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Our Ref: 000118.10

27 January 2022

Narre Warren Central Pty Ltd
Att Mr Paul Nio
52-54 Rathdowne Street
Carlton VIC 3053

Via email: pnio@osanrae.com.au
CC: cmistica@fidus.com.au; inga@natureadvisory.com.au

Dear Paul

Re: 2021 Annual Report of Water Quality and Dwarf Galaxias Monitoring for Casey Green

Aquatica Environmental was engaged by Narre Warren Central to undertake the 2021 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 Department of Agriculture, Water and the Environmental (DAWE) to include the following monitoring requirements (DE 2016, including Aquatica Environmental 2015):

- **Dwarf Galaxias**: Survey Dwarf Galaxias and predatory fish populations at established/baseline and translocation release sites in November/December annually during construction and for least five years post completion of construction on the site.
- **Aquatic and riparian habitat condition**: Assess condition in conjunction with the Dwarf Galaxias survey.
- **Water quality**: Assess water quality at established sites once per fortnight and/or after rainfall events >10mm during construction, including during Dwarf Galaxias monitoring (Condition 3b and 3d).

This report has been produce to provide a summary record of the 2020 water quality and Dwarf Galaxias monitoring in accordance with the DGMP and DGSTP.

1 Methodologies

1.1 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 surveys were undertaken development of the site (and neighbouring sites) has progressed significantly and not all of the originally established site still exist. Figure 1 shows the sites that were monitored during the 2021 monitoring year, with the following changes occurring through the year:

- Due to dense vegetation growth, Sites WQ7 and DG3 were not able to be accessed from about February onwards.

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

Site
Wetland
Structure
Connector or drain
Retained Habitat

Monitoring Points
Water Quality Site (WQ)
Dwarf Galaxias Site (DG)

Casey Green, 96-166 Centre Road, Narre Warren

Dwarf Galaxias and Water Quality monitoring sites

Figure 1

AQUATICA ENVIRONMENTAL

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1.2 Dwarf Galaxias and Predatory Fish Monitoring

Dwarf Galaxias and predatory fish monitoring was undertaken at Site DG1 and DG2 identified in Figure 1. This sites align with previous years monitoring, with Sites DG2 corresponding to where Dwarf Galaxia were released during the 2016 salvage and translocation program (Aquatica Environmental 2017).

Sampling for adult Dwarf Galaxias and predatory 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.

1.3 Aquatic and Riparian Habitat Condition Monitoring

Aquatic and riparian habitat condition was visually and assessed during and at the Dwarf Galaxias survey sites. 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).

1.4 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.

2 Results

2.1 Sampling Frequency and Conditions

During the 2021 monitoring year a total of 30 sampling events had occurred in 2020, including 15 scheduled, 14 post >10mm rainfall events and one during annual Dwarf Galaxias monitoring.

The annual Dwarf Galaxias monitoring and associated water quality sampling occurred on the 22nd and 23rd November.

A summary of the 2020 Dwarf Galaxias and water quality sampling schedule is provided in Table 1.

Figure 2 shows the results of the rainfall monitoring, based the average daily rainfall between the Scoresby, Moorabbin and Ferny Creek weather stations.

Table 1 2021 sampling schedule

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

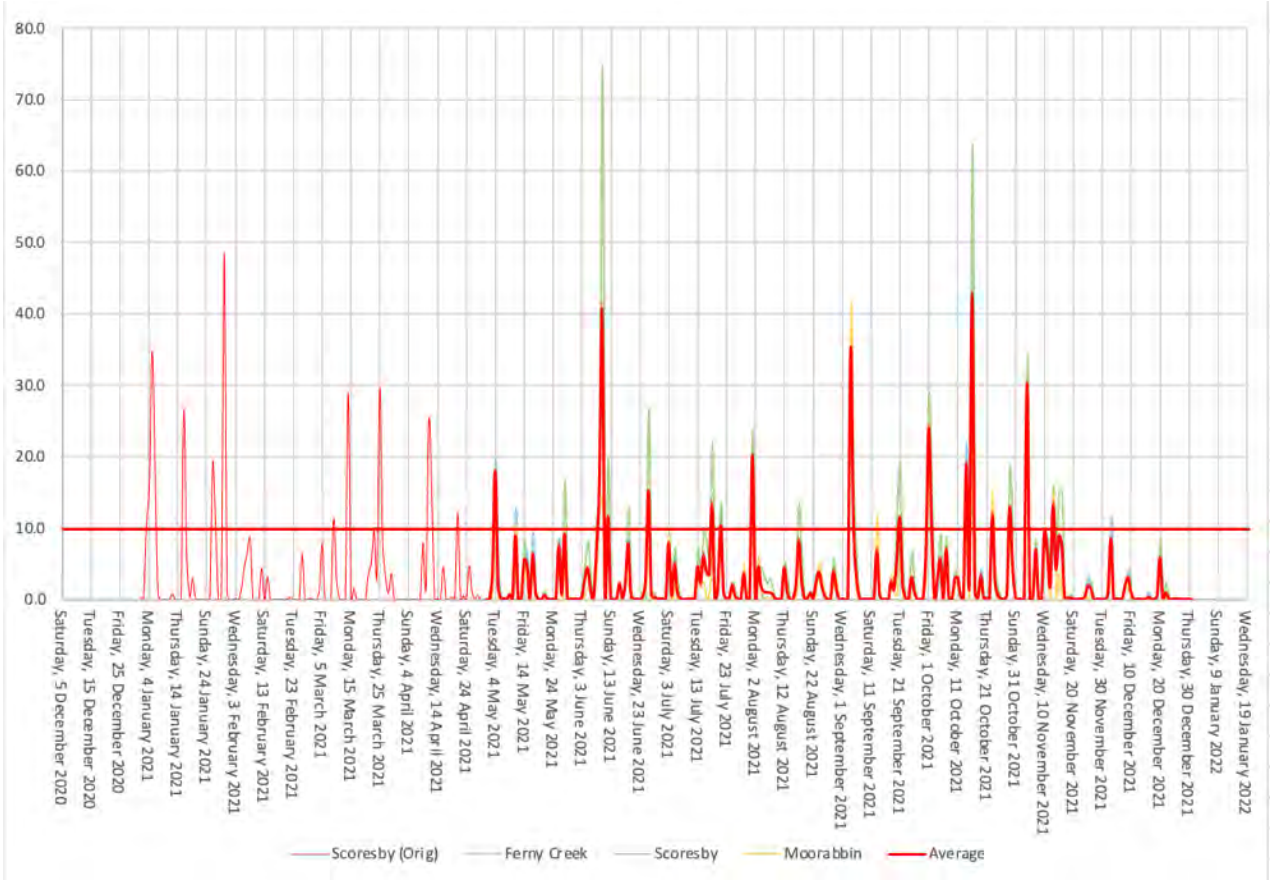

Figure 2 Rainfall chart

2.2 Dwarf Galaxias and Predatory Fish

The survey was undertaken on 22nd and 23rd November 2021. The weather during the survey was mild to warm with temperatures ranging between 20°C (day time maximum) and 8.1°C (night time minimum). No rain fell during the survey The seasonal timing for the survey (late spring) was ideal and young of year and adults would be expected to be found following the usual late autumn to spring breeding season.

A total of 17 Dwarf Galaxias were recorded during the November survey, all adults. All were recorded at Site DG2, with none at DG1 was too dry/low water to survey.

Newly recorded was Flathead Gudgeon (*Philypnodon grandiceps*) (Plate 1 and 2), which is a small beneficial native that cohabitates well with Dwarf Galaxias. It is likely they have entered the area due and are utilising the swales.

Based on the number and condition of the individuals recorded during this survey, it appears there has been another good year for the species on the site (i.e. similarly 2019 and 2020). 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 consistent water levels to the retained habitat, but limiting pest fish ingress to the retained habitat drain. Also see section where it is noted that aquatic an emergent vegetation is improving providing an even larger area suitable for supporting Dwarf Galaxia into the constructed swales.

The results of the November 2021 survey are provided in Table 2 and compared to previous rounds of monitoring.

Similarly to the 2018 and 2019 surveys, Mosquitofish (*Gambusia holbrooki*) (Plate 2a) were recorded, but in larger numbers, especially in the swales where there is more open and warmer water. However, they do not appear to be making inroads into the denser shadier habitat at retained drain. It is also likely as the area and density of new vegetation increases, they will be further excluded.

Table 2 Species and number of individuals recorded

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

Plate 1 Dwarf Galaxias, Flathead Gudgeon and tadpoles

Plate 2 Flathead Gudgeon and Dwarf Galaxias

2.3 Aquatic and Riparian Habitat Condition

Aquatic and riparian habitat condition was assessed during the Dwarf Galaxias survey at sites DG1 and DG2 (noting DG3 is no longer accessible).

During the survey sites DG1 had mostly dried, with negligible surface water present at the time. Habitat conditions at this site were similar to previous years of monitoring with some sparse patches of aquatic an emergent vegetation and an overstory of Melaleuca, in much the same overall condition as during previous years of monitoring.

Aquatic and riparian habitat at site DG 2 appeared to have further improved upon that observed during the 2019 and 2020 surveys. As previously reported the constructed swales either side of this habitat maintain a relatively consistent water level yet still allowing some drying and filling on an ephemeral basis. This provides excellent conditions through the retained habitat for aquatic, emergent and overstory vegetation. Compared to the 2020 survey there appeared to be a continued increase in the area, density and abundance in particular of emergent vegetation such as Persicaria and Juncus, and further recruitment of Melaleuca (Plate 3a). This new and improving vegetation is now extending well into and along the constructed swales Plate 3b). .

a b

Plate 3 Habitat edge vegetation at Site DG2 (a) and the increasingly vegetated swale (b) both showing Melaleuca recruitment

2.4 Water Quality

The raw water quality data is provided in Appendix B. Table 1 provides a summary of the relevant statistical analysis and/or relevant Environmental Reference Standards (ERS; EPA 2021) objectives for the Urban segment, Lowlands of Western Port catchment.

Overall the 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 and the lowest in August. The highest individual temperature was 23.39°C at Site 5 on the 6th January and the lowest was 9.19 °C at Site 6 on 321st August. On average Site 1 had the highest temperatures, apparently due to the discharge of water from the culvert. Site 6 had the lowest due to shading by the dense vegetation at the site.

- pH was on average consistent across all sites, not appearing to be linked to seasonal or weather variations and was withing the ERS objectives at all sites.
- Electrical conductivity was consistently and significantly higher at Sites 6 (mean=794 µS/cm compared to 467-595 µS/cm at Sites 1-5), most likely reflective of the lack of direct flows and the concentration of salts due to evaporation. However, the average at Site 6 was lower than previous years, possibly indicating the effects of dilution from the greater water volumes of the attached swales. The ERS objective of ≤500 µS/cm was exceeded at all sites, but only marginally. The levels observed appeared not attributable to the development of the site, rather occurred naturally and/or other influences, and were clearly of no concern for Dwarf Galaxias due to their ongoing presence and increased abundance at the site.
- Percent dissolved oxygen was consistently low across all sites. The ERS objective of ≥70% was not met at any site. Similarly to electrical conductivity, the levels observed were not attributable to the development of the site, rather occurred naturally and/or other influences, and were clearly of no concern for the resident Dwarf Galaxias population.
- Turbidity was on average highest at Site 1, indicating a high turbidity input from the culvert and unknown upstream sources. Site 6 had the lowest average turbidity. The data showed that turbidity reduces through the downstream flowing sites (i.e. Site 1 to 5) with no indication of any observable inputs from the development of the site. 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 not met at any site more due to catchment inputs than the site.

Table 3 Water quality sampling summary

Parameter		ERS Objective	Centre Road Drain Sites					Habitat Sites	
			Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7
Temperature (°C)	Min.	NA	10.16	9.52	9.65	9.44	9.43	9.19	-
	Max.		15.54	14.68	14.71	14.22	15.23	14.13	-
	Mean		15.76	15.03	15.07	14.64	15.63	14.44	-
pH	25th %tile	≥6.4	6.48	6.52	6.58	6.75	6.69	6.57	-
	75th %tile	≤7.9	7.25	7.15	7.11	7.13	7.14	6.96	-
	Mean	NA	6.93	6.87	6.83	6.89	6.89	6.75	-
Electrical Conductivity (µS/cm)	75th %	≤500	681	684	636	555	508	829	-
	Mean	NA	561	595	552	516	467	794	-
Dissolved Oxygen (%)	75th %tile	≥70	53.63	50.20	47.40	51.58	61.90	55.98	-
	Max.	130	88.00	85.90	81.90	75.90	84.30	87.40	-
	Mean	NA	41.46	39.58	39.46	28.60	53.86	48.73	-
Turbidity (NTU)	75th %tile	≤35	67.6	42.6	44.9	39.4	40.4	42.6	-
	Mean	NA	54.9	36.3	41.0	34.7	37.3	34.1	-

Orange highlight = parameter did not meet the ERS objective

Red = worst value, Green = best value

3 Summary and Recommendations

The 2021 annual Dwarf Galaxias monitoring event detected 17 individual Dwarf Galaxias in the retained habitat drain (compared to 25 in 2020, 12 in 2019 and 3 in 2018). This was at the higher end of the previous records indicating that conditions for the species are being maintained. The primary reason for this is the constructed swales result in more water and a more constant water level in the retained habitat drain in a manner that is clearly suited to the resident Dwarf Galaxias population (i.e. Still maintaining ephemerality but not allowing over drying).

The recording of a new small native fish species, Flathead Gudgeon, is also a positive sign of the system's improving function.

Considering this and previous rounds of sampling for the project and historical records (Aquatica Environmental 2017, 2019, 2020 and 2021), 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 a slight 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 of Dwarf Galaxias. This is probably due to the habitat being more suitable to Dwarf Galaxias than the pest/predatory species.

Based on the results of the 2021 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 2022 monitoring year has commenced and in accordant with approved DGSTP (and the project Dwarf Galaxias Management Plan; BL&A 2015) the following monitoring should occur during the year:

- Water quality monitoring: Fortnightly and/or after rainfall events > 10 millimetres until all construction is completed (i.e. all works on site completed) and then monthly following completion.
- 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,

Aaron Jenkin
Director and Principal Ecologist
Aquatica Environmental

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4 References

Aquatica Environmental (2015). Dwarf Galaxias Salvage and Translocation Plan for 96-166 Centre Road, Narre Warren. Report prepared for Narre Warren Central Pty Ltd c/- The Fidus Group Pty Ltd, dated January.

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DSEWPaC (2004). Survey guidelines for Australia's threatened fish. Guidelines for detecting fish listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999. Department of Sustainability, Environment, Water, Population and Community (now Department of the Environment), Canberra.

EPA (2018), State Environmental Protection Policy (Waters). Victorian Environmental Protection Authority.

Appendix a: Water Quality Results

Temperature (°C)

Sample Date	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7
6/1/21	23.68	24.19	23.40	22.91	26.39	22.51	22.86
18/1/21	20.75	24.65	22.69	19.50	23.68	23.99	21.56
27/1/21	19.20	21.09	19.68	20.06	22.94	21.38	
1/2/21	20.65	22.55	22.10	20.00	23.56	20.90	
15/2/21	19.93	18.07	19.33	17.00	19.51	17.03	
10/3/21	18.40	16.31	16.74	16.05	16.89	16.03	
15/3/21	19.00	18.04	18.06	18.09	18.69	17.95	
29/3/21	18.11	17.43	16.04	16.05	17.36	14.02	
13/4/21	16.51	15.27	15.94	15.74	14.69	13.95	
22/4/21	16.21	15.26	15.78	15.73	15.59	13.65	
7/5/21	14.85	12.40	13.15	11.99	12.98	10.89	
18/5/21	13.35	11.85	11.57	11.50	12.31	11.98	
7/6/21	12.52	13.10	10.86	10.64	10.56	10.83	
14/6/21	12.38	11.38	11.52	11.08	11.62	11.56	
28/6/21	12.22	10.25	11.10	10.21	11.02	10.36	
14/7/21	11.66	9.52	10.28	9.73	10.02	9.55	
27/7/21	10.90	9.56	10.08	9.73	9.82	10.20	
3/8/21	11.72	10.25	10.79	10.22	10.87	10.18	
17/8/21	12.44	11.03	11.40	10.81	11.81	10.26	
31/8/21	10.16	9.82	9.65	9.44	9.43	9.19	
6/9/21	12.06	10.60	10.68	10.90	10.45	10.01	
20/9/21	13.88	11.57	11.95	12.40	11.38	10.72	
4/10/21	13.58	12.55	12.23	14.92	13.51	13.49	
18/10/21	15.85	13.90	14.02	14.62	15.52	14.62	
25/10/21	15.77	14.23	15.36	14.28	15.85	16.29	
5/11/21	15.88	14.25	15.83	13.31	16.52	13.75	
15/11/21	16.77	15.71	16.09	15.48	16.32	14.51	
22/11/21	16.65	16.16	15.54	15.64	17.11	15.87	
6/12/21	18.40	18.70	18.63	18.80	19.65	18.10	
22/12/21	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	Site 7
6/1/21	7.24	7.19	7.11	7.15	7.14	6.97	7.02
18/1/21	7.71	6.76	6.70	7.22	6.70	6.61	6.70
27/1/21	7.12	7.15	7.15	7.36	7.15	7.13	
1/2/21	6.74	7.07	6.74	7.13	6.74	6.96	
15/2/21	6.18	6.93	6.30	7.03	6.12	6.87	
10/3/21	6.42	6.52	6.45	6.99	6.85	7.22	
15/3/21	6.26	6.48	6.33	6.42	6.54	6.64	
29/3/21	6.31	6.36	6.48	6.50	6.49	6.55	
13/4/21	6.56	6.43	6.44	6.39	6.71	6.88	
22/4/21	6.39	6.41	6.43	6.43	6.59	6.68	
7/5/21	7.81	7.53	7.28	7.28	6.98	6.66	

Sample Date	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7
18/5/21	7.11	6.88	6.83	6.75	6.76	6.84	
7/6/21	7.67	7.10	7.11	6.95	6.91	6.65	
14/6/21	7.60	7.37	7.13	7.08	7.01	6.45	
28/6/21	7.53	7.49	7.23	7.03	7.06	7.00	
14/7/21	7.87	7.34	7.09	7.11	7.76	6.85	
27/7/21	7.08	6.78	6.82	6.64	6.88	7.48	
3/8/21	7.22	6.91	7.12	6.80	7.14	7.22	
17/8/21	7.25	7.14	7.31	7.06	7.29	7.06	
31/8/21	6.84	6.53	6.81	6.59	6.68	6.64	
6/9/21	6.77	6.50	6.75	6.78	7.34	6.87	
20/9/21	6.72	6.92	7.01	7.21	6.89	6.45	
4/10/21	6.32	6.35	6.35	6.22	6.28	6.75	
18/10/21	6.45	6.78	6.74	6.76	6.63	6.36	
25/10/21	6.45	6.77	6.65	6.76	6.61	6.28	
5/11/21	6.55	7.21	7.07	7.27	6.95	6.29	
15/11/21	6.84	6.59	7.06	6.80	7.22	6.16	
22/11/21	6.62	6.47	6.55	6.82	6.98	6.13	
6/12/21	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	Site 7
6/1/21	551	502	498	478	497	623	601
18/1/21	532	509	462	449	415	565	623
27/1/21	902	856	802	752	723	694	
1/2/21	716	654	563	545	494	721	
15/2/21	421	403	377	361	351	681	
10/3/21	356	828	659	673	461	675	
15/3/21	474	437	404	436	442	785	
29/3/21	441	434	442	440	423	629	
13/4/21	434	447	426	436	402	675	
22/4/21	446	431	428	456	426	703	
7/5/21	392	510	484	511	399	832	
18/5/21	384	409	372	341	378	688	
7/6/21	396	416	392	426	386	1101	
14/6/21	376	488	453	484	444	896	
28/6/21	430	528	494	556	412	756	
14/7/21	464	588	515	532	380	661	
27/7/21	512	582	564	541	496	1357	
3/8/21	507	595	578	536	514	1096	
17/8/21	522	628	571	551	512	1159	
31/8/21	499	620	605	580	541	1426	
6/9/21	483	450	425	370	344	821	
20/9/21	768	900	713	620	644	1830	
4/10/21	464	428	439	377	370	692	
18/10/21	631	707	695	540	472	536	
25/10/21	634	710	699	536	475	532	

Sample Date	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7
5/11/21	1006	995	920	692	584	369	
15/11/21	897	811	764	609	544	405	
22/11/21	748	647	568	546	463	461	
6/12/21	756	694	613	575	544	761	

Dissolved Oxygen (%)

Sample Date	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7
6/1/21	38.3	37.8	37.9	32.0	40.2	54.2	40.6
18/1/21	24.9	10.1	15.6	14.3	58.3	43.2	23.9
27/1/21	38.6	26.0	23.9	30.2	51.4	50.7	
1/2/21	48.3	47.8	26.9	42.0	50.2	64.1	
15/2/21	19.0	17.8	42.2	36.5	67.6	29.9	
10/3/21	27.5	33.3	43.6	43.7	67.3	42.0	
15/3/21	15.1	27.4	26.9	26.9	57.9	20.2	
29/3/21	25.6	41.5	32.6	30.7	50.4	35.7	
13/4/21	37.7	39.1	39.1	48.8	63.6	67.3	
22/4/21	41.1	51.0	47.9	50.0	57.3	56.1	
7/5/21	53.7	61.9	55.9	56.8	74.1	58.3	
18/5/21	53.4	52.4	53.3	55.5	78.7	49.6	
7/6/21	60.5	69.7	71.5	75.9	78.7	83.3	
14/6/21	44.2	37.4	31.8	26.7	32.8	38.9	
28/6/21	54.3	37.2	36.4	56.4	26.9	53.1	
14/7/21	88.0	85.9	81.9	58.0	84.3	68.0	
27/7/21	34.7	32.2	31.7	24.9	62.5	36.9	
3/8/21	24.5	29.5	38.5	22.4	55.7	34.5	
17/8/21	13.3	27.8	44.2	20.8	47.8	33.5	
31/8/21	61.1	61.0	55.0	54.5	57.0	47.9	
6/9/21	58.4	47.7	51.3	52.1	60.1	69.4	
20/9/21	28.2	30.8	45.9	52.6	40.6	52.6	
4/10/21	79.8	57.1	51.7	44.0	56.8	87.4	
18/10/21	48.0	38.7	32.9	34.5	54.2	55.2	
25/10/21	48.3	38.1	38.0	44.9	43.8	55.6	
5/11/21	57.4	59.0	29.7	26.1	50.3	24.2	
15/11/21	34.8	14.1	31.8	23.6	32.0	26.5	
22/11/21	2.2	11.2	3.8	11.1	23.7	18.8	
6/12/21	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	Site 7
6/1/21	198.0	68.2	73.9	66.0	85.9	51.2	55.0
18/1/21	35.90	34.6	33.9	19.3	21.6	16.1	22.9
27/1/21	52.6	43.5	36.0	39.6	52.9	19.6	
1/2/21	37.75	36.8	38.7	38.6	39.6	26.9	
15/2/21	10.1	9.3	17.4	2.1	4.7	18.8	
10/3/21	16.8	10.3	17.4	11.8	10.2	16.0	
15/3/21	16.4	12.2	9.9	9.5	8.2	28.5	
29/3/21	26.8	23.9	31.8	20.9	35.1	44.9	

Sample Date	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7
13/4/21	56.8	61.4	59.3	48.9	76.1	120.3	
22/4/21	31.6	28.9	31.9	26.7	31.1	68.0	
7/5/21	18.5	10.4	32.1	6.0	9.2	15.9	
18/5/21	66.5	31.8	20.0	12.3	11.9	12.3	
7/6/21	74.2	13.1	31.4	8.8	11.1	7.1	
14/6/21	101.0	35.0	45.1	25.3	40.6	15.6	
28/6/21	55.6	33.4	26.3	15.3	29.9	12.6	
14/7/21	31.9	14.5	21.0	8.8	26.8	16.2	
27/7/21	68.0	40.0	40.4	18.7	16.0	15.8	
3/8/21	42.5	23.6	38.9	16.9	11.1	8.6	
17/8/21	24.1	13.5	44.4	12.8	9.4	11.6	
31/8/21	96.4	151.0	148.0	159.0	165.0	132.0	
6/9/21	50.5	47.8	52.9	72.9	75.0	59.4	
20/9/21	44.6	23.5	26.4	26.8	24.9	27.0	
4/10/21	146.0	93.0	100.5	115.0	118.0	56.6	
18/10/21	102.0	78.0	99.0	128.0	89.0	55.0	
25/10/21	78.9	48.0	45.3	47.7	29.1	21.5	
5/11/21	28.8	13.1	27.8	15.6	19.3	23.0	
15/11/21	64.8	34.2	30.2	20.8	21.6	25.9	
22/11/21	19.8	12.6	11.6	6.9	12.8	29.7	
6/12/21	22.0	15.5	16.2	15.4	12.3	35.7	