday, 26 February 2023	2.4		0.8	1.0	1.4	10
Monday, 27 February 2023	0.8	0.2	2.0	0.2	0.8	10
Tuesday, 28 February 2023	1.0	0.2	0.0	0.0	0.3	10
Wednesday, 1 March 2023	2.2		0.6	0.2	1.0	10
Thursday, 2 March 2023	1.0	0.4	0.2	0.4	0.5	10
Friday, 3 March 2023	0.8	0.2	0.0	0.0	0.3	10
Saturday, 4 March 2023	0.2	0.2	0.0	0.0	0.1	10
Sunday, 5 March 2023	0.0	0.0	0.0	0.0	0.0	10
Monday, 6 March 2023	20.0	12.2	10.4	14.0	14.2	10
Tuesday, 7 March 2023	0.4	2.8	0.0	0.2	0.9	10
Wednesday, 8 March 2023	6.6	1.2	0.4	1.4	2.4	10
Thursday, 9 March 2023	0.0	0.0	0.0	0.0	0.0	10
Friday, 10 March 2023	0.0	0.0	0.0	0.2	0.1	10
Saturday, 11 March 2023	0.0	0.0	0.0	0.0	0.0	10
Sunday, 12 March 2023	0.0	0.0	0.0	0.0	0.0	10
Monday, 13 March 2023	0.0	0.0	0.0	0.0	0.0	10
Tuesday, 14 March 2023	0.0	0.0	0.0	0.0	0.0	10
Wednesday, 15 March 2023	0.2	0.0	0.0	0.0	0.1	10
Thursday, 16 March 2023	0.0	0.0	0.0	0.0	0.0	10
Friday, 17 March 2023	7.4	2.8	4.0	2.8	4.3	10
Saturday, 18 March 2023	0.0	0.0	0.0	0.2	0.1	10
Sunday, 19 March 2023	0.6	0.0	0.0	0.0	0.2	10
Monday, 20 March 2023	0.6	0.0	0.0	0.0	0.2	10
Tuesday, 21 March 2023	0.2	0.0	0.0	0.0	0.1	10
Wednesday, 22 March 2023	11.8	2.0	1.2	3.4	4.6	10
Thursday, 23 March 2023	0.2	0.8	4.8	0.2	1.5	10
Friday, 24 March 2023	15.8	2.2	3.8	6.8	7.2	10

Date	Ferny Creek	Frankston	Moorabbin	Scoresby	Combined Average Rainfall (mm)	Emergency Monitoring Trigger
Saturday, 25 March 2023	0.2	0.0	0.0	0.0	0.1	10
Sunday, 26 March 2023	0.0	0.0	0.0	0.0	0.0	10
Monday, 27 March 2023	0.0	0.2	0.0	0.0	0.1	10
Tuesday, 28 March 2023	12.2	5.4	0.6	5.4	5.9	10
Wednesday, 29 March 2023	9.6	0.0	0.2	4.4	3.6	10
Thursday, 30 March 2023	34.0	10.8	0.0	20.6	16.4	10
Friday, 31 March 2023	9.0	4.2	0.0	1.4	3.7	10
Saturday, 1 April 2023	5.8	1.8	0.8	3.6	3.0	10
Sunday, 2 April 2023	0.0	0.2	0.0	0.0	0.1	10
Monday, 3 April 2023	0.0	0.2	0.0	0.0	0.1	10
Tuesday, 4 April 2023	0.2	0.0	0.0	0.0	0.1	10
Wednesday, 5 April 2023	0.0	0.0	0.0	0.0	0.0	10
Thursday, 6 April 2023	0.0	0.0	0.0	0.0	0.0	10
Friday, 7 April 2023	6.2	2.4	3.0	3.4	3.8	10
Saturday, 8 April 2023	11.4	7.8	11.2	12.6	10.8	10
Sunday, 9 April 2023	31.6	11.4	9.6	11.2	16.0	10
Monday, 10 April 2023	6.2	0.6	1.8	2.6	2.8	10
Tuesday, 11 April 2023	1.2	0.4	0.6	0.2	0.6	10
Wednesday, 12 April 2023	5.8	5.4	6.2	3.6	5.3	10
Thursday, 13 April 2023	2.0	0.6	0.2	1.0	1.0	10
Friday, 14 April 2023	0.4	0.2	0.0	0.2	0.2	10
Saturday, 15 April 2023	0.0		0.2	0.0	0.1	10
Sunday, 16 April 2023	56.6	35.6	46.6	54.8	48.4	10
Monday, 17 April 2023	6.0	2.2	2.6	2.8	3.4	10
Tuesday, 18 April 2023	0.2	0.0	0.0	0.0	0.1	10
Wednesday, 19 April 2023	4.6	1.6	2.2	2.8	2.8	10
Thursday, 20 April 2023	0.0	0.8	0.0	0.2	0.3	10
Friday, 21 April 2023	0.2	0.0	0.2	0.0	0.1	10
Saturday, 22 April 2023	0.0		0.0	0.0	0.0	10
Sunday, 23 April 2023	0.0	0.0	0.0	0.0	0.0	10
Monday, 24 April 2023	0.0	0.2	0.0	0.0	0.1	10
Tuesday, 25 April 2023	0.0	0.0	0.0		0.0	10
Wednesday, 26 April 2023	0.0	0.0	0.0		0.0	10
Thursday, 27 April 2023	0.0	0.0	0.0		0.0	10
Friday, 28 April 2023	2.6	2.4	1.8	0.8	1.9	10
Saturday, 29 April 2023	8.6	11.4	11.2	9.8	10.3	10
Sunday, 30 April 2023	0.0	0.8	0.2	0.6	0.4	10
Monday, 1 May 2023	0.0	0.0	0.0	0.0	0.0	10
Tuesday, 2 May 2023	0.0	0.0	0.0	0.0	0.0	10
Wednesday, 3 May 2023	6.8	9.0	13.2	11.8	10.2	10
Thursday, 4 May 2023	2.8	2.6	1.6	3.6	2.7	10
Friday, 5 May 2023	0.2	0.0	0.0	0.0	0.1	10

Date	Ferny Creek	Frankston	Moorabbin	Scoresby	Combined Average Rainfall (mm)	Emergency Monitoring Trigger
Saturday, 6 May 2023	19.0	23.4	14.4	12.6	17.4	10
Sunday, 7 May 2023	6.8	9.2	10.4	3.0	7.4	10
Monday, 8 May 2023	2.4	0.6	0.4	3.0	1.6	10
Tuesday, 9 May 2023	22.0	7.8	12.2	19.2	15.3	10
Wednesday, 10 May 2023	9.0	1.8	15.6	4.8	7.8	10
Thursday, 11 May 2023	0.2	0.0	0.0	0.2	0.1	10
Friday, 12 May 2023	0.2	0.0	0.0	0.0	0.1	10
Saturday, 13 May 2023	0.2	0.0	0.0	0.0	0.1	10
Sunday, 14 May 2023	0.0	0.0	0.0	0.2	0.1	10
Monday, 15 May 2023	0.2	0.0	0.0	0.0	0.1	10
Tuesday, 16 May 2023	1.6	0.0	0.0	5.2	1.7	10
Wednesday, 17 May 2023	6.0	0.4	0.0	2.4	2.2	10
Thursday, 18 May 2023	0.0	0.0	0.2	0.0	0.1	10
Friday, 19 May 2023	0.4	1.0	0.0	0.2	0.4	10
Saturday, 20 May 2023	5.2	3.2	2.2	2.4	3.3	10
Sunday, 21 May 2023	22.2	8.8	6.6	9.4	11.8	10
Monday, 22 May 2023	0.0	0.0	0.0	0.2	0.1	10
Tuesday, 23 May 2023	0.2	0.0	0.0	0.0	0.1	10
Wednesday, 24 May 2023	0.0	0.0	0.0	0.0	0.0	10
Thursday, 25 May 2023	0.0	0.0	0.0	0.0	0.0	10
Friday, 26 May 2023	9.8	10.4	5.6	5.8	7.9	10
Saturday, 27 May 2023	7.0	0.2	0.4	1.0	2.2	10
Sunday, 28 May 2023	9.6	4.6	6.6	7.2	7.0	10
Monday, 29 May 2023	12.6	2.6	2.4	8.8	6.6	10
Tuesday, 30 May 2023	0.8	0.0	0.0	0.2	0.3	10
Wednesday, 31 May 2023	10.0	0.0	0.0	0.0	2.5	10
Thursday, 1 June 2023	7.0	3.0	0.2	4.4	3.7	10
Friday, 2 June 2023	0.0	0.0	0.0	0.0	0.0	10
Saturday, 3 June 2023	4.2		4.6	3.6	4.1	10
Sunday, 4 June 2023	0.8		0.0	0.2	0.3	10
Monday, 5 June 2023	0.0		0.0	0.0	0.0	10
Tuesday, 6 June 2023	0.0		0.2	0.2	0.1	10
Wednesday, 7 June 2023	1.6	0.0	0.2	1.4	0.8	10
Thursday, 8 June 2023	21.2	11.2	11.0	11.6	13.8	10
Friday, 9 June 2023	9.2	4.0	4.6	7.8	6.4	10
Saturday, 10 June 2023	0.0	0.0	0.0	0.0	0.0	10
Sunday, 11 June 2023	0.0	0.0	0.0	0.0	0.0	10
Monday, 12 June 2023	0.0	0.0	0.0	0.0	0.0	10
Tuesday, 13 June 2023	0.0	0.0	0.0	0.0	0.0	10
Wednesday, 14 June 2023	5.8	1.2	1.8	2.0	2.7	10
Thursday, 15 June 2023	1.0	0.0	0.0	0.4	0.4	10
Friday, 16 June 2023	1.2	0.0	0.0	0.2	0.4	10

Date	Ferny Creek	Frankston	Moorabbin	Scoresby	Combined Average Rainfall (mm)	Emergency Monitoring Trigger
Saturday, 17 June 2023	0.0	0.0	0.0	0.0	0.0	10
Sunday, 18 June 2023	11.8	10.8	10.6	7.4	10.2	10
Monday, 19 June 2023	17.0	14.2	13.8	12.6	14.4	10
Tuesday, 20 June 2023	3.6	10.2	0.6	2.4	4.2	10
Wednesday, 21 June 2023	0.2	0.4	0.2	0.0	0.2	10
Thursday, 22 June 2023	0.0	0.0	0.0	0.0	0.0	10
Friday, 23 June 2023	2.8	5.4	3.8	1.0	3.3	10
Saturday, 24 June 2023	2.4	0.0	1.8	0.6	1.2	10
Sunday, 25 June 2023	0.4	2.2	1.0	0.4	1.0	10
Monday, 26 June 2023	2.4	2.4	0.0	0.8	1.4	10
Tuesday, 27 June 2023	5.0	0.0	0.6	2.6	2.1	10
Wednesday, 28 June 2023	0.2	0.4	0.4	0.0	0.3	10
Thursday, 29 June 2023	16.2	3.2	7.2	5.6	8.1	10
Friday, 30 June 2023	2.4	0.0	0.0	0.0	0.6	10
Saturday, 1 July 2023	11.6	2.8	0.4	0.6	3.9	10
Sunday, 2 July 2023	3.0	1.6	0.8	1.0	1.6	10
Monday, 3 July 2023	0.8	0.4	0.2	0.4	0.5	10
Tuesday, 4 July 2023	0.0	0.0	0.0	0.0	0.0	10
Wednesday, 5 July 2023	8.0	2.2	1.8	2.8	3.7	10
Thursday, 6 July 2023	0.2	0.0	0.2	0.2	0.2	10
Friday, 7 July 2023	3.6	0.6	0.8	1.6	1.7	10
Saturday, 8 July 2023	2.2	4.0	3.0	1.6	2.7	10
Sunday, 9 July 2023	7.8	0.2	0.0	1.6	2.4	10
Monday, 10 July 2023	6.6	0.8	1.4	1.4	2.6	10
Tuesday, 11 July 2023	3.0	0.0	0.0	0.2	0.8	10
Wednesday, 12 July 2023	0.2	0.0	0.0		0.1	10
Thursday, 13 July 2023	0.0	0.0	0.0	0.0	0.0	10
Friday, 14 July 2023	0.0	0.0	0.0	0.0	0.0	10
Saturday, 15 July 2023	0.0	0.0	0.2	0.0	0.1	10
Sunday, 16 July 2023	1.8	1.6	0.8	0.4	1.2	10
Monday, 17 July 2023	0.2	0.0	0.0	0.0	0.1	10
Tuesday, 18 July 2023	0.0	0.0	0.0	0.0	0.0	10
Wednesday, 19 July 2023	2.6	2.4	3.4	2.0	2.6	10
Thursday, 20 July 2023	0.0	0.0	0.0	0.0	0.0	10
Friday, 21 July 2023	4.4	2.4	1.4	2.6	2.7	10
Saturday, 22 July 2023	0.2	0.0	0.0	0.0	0.1	10
Sunday, 23 July 2023	0.0	0.0	0.2	0.0	0.1	10
Monday, 24 July 2023	7.0	3.8	1.0	1.8	3.4	10
Tuesday, 25 July 2023	2.4	0.8	0.0	0.6	1.0	10
Wednesday, 26 July 2023	0.4	0.0	0.2	0.0	0.2	10
Thursday, 27 July 2023	0.0	0.0	0.0	0.0	0.0	10
Friday, 28 July 2023	11.8		7.8	10.0	9.9	10

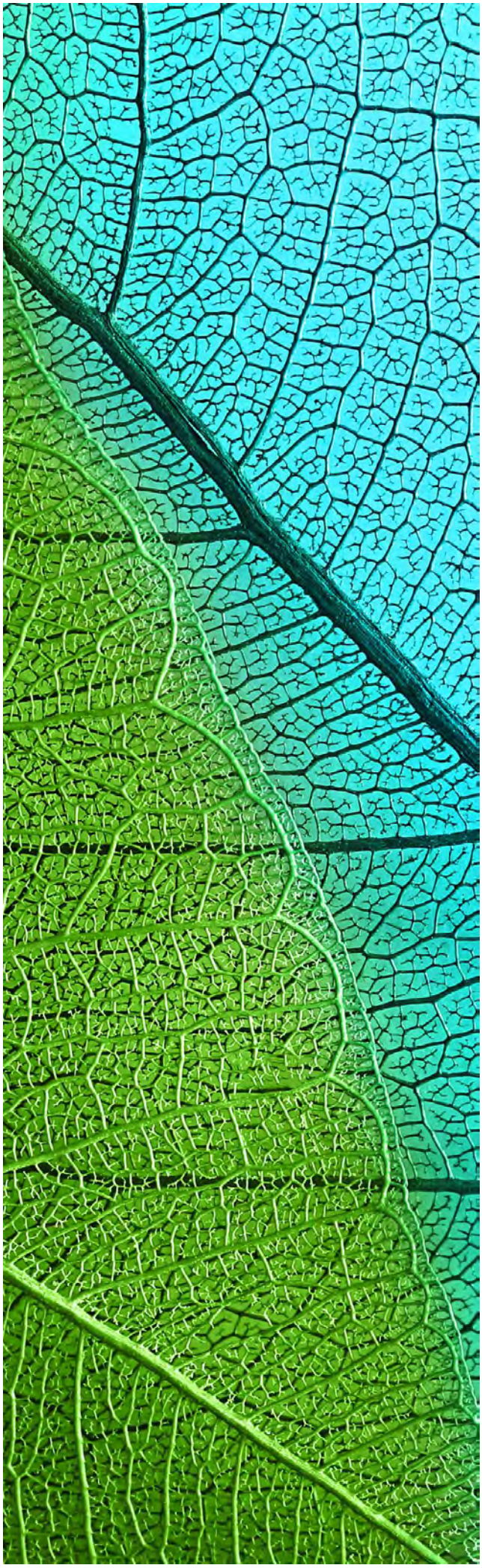
Date	Ferny Creek	Frankston	Moorabbin	Scoresby	Combined Average Rainfall (mm)	Emergency Monitoring Trigger
Saturday, 29 July 2023	0.0	0.0	0.0	0.0	0.0	10
Sunday, 30 July 2023	0.0		0.0	0.0	0.0	10
Monday, 31 July 2023	5.4	2.6	2.6	6.4	4.3	10
Tuesday, 1 August 2023	0.4	0.0	0.2	0.0	0.2	10
Wednesday, 2 August 2023	1.8	0.0	0.0	0.0	0.5	10
Thursday, 3 August 2023	0.2	0.0	0.0	0.0	0.1	10
Friday, 4 August 2023	0.0	0.0	0.0	0.0	0.0	10
Saturday, 5 August 2023	0.6	4.2	1.0	0.0	1.5	10
Sunday, 6 August 2023	0.4	0.4	0.0	0.2	0.3	10
Monday, 7 August 2023	0.0	0.4	0.2	0.0	0.2	10
Tuesday, 8 August 2023	0.2	0.2			0.2	10
Wednesday, 9 August 2023	0.2		0.0	0.0	0.1	10
Thursday, 10 August 2023	8.6	6.2	4.0		6.3	10
Friday, 11 August 2023	0.2	1.4	0.0	0.0	0.4	10
Saturday, 12 August 2023	0.6	0.0	0.2	0.2	0.3	10
Sunday, 13 August 2023	6.8	0.4	0.8	3.8	3.0	10
Monday, 14 August 2023	0.4	0.6	0.0	0.2	0.3	10
Tuesday, 15 August 2023	0.0	0.0	0.2	0.0	0.1	10
Wednesday, 16 August 2023	0.2		0.0	0.2	0.1	10
Thursday, 17 August 2023	0.2		0.2		0.2	10
Friday, 18 August 2023	12.4	7.4	6.8	8.0	8.7	10
Saturday, 19 August 2023	16.4	3.8	3.2	7.2	7.7	10
Sunday, 20 August 2023	2.8	0.0	0.0	0.0	0.7	10
Monday, 21 August 2023	0.4	0.0	0.2	0.0	0.2	10
Tuesday, 22 August 2023	0.6	1.0	0.0	0.2	0.5	10
Wednesday, 23 August 2023	22.0	3.4	3.0	7.4	9.0	10
Thursday, 24 August 2023	0.2	0.0	0.0	0.0	0.1	10
Friday, 25 August 2023	0.0		0.0	0.0	0.0	10
Saturday, 26 August 2023	0.4		0.0	0.0	0.1	10
Sunday, 27 August 2023	0.0	0.0	0.0	0.0	0.0	10
Monday, 28 August 2023	0.2	0.0	0.0	0.0	0.1	10
Tuesday, 29 August 2023	0.8	0.2	0.2	0.4	0.4	10
Wednesday, 30 August 2023	10.2	4.8	3.0	7.8	6.5	10
Thursday, 31 August 2023	8.2	0.0	0.4	2.4	2.8	10
Friday, 1 September 2023	7.2	2.4	2.2	2.0	3.5	10
Saturday, 2 September 2023	0.2	0.0	0.0	0.0	0.1	10
Sunday, 3 September 2023	0.0	0.0	0.0	0.2	0.1	10
Monday, 4 September 2023	0.0	0.0	0.0	0.0	0.0	10
Tuesday, 5 September 2023	12.0	3.0	6.2	12.4	8.4	10
Wednesday, 6 September 2023	3.6	1.0	0.4	1.2	1.6	10
Thursday, 7 September 2023	0.0	0.0	0.0	0.0	0.0	10
Friday, 8 September 2023	9.0	7.0	5.2	7.6	7.2	10

Date	Ferny Creek	Frankston	Moorabbin	Scoresby	Combined Average Rainfall (mm)	Emergency Monitoring Trigger
Saturday, 9 September 2023	10.4	14.2	0.8	3.4	7.2	10
Sunday, 10 September 2023	0.0	1.8	0.0	0.2	0.5	10
Monday, 11 September 2023	0.4	0.0	0.0	0.0	0.1	10
Tuesday, 12 September 2023	0.0	0.2	0.0	0.0	0.1	10
Wednesday, 13 September 2023	0.0	0.0	0.0	0.0	0.0	10
Thursday, 14 September 2023	0.0	0.0	0.0	0.0	0.0	10
Friday, 15 September 2023	0.0	0.0	0.0	0.0	0.0	10
Saturday, 16 September 2023	0.0	0.0	0.0	0.0	0.0	10
Sunday, 17 September 2023	0.0	0.0	0.0	0.0	0.0	10
Monday, 18 September 2023	0.0	0.0	0.0	0.0	0.0	10
Tuesday, 19 September 2023	0.0	0.0	0.0	0.0	0.0	10
Wednesday, 20 September 2023	5.2	0.8	0.8	2.6	2.4	10
Thursday, 21 September 2023	3.6	2.0	0.8	1.6	2.0	10
Friday, 22 September 2023	1.4	0.2	0.0		0.5	10
Saturday, 23 September 2023	0.0	0.0	0.0	0.0	0.0	10
Sunday, 24 September 2023	0.0	0.0	0.0	0.0	0.0	10
Monday, 25 September 2023	0.0	0.0	0.0	0.0	0.0	10
Tuesday, 26 September 2023	0.0	0.0	0.0	0.0	0.0	10
Wednesday, 27 September 2023	0.2	0.0	0.0	0.0	0.1	10
Thursday, 28 September 2023	0.0	0.0	0.0	0.0	0.0	10
Friday, 29 September 2023	0.0	0.0	0.0	0.0	0.0	10
Saturday, 30 September 2023	0.0	0.0	0.0	0.0	0.0	10
Sunday, 1 October 2023	0.0	0.0	0.0		0.0	10
Monday, 2 October 2023		0.0	0.0		0.0	10
Tuesday, 3 October 2023	6.0	7.0	3.2	3.2	4.9	10
Wednesday, 4 October 2023	72.8		25.0	47.4	48.4	10
Thursday, 5 October 2023	9.6	2.4	5.2	2.2	4.9	10
Friday, 6 October 2023	2.0	2.6	7.8		4.1	10
Saturday, 7 October 2023	0.0	0.6	0.0		0.2	10
Sunday, 8 October 2023	0.0	0.0	0.0		0.0	10
Monday, 9 October 2023	0.0	0.0	0.0		0.0	10
Tuesday, 10 October 2023	0.0	0.0	0.0	0.0	0.0	10
Wednesday, 11 October 2023	0.0	0.0	0.0	0.0	0.0	10
Thursday, 12 October 2023	2.8	0.6	1.4	1.0	1.5	10
Friday, 13 October 2023	28.8	11.6	17.2	22.0	19.9	10
Saturday, 14 October 2023	9.6		1.0	1.0	3.9	10
Sunday, 15 October 2023	0.8	0.2	0.0	0.2	0.3	10
Monday, 16 October 2023	18.0	7.2	6.4	11.6	10.8	10
Tuesday, 17 October 2023	6.0	2.0	4.4	3.2	3.9	10
Wednesday, 18 October 2023	0.2		0.0	0.0	0.1	10
Thursday, 19 October 2023	0.0	0.0	0.0		0.0	10
Friday, 20 October 2023	0.0	0.0	0.0		0.0	10

Date	Ferny Creek	Frankston	Moorabbin	Scoresby	Combined Average Rainfall (mm)	Emergency Monitoring Trigger
Saturday, 21 October 2023	0.0	0.0	0.0		0.0	10
Sunday, 22 October 2023	2.0	0.8	1.0	0.6	1.1	10
Monday, 23 October 2023	9.0	1.2	0.8	2.8	3.5	10
Tuesday, 24 October 2023	0.6	0.2	0.0	0.0	0.2	10
Wednesday, 25 October 2023	0.0	0.0	0.0	0.0	0.0	10
Thursday, 26 October 2023	0.2	0.8	2.0		1.0	10
Friday, 27 October 2023	0.4	0.2	0.0		0.2	10
Saturday, 28 October 2023	0.2	0.0	0.0	0.0	0.1	10
Sunday, 29 October 2023	0.0	0.0	0.0	0.0	0.0	10
Monday, 30 October 2023	1.4	0.0	0.0		0.5	10
Tuesday, 31 October 2023	1.2	5.2	3.8	3.6	3.5	10
Wednesday, 1 November 2023	0.2	0.4	0.0	0.0	0.2	10
Thursday, 2 November 2023	0.2	0.0	0.0	0.0	0.1	10
Friday, 3 November 2023	0.0	0.0	0.0	0.0	0.0	10
Saturday, 4 November 2023	0.2	0.0	0.0	0.0	0.1	10
Sunday, 5 November 2023	0.0	0.0	0.0	0.0	0.0	10
Monday, 6 November 2023	0.2	0.0	0.0	0.0	0.1	10
Tuesday, 7 November 2023	0.0	0.0	0.0	0.0	0.0	10
Wednesday, 8 November 2023	5.4	7.6	14.0	3.4	7.6	10
Thursday, 9 November 2023	1.4	3.8	8.0	2.4	3.9	10
Friday, 10 November 2023	0.2	0.0	0.0	0.0	0.1	10
Saturday, 11 November 2023	0.2	0.0	0.0	0.0	0.1	10
Sunday, 12 November 2023	0.0	0.0	0.0	0.0	0.0	10
Monday, 13 November 2023	0.6	0.0	1.4	0.8	0.7	10
Tuesday, 14 November 2023	1.2	0.0	0.2	0.6	0.5	10
Wednesday, 15 November 2023	0.2	0.0	0.0	0.2	0.1	10
Thursday, 16 November 2023	2.8	1.0	3.6	1.8	2.3	10
Friday, 17 November 2023	1.4	0.2	0.2	1.2	0.8	10
Saturday, 18 November 2023	0.0	0.0	0.0	0.0	0.0	10
Sunday, 19 November 2023	0.0	0.0	0.0	0.0	0.0	10
Monday, 20 November 2023	0.2	0.0	0.0	0.0	0.1	10
Tuesday, 21 November 2023	0.0	0.0	0.0	0.0	0.0	10
Wednesday, 22 November 2023	0.2	0.0	0.0	0.0	0.1	10
Thursday, 23 November 2023	0.0	0.0	0.0	0.0	0.0	10
Friday, 24 November 2023	0.0	0.0	0.0	0.0	0.0	10
Saturday, 25 November 2023	16.4	12.2	15.2	15.8	14.9	10
Sunday, 26 November 2023	37.0	22.4	9.0	16.2	21.2	10
Monday, 27 November 2023	8.0	0.2	3.6	2.4	3.6	10
Tuesday, 28 November 2023	1.0	0.0	0.2	0.4	0.4	10
Wednesday, 29 November 2023	4.6	3.0	2.2	1.8	2.9	10
Thursday, 30 November 2023	9.5	10.0	3.2	4.4	6.8	10
Friday, 1 December 2023	4.6	2.6	3.2	2.2	3.2	10

Date	Ferny Creek	Frankston	Moorabbin	Scoresby	Combined Average Rainfall (mm)	Emergency Monitoring Trigger
Saturday, 2 December 2023	12.8	2.2	1.4	4.4	5.2	10
Sunday, 3 December 2023	36.8	10.2	9.0	11.0	16.8	10
Monday, 4 December 2023	0.2	0.0	0.2	0.0	0.1	10
Tuesday, 5 December 2023	0.0	0.0	0.0		0.0	10
Wednesday, 6 December 2023	0.0	0.0	0.0		0.0	10
Thursday, 7 December 2023	0.0	0.0	0.0	0.0	0.0	10
Friday, 8 December 2023	0.4	0.4	0.0	0.0	0.2	10
Saturday, 9 December 2023	9.2	8.2	4.6	5.0	6.8	10
Sunday, 10 December 2023	14.8	13.4	13.2	8.2	12.4	10
Monday, 11 December 2023	1.0	3.4	32.6	1.6	9.7	10
Tuesday, 12 December 2023	0.2	0.0	0.0	0.0	0.1	10
Wednesday, 13 December 2023	0.2	1.2	0.4	0.0	0.5	10
Thursday, 14 December 2023	5.8	2.2	3.0	3.0	3.5	10
Friday, 15 December 2023	0.2	0.0	0.2	0.2	0.2	10
Saturday, 16 December 2023	0.0	0.0	0.0	0.0	0.0	10
Sunday, 17 December 2023	0.2	0.0	0.0	0.0	0.1	10
Monday, 18 December 2023	0.0	0.0	0.0	0.0	0.0	10
Tuesday, 19 December 2023	5.0	3.4	3.2	2.0	3.4	10
Wednesday, 20 December 2023	4.4	0.6	1.0	1.8	2.0	10
Thursday, 21 December 2023	0.0	0.0	0.0	0.0	0.0	10
Friday, 22 December 2023	0.0	0.0	0.0	0.0	0.0	10
Saturday, 23 December 2023	0.0	0.0	0.0	0.0	0.0	10
Sunday, 24 December 2023	0.0	0.0	0.0	0.0	0.0	10
Monday, 25 December 2023	13.4	5.6	9.8	10.4	9.8	10
Tuesday, 26 December 2023	33.4	38.8	22.8	20.0	28.8	10
Wednesday, 27 December 2023	7.6	0.0	7.8	3.2	4.7	10
Thursday, 28 December 2023		0.0	0.4	0.0	0.1	10
Friday, 29 December 2023	2.4	0.0	0.0	0.2	0.7	10
Saturday, 30 December 2023	1.2		0.0	0.2	0.5	10
Sunday, 31 December 2023	2.4	2.2	0.2	1.2	1.5	10

Appendix 3: Vegetation monitoring report for the habitat buffers (2023) by Nature Advisory



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

December 2023
Report No. 14090.8 (19.0)

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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 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 located 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 Packenham 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 Packenham

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

N

Metres
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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 Packenham 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 7

Quadrat 9

Quadrat 10

Quadrat 11

Quadrat 13

Quadrat 15

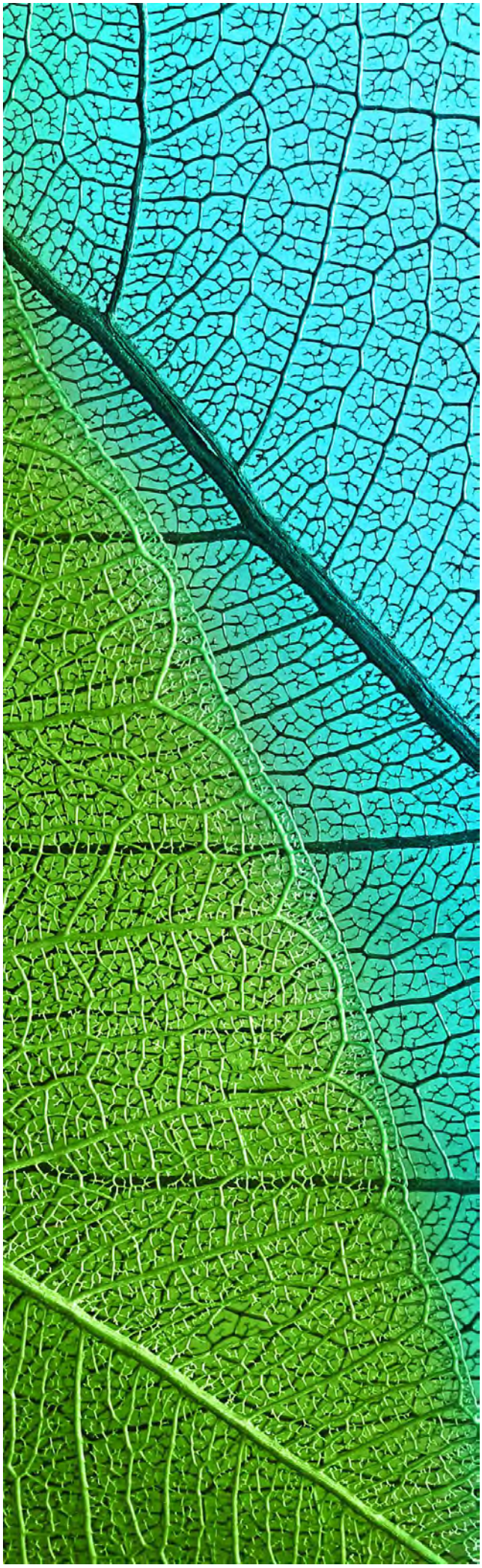
Quadrat 16

Quadrat 17

Quadrat 19

Quadrat 20

Appendix 4: Offset site monitoring report (December 2023) by Nature Advisory



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

January 2024
Report No. 14090.7 (1.0)

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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 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

N

Metres 20 40 60 80 100

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Figure 1: Study area and monitoring observations - Created by: - E:\GIS\2014 jobs\14090\14090.07 Figure 1 Study area and monitoring observations 240124.aprx

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

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

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

* Denotes that this plant species is a weed.