



# Green and Golden Bell Frog Monitoring, Arncliffe, Mar – May 2023

Prepared by AMBS Ecology & Heritage Pty Ltd  
for Transport for NSW

Final Report

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# 1 Introduction

## 1.1 Background

AMBS Ecology & Heritage Pty Ltd (AMBS) was commissioned by Transport for NSW to undertake monitoring of the Green and Golden Bell Frog (*Litoria aurea*) (GGBF) at Arncliffe. This quarterly report presents the results of monitoring and other GGBF management actions undertaken by AMBS for the three-month period of March to May 2023 inclusive.

## 1.2 Study Area

The Study Area includes the following locations (Figure 1.1):

- M8 Marsh Street habitat area (previously known as the “New M5 Marsh Street habitat area”) – an area set aside for the establishment of potential GGBF habitat, including three ponds and surrounding terrestrial habitat, located south of the M5 between Marsh Street and Eve Street;
- the “Creek” area – a drainage line near the M8 Marsh Street habitat area, which runs eastwards from a stormwater outlet below Marsh Street to the Eve Street Wetland Reserve;
- the RTA Ponds – two ponds constructed as replacement habitat for the GGBF when the M5 was built (late 1990’s to early 2000’s), by the then NSW Roads and Traffic Authority (RTA), located near the Marsh Street/M5 intersection and adjacent to the Kogarah Golf Course;
- the Enhancement Area – six small ponds located near a drainage line that runs along the southern boundary of the Kogarah Golf Course, east of the RTA ponds;
- Kogarah Golf Course – a golf course located between Marsh Street and the Cooks River, which contains a number of water features, including some ponds where GGBFs have been recorded;
- Riverine Park and surrounds – parts of the area between the M5 and the Spring Street canal, where GGBFs have been recorded or potentially suitable habitat occurs;
- Barton Park – parts of the area in the northern section of Barton Park;
- Underpass – a passageway below the M5 East, which contains a pedestrian/bicycle path and a fenced-off containment pond.

## 1.3 Scope and Methodology

Monitoring and management of the GGBF at Arncliffe included:

- tadpole surveys and water quality measurements in the M8 Marsh Street habitat area, RTA Ponds, Enhancement Area, Kogarah Golf Course, Riverine Park and surrounds and Barton Park;
- nocturnal frog surveys in the M8 Marsh Street habitat area, RTA Ponds, Enhancement Area, Kogarah Golf Course, Creek, Underpass, Riverine Park and surrounds and Barton Park;
- removal of Striped Marsh Frogs (*Limnodynastes peronii*) from the M8 Marsh Street habitat area (under Office of Environment and Heritage [OEH] Licence);
- release of captive-bred GGBF tadpoles into the M8 Marsh Street habitat area;
- regular checks and support feeding of tadpoles in the M8 Marsh Street habitat area;
- inspections of the M8 Marsh Street habitat area, RTA Ponds and Enhancement Area;
- vegetation management in the M8 Marsh Street habitat area (undertaken by Total Earth Care [TEC]).

Tadpole and water quality surveys were undertaken concurrently in all areas on 28 March 2023 (Dr Arthur White and Glenn Muir), 20 April 2023 (Alana de Laive and Glenn Muir), and 25 May 2023 (Alana de Laive and Glenn Muir). Survey techniques included dip net sweeps and watching for tadpole activity; identification and staging of any tadpoles captured; and use of a hand-held probe to take water quality measurements.

Nocturnal frog surveys were undertaken on:

- 9 March 2023 in the RTA Ponds, Enhancement Area, Kogarah Golf Course and Underpass by Yang Hu, Lisa Albino and Henry Cook;
- 15 March 2023 in the M8 Marsh Street habitat area by Henry Cook, Lisa Albino, Santiago Cuartas-Villa and Glenn Muir;
- 16 March 2023 in the Riverine Park and surrounds and Barton Park by Conor Nest and Santiago Cuartas-Villa;
- 29 March 2023 in the RTA Ponds, Enhancement Area, and Kogarah Golf Course by Lisa Albino and Santiago Cuartas-Villa;
- 29 March 2023 in the Creek, Underpass, Riverine Park and surrounds and Barton Park by Conor Nest and Alana de Laive;
- 5 April 2023 in the M8 Marsh Street habitat area by Yang Hu, Alana de Laive, Santiago Cuartas-Villa and Glenn Muir;
- 19 April 2023 in the RTA Ponds, Enhancement Area, Kogarah Golf Course and Underpass by Yang Hu and Santiago Cuartas-Villa;
- 26 April 2023 in the M8 Marsh Street habitat area by Yang Hu, Christ Jackson, Henry Cook and Glenn Muir;
- 2 May in the Eastern Frog Corridor, Underpass, Riverine Park and surrounds and Barton Park by Lisa Albino and Yang Hu;
- 16 May 2023 in the M8 Marsh Street habitat area by Conor Nest, Santiago Cuartas-Villa, Yang Hu and Glenn Muir;
- 17 May 2023 in the RTA Ponds, Enhancement Area, Kogarah Golf Course and Underpass by Lisa Albino and Santiago Cuartas-Villa; and
- 23 May 2023 in Riverine Park and surrounds and Barton Park by Yang Hu and Glenn Muir.

Inspections of the M8 Marsh Street habitat area, RTA Ponds and the Enhancement Area were undertaken concurrently with the surveys.

GGBF tadpoles were transported from Symbio Wildlife Park on 14 March 2023 and released into Pond C in the M8 Marsh Street habitat area.

## **1.4 Other**

Construction work on the upgrade of Barton Park continued throughout the survey period. These works are being undertaken by Bayside Council and are very close to the Landing Lights East pond. Access to that site has been fenced off since October 2022.



Figure 1.1: Study area.

## 2 Results

### 2.1 Water Quality Monitoring

Results of the water quality measurements in comparison with threshold values indicated by Mahony and Beranak are summarised in Table 2.1. Raw data are provided in Appendix 1. All water quality variables were within the overall GGBF survival thresholds described by Mahony and Beranak in all ponds holding water, with the exception that temperature in a number of the ponds dropped in May and salinity in the Mangrove Pond was typically very high. Turbidity was acceptable in all ponds.

**Table 2.1: Summary of water quality results.**

Location	Pond	Temperature			Salinity			Dissolved O2			pH		
		Mar 23	Apr 23	May 23	Mar 23	Apr 23	May 23	Mar 23	Apr 23	May 23	Mar 23	Apr 23	Fri 23
M8 Marsh Street habitat area	A	Pass	Pass*	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass*	Pass*	Pass*
	B	Pass	Pass*	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass*	Pass*	Pass*
	C	Pass	Pass*	Pass*	Pass	Pass	Pass	Pass	Pass	Pass	Pass*	Pass	Pass*
RTA	Western	Pass	Pass*	Fail	Pass	Pass	Pass	Pass	Pass*	Pass	Pass*	Pass*	Pass*
	Eastern	Pass*	Pass*	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass*	Pass*	Pass*
Enhancement Area	1	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
	2	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
	3	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
	4	Pass	Pass*	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass*	Pass
	5	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
	6	Pass*	Pass*	Fail	Pass	Pass	Pass*	Pass	Pass	Pass	Pass	Pass*	Pass*
Kogarah Golf Course	Circular	Pass	Pass*	Pass*	Pass	Pass	Pass*	Pass	Pass	Pass	Pass	Pass	Pass
	Long	Pass	Pass*	Pass*	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
	Mangrove Pond	Pass	Pass*	Pass*	Fail	Fail	Fail	Pass	Pass	Pass	Pass	Pass	Pass
	Eastern Pond	Pass	Pass*	Pass*	Pass	Pass	Pass*	Pass	Pass	Pass	Pass	Pass	Pass
Riverine Park and surrounds and Barton Park	Southern Phragmites	Pass*	Pass*	Dry	Pass	Pass	Dry	Pass	Pass	Dry	Pass	Pass	Dry
	Bend Swamp	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
	Southern Jungle	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
	Landing Lights West	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
	Driving Range Wetland	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry

\*Indicates outside higher survival threshold but within overall survival threshold as described in Mahony and Beranak.



## 2.2 Tadpole Releases

Approximately 1300 GGBF tadpoles were released into Pond C of the M8 Marsh St habitat area in mid-March.

## 2.3 Tadpole Monitoring

The results of the tadpole monitoring surveys are shown in Tables 2.3 - 2.5. Only one Striped Marsh Frog tadpole was detected across all three sampling periods, in Pond C of the M8 Marsh St habitat area. The waterbodies in the Riverine Park and surrounds and Barton Park areas were mostly dry or too low for sampling during all three surveys.

**Table 2.2: Summary of tadpole net sweep results 28 March 2023**

Area	Pond	Tadpoles Present	Species	Number and Stage			
				A	B	C	D
M8 Marsh Street habitat area	A	No	-	-	-	-	-
	B	No	-	-	-	-	-
	C	Yes	<i>Limnodynastes peronii</i>	-	1	-	-
RTA Ponds	Western	No	-	-	-	-	-
	Eastern	No	-	-	-	-	-
Enhancement Area	1	Dry	-	-	-	-	-
	2	Dry	-	-	-	-	-
	3	Dry	-	-	-	-	-
	4	No	-	-	-	-	-
	5	Dry	-	-	-	-	-
	6	No	-	-	-	-	-
Kogarah Golf Course	Circular	No	-	-	-	-	-
	Long	No	-	-	-	-	-
	Eastern	No	-	-	-	-	-
	Mangrove	No	-	-	-	-	-
Riverine Park and surrounds and Barton Park	Southern Phragmites	Dry	-	-	-	-	-
	Bend Swamp	Dry	-	-	-	-	-
	Southern Jungle	Dry	-	-	-	-	-
	Landing Lights West	Dry	-	-	-	-	-
	Driving Range Wetland	Dry	-	-	-	-	-

**Table 2.3: Summary of tadpole net sweep results 20 April 2023.**

Area	Pond	Tadpoles Present	Species	Number and Stage			
				A	B	C	D
M8 Marsh Street habitat area	A	No	-	-	-	-	-
	B	No	-	-	-	-	-
	C	No	-	-	-	-	-
RTA Ponds	Western	No	-	-	-	-	-
	Eastern	No	-	-	-	-	-
Enhancement Area	1	Dry	-	-	-	-	-
	2	Dry	-	-	-	-	-
	3	Dry	-	-	-	-	-
	4	No	-	-	-	-	-
	5	Dry	-	-	-	-	-
	6	No	-	-	-	-	-
Kogarah Golf Course	Circular	No	-	-	-	-	-
	Long	No	-	-	-	-	-
	Eastern	No	-	-	-	-	-
	Mangrove	No	-	-	-	-	-
Riverine Park and surrounds and Barton Park	Southern Phragmites	No	-	-	-	-	-
	Bend Swamp	Dry	-	-	-	-	-
	Southern Jungle	Dry	-	-	-	-	-
	Landing Lights West	Dry	-	-	-	-	-
	Driving Range Wetland	Dry	-	-	-	-	-

**Table 2.4: Summary of tadpole net sweep results 25 May 2023.**

Area	Pond	Tadpoles Present	Species	Number and Stage			
				A	B	C	D
M8 Marsh Street habitat area	A	No	-	-	-	-	-
	B	No	-	-	-	-	-
	C	No	-	-	-	-	-
RTA Ponds	Western	No	-	-	-	-	-
	Eastern	No	-	-	-	-	-
Enhancement Area	1	Dry	-	-	-	-	-
	2	Dry	-	-	-	-	-
	3	Dry	-	-	-	-	-
	4	No	-	-	-	-	-
	5	Dry	-	-	-	-	-
	6	No	-	-	-	-	-
Kogarah Golf Course	Circular	No	-	-	-	-	-
	Long	No	-	-	-	-	-
	Eastern	No	-	-	-	-	-
	Mangrove	No	-	-	-	-	-
Riverine Park and surrounds and Barton Park	Southern Phragmites	Dry	-	-	-	-	-
	Bend Swamp	Dry	-	-	-	-	-
	Southern Jungle	Dry	-	-	-	-	-
	Landing Lights West	Dry	-	-	-	-	-
	Driving Range Wetland	Dry	-	-	-	-	-

## 2.4 Nocturnal GGBF Monitoring in the M8 Marsh Street habitat area

A total of 116 GGBFs were encountered during timed spotlight searches in the M8 Marsh Street habitat area in March, 92 in early April, 145 in late April and 84 in May (Tables 2.6 and 2.7). Of the GGBFs that were captured, measured and released; in March approximately 33% were juveniles and 5% were recaptures, in early April approximately 26% were juveniles and 14% were recaptures, in late April approximately 17% were juveniles and 15% were recaptures, and in May approximately 4% were juveniles and 31% were recaptures.

Striped Marsh Frogs (*Limnodynastes peronii*) were recorded from all three ponds during the surveys (Table 2.7). No other frog species were found.

**Table 2.5: GGBF captures, M8 Marsh Street habitat area**

Date	Pond	Juvenile / Subadult / Not tagged	Recapture	Number microchipped	Total
15 Mar 2023	Pond A	5	2	19	26
	Pond B	1	1	11	13
	Pond C	11	2	19	32
	Swale	3	0	7	10
	Perimeter	12	0	5	17
<b>Total</b>		<b>32</b>	<b>5</b>	<b>61</b>	<b>98</b>
5 Apr 2023	Pond A	7	2	8	17
	Pond B	0	3	12	15
	Pond C	2	3	15	20
	Swale	0	0	0	0
	Perimeter	8	1	5	14
<b>Total</b>		<b>17</b>	<b>9</b>	<b>40</b>	<b>66</b>
26 Apr 2023	Pond A	7	7	37	51
	Pond B	4	7	26	37
	Pond C	3	3	14	20
	Swale	2	0	2	4
	Perimeter	5	1	6	12
<b>Total</b>		<b>21</b>	<b>18</b>	<b>85</b>	<b>124</b>
16 May 2023	Pond A	1	6	6	13
	Pond B	1	4	24	29
	Pond C	1	8	8	17
	Swale	0	0	4	4
	Perimeter	0	3	1	4
<b>Total</b>		<b>3</b>	<b>21</b>	<b>43</b>	<b>67</b>
<b>Grand Total</b>		<b>73</b>	<b>53</b>	<b>229</b>	<b>355</b>

**Table 2.6: Frogs observed but not captured (all species), M8 Marsh Street Habitat Area**

Date	Pond	<i>Litoria aurea</i>	<i>Limnodynastes peronii</i>	<i>Litoria peronii</i>
15 Mar 2023	Pond A	5	5	0
	Pond B	5	0	0
	Pond C	8	0	0
	Swale	0	0	0
	Perimeter	0	0	0
<b>Total</b>		<b>18</b>	<b>5</b>	<b>0</b>
5 Apr 2023	Pond A	16	10+	0
	Pond B	8	11	0
	Pond C	2	20+	0
	Swale	0	0	0
	Perimeter	0	0	0
<b>Total</b>		<b>26</b>	<b>41</b>	<b>0</b>
26 Apr 2023	Pond A	3	0	0
	Pond B	6	0	0
	Pond C	12	1	0
	Swale	0	0	0
	Perimeter	0	0	0
<b>Total</b>		<b>21</b>	<b>1</b>	<b>0</b>
16 May 2023	Pond A	3	0	0
	Pond B	8	0	0
	Pond C	5	0	0
	Swale	0	0	0
	Perimeter	1	0	0
<b>Total</b>		<b>17</b>	<b>0</b>	<b>0</b>
<b>Grand Total</b>		<b>82</b>	<b>47</b>	<b>0</b>

## 2.5 Nocturnal Frog Monitoring in the Wider Study Area

Results of the frog monitoring surveys in the wider study area are summarised in Table 2.8. A total of 55 GGBFs were detected by call-playback or spotlight outside of the M8 Marsh Street habitat area. Most of these (51%) were found in the Creek area (i.e., between the M8 Marsh Street habitat area and the Underpass) or in the RTA Ponds (40%). Two GGBFs were detected in Pond 4 of the Enhancement Area and three in the Riverine Park surrounds (one in the Eastern Channel and two in Southern Phragmites). Of these, 52 GGBFs were captured, measured and released, including 13 juveniles (25%) and two recaptures (4%).

Striped Marsh Frogs were abundant in the Riverine Park surrounds and were also recorded in the RTA Ponds, the Enhancement Area and in some locations on Kogarah Golf Course. Peron's Tree Frogs (*Litoria peronii*), Eastern Dwarf Tree Frogs (*Litoria fallax*) and Common Eastern Froglets (*Crinia signifera*) were present in the western RTA Pond (and Common Eastern Froglets were also in the eastern RTA Pond). A single Peron's Tree Frog was observed in Southern Phragmites in the Riverine Park surrounds.

**Table 2.7: Summary of frog survey results outside of the M8 Marsh Street Habitat Area, March - May**

Area	Pond	<i>Litoria aurea</i>	<i>Limnodynastes peronii</i>	<i>Litoria peronii</i>	<i>Litoria fallax</i>	<i>Crinia signifera</i>
Eastern Frog Corridor and Creek area	Creek (west)	10	-	-	-	1
	Creek (east)	18	-	-	-	-
	Underpass	-	-	-	-	-
RTA Ponds	Western	17	-	5	23	20+
	Eastern	5	6	-	-	32+
Enhancement Area	1	-	1	-	-	-
	2	-	-	-	-	-
	3	-	-	-	-	-
	4	2	4	-	-	-
	5	-	3	-	-	-
	6	-	-	-	-	-
	Creek	-	1	-	-	-
Kogarah Golf Course	Circular	-	-	-	-	-
	Long	-	2	-	-	-
	Eastern	-	-	-	-	-
	Skinny	-	-	-	-	-
	Northern	-	8	-	-	-
	Mangrove	-	1	-	-	-
Riverine Park and surrounds and Barton Park	Eastern Channel	1	1	-	-	-
	Southern Phragmites	2	4	1	-	-
	Bend Swamp	-	1	-	-	-
	Southern Jungle	-	22+	-	-	-
	Driving Range Wetland	-	1	-	-	-
	Landing Lights West	-	1	-	-	-

## 2.6 Maintenance Observations

All ponds within the M8 Marsh Street habitat area were holding water and no Plague Minnow (*Gambusia holbrooki*) were observed. Terrestrial vegetation management was undertaken by Total Earth Care.

Both RTA Ponds were holding water for the duration of the quarter and no Plague Minnow were observed.

All ponds within the Enhancement Area are overgrown with weeds and grasses. Several ponds were dry throughout the survey period. Plague Minnows were abundant in several ponds on the Kogarah Golf Course.



Figure 2.1: Locations where GGBFs were observed, March to May 2023.

Numbers represent the total number of GGBFs observed in several surveys over the 3-month period and include recaptures (i.e., a proportion of the number will be GGBFs that were counted twice or more).

### 3 Discussion

GGBFs were observed in reasonable numbers in the M8 Marsh Street habitat area over the season. In the early part of the season (which was during and after the release of captive-bred tadpoles), a high proportion of juvenile frogs and low recapture rates were observed. As expected, the proportion of adult/juvenile frogs increased towards the end of the season, as did recapture rates. Few adults from previous seasons have been recaptured.

Adult and juvenile GGBFs were also detected at other sites in Arncliffe during the quarter, although the number of frogs, the proportion of juveniles and the recapture rates were all lower than that of the M8 Marsh Street habitat area. Further, the vast majority of the GGBFs observed outside of the M8 Marsh Street habitat area were found either close by (in the Creek area), or in the RTA Ponds after captive-bred tadpoles had been released.

### 4 Conclusion

The objectives of the monitoring program are stated in the Plan of Management (ELA 2018) as “to assess the ongoing survival of the Arncliffe population at the Kogarah Golf Course and within the RTA ponds” and in the HCCBP as “to provide information for adaptive management on the effectiveness of the habitat created as part of the project” (i.e., the M8 Marsh Street habitat area).

The M8 Marsh Street habitat continues to provide habitat for GGBFs, although most of the GGBFs observed were the result of the captive-bred tadpole releases from this season. GGBFs were also observed in the RTA ponds, but mostly after the release of captive-bred tadpoles into that area.

### 5 References

ELA (2018). *Green and Golden Bell Frog Plan of Management - Arncliffe*. Prepared by Eco Logical Australia for NSW Roads and Maritime Services.

Mahony, M. and Beranak C. (undated). *Water Quality parameters measured to assess suitability for Green and Golden Bell Frog occupancy*. Unpublished report provided to NSW Roads and Maritime Services.

## Appendix 1: Water Quality Results

Table A1-1: Water Quality Results for March 2023

Location	Date	Pond	General Condition	mVpH	pH	ORP [mV]	% Sat (DO%)	Diss. O2 [mg/l]	Conduct [uS/cm]	TDS ppm	Salinity (PSU)	Turbidity [FNU]	Temp [C°]	Gambusia
Eve Street	28/03/2023	A		12.8	6.9	65.4	6.1	0.59	159	81	0.08	154	20.4	
	28/03/2023	B		15.2	6.8	76.6	4.6	0.38	2059	1034	1.06	12.2	20.7	
	28/03/2023	C		10.6	6.9	91.7	4.8	0.42	373	187	0.18	1.6	21.1	
RTA	28/03/2023	Western		30.4	6.5	141.8	3.8	0.32	1209	551	0.53	10.6	20.5	
	28/03/2023	Eastern		56.6	6.1	68.1	2.8	0.25	135	79	0.42	43.4	19.9	
Enhancement Area	28/03/2023	1	Dry											
	28/03/2023	2	Dry											
	28/03/2023	3	Dry											
	28/03/2023	4		13.9	6.8	-14.4	3.2	0.27	233	117	0.11	19.7	20.3	
	28/03/2023	5	Dry											
	28/03/2023	6		18.8	6.7	62.5	3.1	0.26	3559	1777	1.88	52.8	19.9	Yes
Kogarah Golf Course	28/03/2023	Circular		-64.2	8.2	7.8	8.5	0.51	3055	1518	1.6	28.8	20.5	Yes
	28/03/2023	Long		-85.9	8.6	-19.7	3.8	0.33	3135	1569	1.64	34.3	21.1	Yes
	28/03/2023	Mangrove Pond		-26.4	7.5	-22.6	5.1	0.39	45480	22740	29.53	26.7	20.6	Yes
	28/03/2023	Eastern		-105.6	8.7	40.6	4.3	0.37	6451	3228	3.54	39.7	21.5	Yes
Barton Park	28/03/2023	Southern Phragmites		8.6	7.1	-109.3	5.4	0.48	191	99	0.09	18.3	19.3	
	28/03/2023	Bend Swamp	Dry											
	28/03/2023	Southern Jungle	Dry											
	28/03/2023	Landing Lights West	Dry											
	28/03/2023	Driving Range Wetland	Dry											



**Table A1-2: Water Quality Results for April 2023**

Location	Date	Pond	General Condition	mVpH	pH	ORP [mV]	% Sat (DO%)	Diss. O2 [mg/l]	Conduct [uS/cm]	TDS ppm	Salinity (PSU)	Turbidity [FNU]	Temp [C°]	Gambusia
Eve Street	20/04/2023	A	Full	5.8	6.93	183.8	2.9	0.27	181	90	0.09	304	17.2	No
	20/04/2023	B	Full	29.5	6.52	136.1	3.2	0.31	2077	1040	1.07	6.8	17.08	No
	20/04/2023	C	Full	-5.8	7.16	108.4	3.5	0.34	330	165	0.16	12.5	16.83	No
RTA	20/04/2023	Western	Full	62.7	5.94	278.6	1.4	0.13	125	63	0.06	6.2	17.31	No
	20/04/2023	Eastern	Full	81.56	5.6	304	1.6	0.15	117	59	0.05	3.7	16.53	No
Enhancement Area	20/04/2023	1	Dry											
	20/04/2023	2	Dry											
	20/04/2023	3	Too shallow											
	20/04/2023	4	Full	0.9	7.02	140.8	2.9	0.27	169	84	0.08	81	17.62	No
	20/04/2023	5	Too shallow											
	20/04/2023	6	Full	36.5	6.42	111.7	2.1	0.2	5119	2609	2.87	107	17.21	No
Kogarah Golf Course	20/04/2023	Circular	Full	-50.5	7.8	145.3	4.1	0.38	4119	2059	2.2	67.6	18	Yes
	20/04/2023	Long	Full	-63.5	8.19	139.1	3.6	0.34	3086	1545	1.62	12.2	18.48	Yes
	20/04/2023	Mangrove Pond	Full	-5.3	7.13	-118.4	3.4	0.28	4145	20.85	26.77	38.8	18.3	No
	20/04/2023	Eastern	Full	-81.2	8.52	147.2	3.9	0.35	5962	2987	3.27	30.3	18.5	Yes
Barton Park	20/04/2023	Southern Phragmites	25% full	-3.4	7.1	-83.5	3.6	0.36	638	319	0.31	531	15.4	No
	20/04/2023	Bend Swamp	Dry											
	20/04/2023	Southern Jungle	Dry											
	20/04/2023	Landing Lights West	Dry											
	20/04/2023	Driving Range Wetland	Dry											

**Table A1-3: Water Quality Results for May 2023**

Location	Date	Pond	General Condition	mVpH	pH	ORP [mV]	% Sat (DO%)	Diss. O2 [mg/l]	Conduct [uS/cm]	TDS ppm	Salinity (PSU)	Turbidity [FNU]	Temp [C°]	Gambusia
<b>Eve Street</b>	25/05/2023	A	50% full	47.5	6.23	239.6	5.5	0.65	183	91	0.09	45.3	8.68	No
	25/05/2023	B	50% full	41.1	6.3	209.9	6	0.66	1985	992	1.02	28	9.95	No
	25/05/2023	C	Full	29	6.53	193.1	6.3	0.7	395	197	0.19	164	11.27	No
<b>RTA</b>	25/05/2023	Western	Full	43.9	6.3	70.1	5.3	0.59	153	77	0.07	39.5	10.43	No
	25/05/2023	Eastern	Full	73.8	5.72	124.5	5.5	0.64	134	67	0.06	36.6	9.7	No
<b>Enhancement Area</b>	25/05/2023	1	Dry											
	25/05/2023	2	Dry											
	25/05/2023	3	Dry											
	25/05/2023	4	Full	-18.5	7.27	39.9	4	0.48	368	187	0.18	1.2	9.1	No
	25/05/2023	5	Dry											
	25/05/2023	6	Full	15.5	6.78	-8	3.4	0.36	11.42	5741	6.58	42.1	10.56	No
<b>Kogarah Golf Course</b>	25/05/2023	Circular	75% full	-64.5	8.26	113.8	4.9	0.52	9384	4693	5.3	182	10.85	Yes
	25/05/2023	Long	Full	-62.8	8.22	52.5	5.3	0.56	3133	1567	1.65	160	11.38	Yes
	25/05/2023	Mangrove Pond	Full	12.7	7.28	-105.7	5.9	0.48	45.73	22.84	29.66	57.5	15.25	Yes
	25/05/2023	Eastern	Full	-70.6	8.36	94.3	4.8	0.5	6498	3249	3.58	47.5	11.99	Yes
<b>Barton Park</b>	25/05/2023	Southern Phragmites	Too shallow											
	25/05/2023	Bend Swamp	Dry											
	25/05/2023	Southern Jungle	Dry											
	25/05/2023	Landing Lights West	Dry											
	25/05/2023	Driving Range Wetland	Dry											