



Green and Golden Bell Frog Monitoring, Arncliffe, Annual Report for 2024-2025



Prepared by AMBS Ecology & Heritage Pty Ltd
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Authors:	Glenn Muir, Yang Hu, Santiago Cuartas Villa and Chris Jackson
Recipient:	Mike Pereira
Approved by:	Glenn Muir
Cover Photo:	Green and Golden Bell Frog at Pond A in the M8 Marsh Street Habitat Area. Photo credit: Henry Cook

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1 Introduction

1.1 A note on nomenclature

In June 2025 a proposed taxonomic revision of the *Litoria* genus was published (Donnellan et al., 2025). This resulted in the re-naming of some of the species frequently observed at Arncliffe, including the Green and Golden Bell Frog (*Litoria aurea*, proposed new name *Ranoidea aurea*), Peron's Tree Frog (*Litoria peronii*, proposed new name *Pengilleyia peronii*) and the Eastern Dwarf Tree Frog (*Litoria fallax*, proposed new name *Drymomantis fallax*).

Given that this report is dealing with the period to May 2025, prior to the publication, and for the purpose of consistency with previous reports, we proposed to use the pre-June 2025 nomenclature in this report. It is likely that future reporting will adopt the new nomenclature.

1.2 Background

AMBS Ecology & Heritage Pty Ltd (AMBS) was commissioned by Transport for NSW (TfNSW) to undertake monitoring of the Green and Golden Bell Frog (*Litoria aurea*) (GGBF) at Arncliffe. This report describes the monitoring and other GGBF management actions undertaken between September 2024 and May 2025. The GGBF monitoring and management is being undertaken in response to consent conditions and management plans associated with project approvals for the recently constructed M8 motorway (previously referred to as the "New M5" motorway) and the previously constructed M5 East motorway.

Construction of the M5 East commenced in the late 1990's and the motorway was opened in 2001. The M5 East connects General Holmes Drive in Mascot to the M5 motorway at King Georges Road. There is a tunnel under the Cooks River and a second tunnel west of Marsh Street, Arncliffe. The section between the two tunnels is above-ground and passes between Kogarah Golf Course to the north and the Barton Park Driving Range and Eve Street Wetlands to the south.

Due to impacts on an area known as the "Marsh Street Wetland" (a habitat area for the GGBF), a management plan for the GGBF was prepared (White, 1998). Implementation of this management plan included the construction of two frog ponds on the northern side of the M5 East, adjacent to Kogarah Golf Course. These two ponds are generally referred to as the "RTA Ponds" (Figure 1.1), but have also been referred to as the "M5 East Ponds" (e.g., in DECC [2008]) and are referred to as "Habitat Area 1" in White (1998). In this report these ponds will be referred to as the RTA Ponds.

Construction of the M8 commenced in July 2016. This project was originally called the "New M5" and has since been re-named as the "WestConnex M8". Much of the documentation associated with the project, including the management plans and the infrastructure approval, still refer to the project as the New M5. In this report the project will be referred to as the M8.

The M8 involved the construction of twin underground tunnels between the M5 East at Kingsgrove to a new interchange at St Peters. A construction compound for the project was established on Kogarah Golf Course. The compound is approximately 7.8 ha in size and is located within 50 m of the RTA Ponds (Figure 1.1).

Conditions of Approval B14 and B15 for the M8 (SSI 6788) included a requirement to prepare a Plan of Management (PoM) for the GGBF (EcoLogical 2018) and a Habitat Creation and Captive Breeding Plan (HCCBP) (EcoLogical 2017). Together these plans outline:

- measures to minimise impacts from construction works on GGBF habitat in the RTA Ponds and Kogarah Golf Course;

- the establishment of a new habitat area for the GGBF south of the M5 East, between Marsh Street and Eve Street (the “M8 Marsh Street habitat area”; Figure 1.1);
- the establishment of six small “stepping-stone” ponds along the southern boundary of Kogarah Golf Course, east of the RTA Ponds (the “Enhancement Area”; Figure 1.1); and
- the establishment of a captive breeding facility at Symbio Wildlife Park.

The M8 project included the installation of permanent infrastructure (ventilation towers and water treatment facilities) located north of the RTA Ponds. With the exception of the area occupied by these permanent facilities, most of the area currently occupied by the compound was intended to be re-instated after construction of the M8 was completed. However, the compound is now being used for the construction of the M6 Stage 1 and re-instatement has been delayed until that project is complete.

1.3 Study Area

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

- the 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;
- Riverine Park 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.

* N.B. “Riverine Park surrounds” and “Barton Park” are referred to collectively in some previous reports as “Barton Park” and/or “the extended search area in Barton Park”.

1.4 Scope

Monitoring and management of the GGBF at Arncliffe in 2024-2025 included:

- transfer of captive-bred tadpoles from the breeding facility and their release into the ponds in the M8 Marsh Street habitat area and one of the RTA Ponds;
- nocturnal frog surveys in the M8 Marsh Street habitat area;
- support feeding of frogs in the M8 Marsh Street habitat area;
- removal of Striped Marsh Frogs (*Limnodynastes peronii*) from the M8 Marsh Street habitat area and their release into the adjacent creek (under a licence provided by the Office of Environment and Heritage [OEH] under the NSW Department of Climate Change, Energy, the Environment and Water);
- nocturnal frog surveys in the RTA Ponds, Enhancement Area, Kogarah Golf Course, Perimeter, Creek, Underpass, Riverine Park surrounds and Barton Park;

- tadpole surveys and water quality measurements undertaken in the M8 Marsh Street Habitat area, RTA Ponds, Enhancement Area, Kogarah Golf Course, Riverine Park surrounds and Barton Park;
- salting of Pond B and building of refugia; and
- vegetation and weed management in the M8 Marsh Street habitat area and RTA Ponds area (undertaken by Total Earth Care [TEC]).

1.5 Objectives

The objectives of the monitoring program as stated in the PoM are “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.”



Figure 1.1: Study Area.

1.6 Summary of Previous Monitoring Results

1.6.1 GGBF Monitoring for the M5 East

Monitoring of GGBFs at Arncliffe was undertaken by Dr Arthur White (Biosphere Environmental Consultants Pty Ltd) until 2017-2018. Surveys carried out in 1999-2000 and 2000-2001 showed an increase in the number of GGBFs in the RTA Ponds and a decrease in the Marsh Street Wetland (ELA 2018). Subsequent monitoring was mainly confined to the RTA Ponds and Kogarah Golf Course.

Each year between 2003-2004 and 2012-2013 the RTA Ponds and Kogarah Golf Course supported a population of GGBFs estimated to comprise a maximum of about 60 – 80 adults (except in 2011-2012, when the estimate was between 100 and 120 adults [numbers derived from Figure 2 in ELA 2018]). Breeding was recorded in the RTA Ponds in every year until 2014 (ELA 2017). GGBFs were regularly recorded on Kogarah Golf Course and tadpoles were recorded on a few occasions (the “pond to the east of the Crescent Lake on the Kogarah Golf Course in January / February 2003 and November 2005” [A Hamer, pers. comm. 2017 and A White, pers. comm. 2015 in ELA 2017]).

After 2012-2013 the population appears to have been in decline. In 2013-2014 the number of adult GGBFs captured was too low for a population estimate to be calculated (ELA 2018). In 2014-2015 the maximum population size was estimated to be fewer than 40 adult frogs. In 2015-2016 only a few GGBFs were captured (six in November 2015 and eight in February 2016, the latter being over 5 consecutive nights of survey) (ELA 2017). However, a GGBF breeding event was recorded “in a large, ponded area between the RTA Ponds and the Kogarah Golf Course” in January 2016 (ELA 2017).

1.6.2 Implementation of the PoM and HCCBP and GGBF monitoring 2016-2017 and 2017-2018

In 2016-2017 surveys of the GGBF were expanded to include a number of areas south of the M5 as well as the RTA Ponds and Kogarah Golf Course (White 2017). Three juveniles were found in the RTA Ponds in September 2016, two were detected on Kogarah Golf Course in October 2016 (one in the “Southern Drain” and one in the Circular Pond), and between one and three GGBFs were observed on four occasions between October 2016 and March 2017 in the expanded survey area (White 2017).

In 2017 the HCCBP was implemented. Eighteen GGBFs found in the RTA Ponds, Kogarah Golf Course or the expanded survey area south of the M5 were transferred to Symbio Wildlife Park in February 2017 (Biosphere 2017a). Construction of the stepping-stone ponds in the Enhancement Area was completed by May-June 2017 (Biosphere 2017b, c) and construction of the M8 Marsh Street Habitat Area was completed over the following year.

In 2017-2018, after the transfer of animals to the captive breeding facility, only two GGBFs were detected; one in the south-eastern corner of Kogarah Golf Course and one in “Barton Park”.

1.6.3 GGBF Monitoring 2018-2019

AMBS commenced monitoring of the GGBFs at Arncliffe in September 2018, by which time the construction of the M8 Marsh Street habitat area was complete. Captive breeding of the GGBFs at Symbio Wildlife Park commenced. Approximately 3,500 captive-bred tadpoles were released into the ponds in the M8 Marsh Street habitat area over February and March 2019. Juvenile GGBFs began to be observed almost immediately. Surveys in March and April 2019 recorded well over 100 animals and sometimes more than 200 animals. The average size and weight of the animals increased over time and by April 2019 a small proportion of the animals were large enough to be implanted with a PIT tag. By early June, 16 GGBFs had been tagged.

Two juvenile GGBFs were observed outside the boundary fence during surveys conducted in May 2019.

Outside of the M8 Marsh Street habitat area, monitoring in 2018-2019 included surveys of the RTA Ponds, Enhancement Area, a selection of waterbodies on Kogarah Golf Course and a range of sites south of the M5. No GGBFs were detected in any of these sites. It should be noted that this season marked the commencement of a period of very low rainfall across NSW.

1.6.4 GGBF Monitoring 2029-2020

The 2019-2020 season was characterised by extreme weather events, with an extended period of hot, dry conditions followed by heavy rainfall. Conditions between mid-October 2019 and mid-January 2020 were particularly poor, with most of south-eastern Australia in the midst of a drought and a severe bushfire season. There was a short period of heavy rain and thunderstorms in the middle of January 2020 (16-18 January); however, in general the month was characterised by extreme heat, low rainfall, bushfires and poor air quality.

An extreme rainfall event in February 2020 marked the end of this period of extreme heat and dry weather. Approximately 390 mm of rain fell in a 4-day period from 7 to 10 February 2020 (recorded at Observatory Hill by the Bureau of Meteorology). Over those 4 days many parts of Greater Sydney were subject to local flooding and some sites received their highest February rainfall on record. The heavy rain caused a large tree in Eve Street to fall, which landed across the frog fence surrounding the M8 Marsh Street habitat area.

During the drought, the habitat within the M8 Marsh Street habitat area was managed by using water from an on-site tank to top up the ponds and to dampen some of the terrestrial vegetation. A survey in October 2019 was undertaken prior to the release of captive-bred tadpoles in 2019-2020 and counted 110 GGBFs, approximately a third of which were large enough to be tagged. Male GGBFs were heard calling, but no other evidence of breeding was observed and no GGBF tadpoles were recorded in September or October.

Between the end of October 2019 and January 2020, a total of approximately 4,500 captive-bred GGBF tadpoles were released into the M8 Marsh Street habitat area. Juvenile GGBFs were observed in or adjacent to the ponds in November, December and January, shortly after the tadpole releases. At the end of the season a population estimate obtained from mark-recapture data indicated approximately 680 adult GGBFs (the 95% confidence interval being 336-1022 individuals).

No GGBFs were recorded anywhere outside of the M8 Marsh Street habitat area in the latter half of 2019. However, after the rain in January 2020, GGBFs began appearing outside of this area, mainly in nearby locations. Some of these frogs contained microchip codes confirming that they had escaped from the M8 Marsh Street habitat area.

A GGBF breeding event was recorded in the RTA Ponds in January 2020.

After the heavy rain event in February and the tree falling on the perimeter fence, dispersal to other areas was rapid. GGBFs appeared in a number of locations both south and north of the M5 East, including the RTA Ponds, the Enhancement Area, Riverine and Barton Parks and some of the ponds on the Kogarah Golf Course. However, none of the GGBFs that were found north of the M5 East had been tagged in the M8 Marsh Street habitat area; it was therefore unclear whether the animals recorded north of the M5 East had originated from the M8 Marsh Street habitat area, or from the breeding event in the RTA Ponds, or both.

1.6.5 GGBF Monitoring 2020-2021

A survey of the M8 Marsh Street habitat area and the RTA Ponds in October 2020 found GGBFs in all ponds in the M8 Marsh Street habitat area, including calling males in Pond B and Pond C, and one GGBF in the Western RTA Pond.

Between the end of October 2020 and January 2021 a total of approximately 4,500 captive-bred GGBF tadpoles were released into the M8 Marsh Street habitat area. In December 2020 approximately 500 captive-bred tadpoles were released into the Western RTA Pond. No GGBF tadpoles were detected in either area prior to the release of captive-bred tadpoles and no GGBF tadpoles were detected in any of the other sites during the season.

At the end of the season a population estimate for the M8 Marsh Street habitat area, obtained from mark-recapture data indicated approximately 470 adult GGBFs (with a 95% confidence interval of 412-527).

GGBFs were also recorded (but in much lower numbers) in many locations outside of the M8 Marsh Street habitat area. These included several locations south of the M5, the RTA Ponds, the Enhancement Area and three of the water features on Kogarah Golf Course.

1.6.6 GGBF Monitoring 2021-2022

The 2021-2022 monitoring season was characterised by low numbers of GGBFs compared to the previous three years and very few tadpoles introduced from the captive breeding program.

GGBFs were recorded in the M8 Marsh Street habitat area early in the season (October), including several calling males, although numbers were relatively low compared to the initial post-winter surveys of previous seasons. No GGBF tadpoles were detected. At the same time, most of the captive breeding attempts undertaken at Symbio Wildlife Park failed. As a result, only about 230 captive-bred GGBF tadpoles were released into the M8 Marsh Street habitat area (compared to several thousand in previous years) and a proportion of these became deformed as they grew. However, evidence of successful on-site breeding was detected in Pond B of the M8 Marsh Street habitat area later in the season. At the same time a small number of juvenile and "sub-adult" GGBFs were recorded in a few locations, indicating that there was at least some natural recruitment to the population later in the season.

At the end of the season a population estimate for the M8 Marsh Street habitat area, obtained from mark-recapture data indicated approximately 46.1 adult GGBFs (with a 95% confidence interval of 27.7 - 64.5).

One of the results from 2021-2022 was the detection of GGBF movement between the north and south of the M5. Although only a single individual has been recorded, it demonstrates that movement between these areas is possible.

The key outcomes of the 2021-2022 season were:

1. A GGBF breeding event was recorded in the M8 Marsh Street habitat area;
2. Movement of one GGBF between the north and south of the M5 was detected;
3. A population of GGBFs was present in the M8 Marsh Street habitat area (with a small number of individuals occupying other sites), but the number of animals present was very low in comparison to previous years when captive-bred tadpoles were introduced.

1.6.7 GGBF Monitoring 2022-2023

The initial results for 2022-2023 indicated that GGBFs had overwintered successfully and were occupying the M8 Marsh Street habitat area in spring 2023. Numbers were low compared to previous years, as would be expected after the results from 2021-2022.

Captive breeding at Symbio Wildlife Park was successful in 2022-2023 and approximately 4,700 tadpoles were released into the M8 Marsh Street habitat area. A further 1850 tadpoles were released into the Western RTA Pond.

As with previous years, the release of tadpoles resulted in a large number of GGBFs occupying the M8 Marsh Street habitat area during the season, with the population estimate for that site being approximately 604 adult GGBFs. GGBFs were also observed around the RTA Ponds, particularly in March 2024, but in much lower numbers than in the M8 Marsh Street habitat area. A few individuals were occasionally observed in some of the other survey sites, most frequently in the Enhancement Area.

1.6.8 GGBF Monitoring 2023-2024

Both adult and juvenile GGBFs were present at the beginning of the 2023-2024 season, with a small number of recaptures from the previous year recorded both inside and outside the M8 Marsh Street habitat area.

Tadpoles from the captive breeding program were released into the M8 Marsh Street habitat area and the Western RTA Pond. After these tadpole releases, the number of GGBFs encountered increased, especially in the M8 Marsh Street habitat area, the adjacent Creek area, and in the RTA Ponds.

The overall population estimate for adult GGBFs calculated for the M8 Marsh Street habitat area in the 2023-2024 season was approximately 288, which is a significant improvement on the year in which no tadpoles from the captive breeding program were released (2021-2022), but somewhat lower than in other years. No definitive evidence of GGBF recruitment was noted outside of the tadpoles released from the captive breeding program.

1.7 Weather Conditions in 2024-2025

Weather in 2024-2025 could generally be described as having above average rainfall at particular times, with some dry spells in between, and higher than average temperatures. During the winter, Sydney Airport received above average rainfall and Sydney in general had above average temperatures.

In early spring, rainfall was below average in September, October and November until a weather event at the end of November produced 80 mm of rain in 24 hours. This was followed by an extremely dry period in mid-late December, high rainfall in January, and a dry February. March and April received close to average rainfall and May received well above average rainfall.

Mean monthly temperatures were above average for almost the entire survey season, with a mean maximum monthly temperature of 25.6°C compared to the long-term average of 24.0°C, and a mean minimum monthly temperature of 17.1°C compared to the long-term average of 13.7°C, for the months between September and May. There were seven days of extreme heat (over 35°C) in the current season, compared with eight in 2023-2024, three in 2022-2024, two in 2021-2022, five in 2020-2021, and nine in 2019-2020.

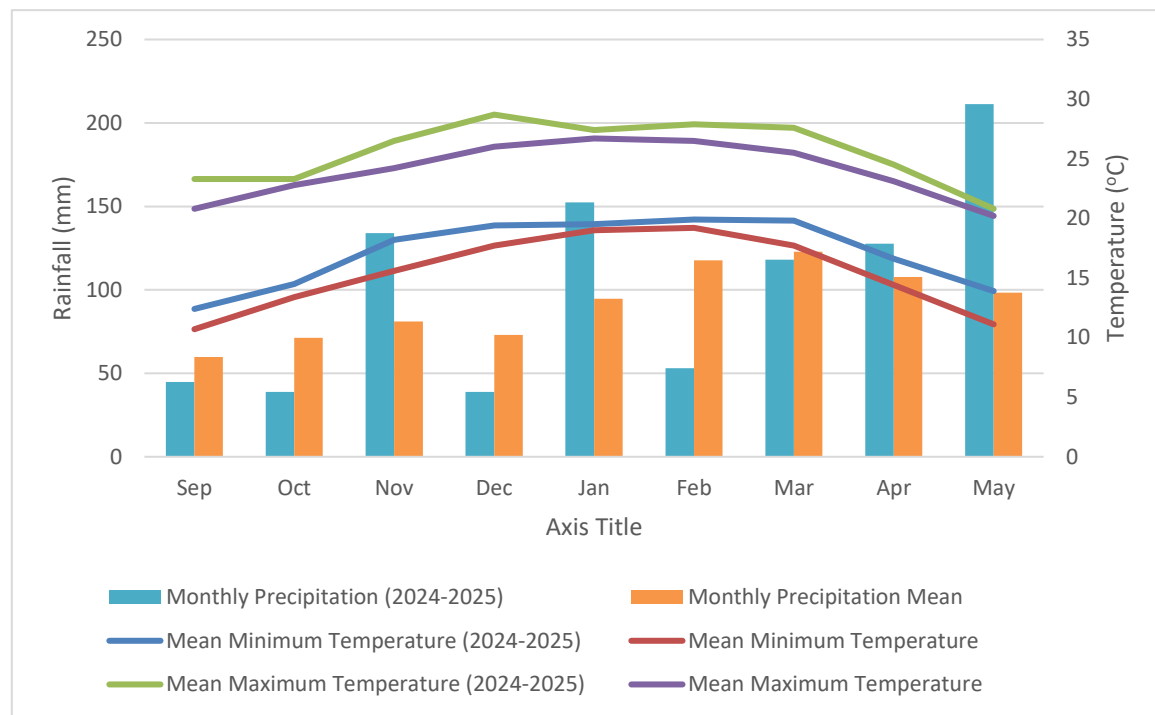


Figure 1.2: Weather data September 2024 to May 2025 (Sydney Airport 066037; Australian Bureau of Meteorology 2025).

2 Methods

2.1 Captive Breeding and Tadpole Transfer

Prior to any tadpole releases, inspections of the recipient sites, including tadpole surveys and sampling of water quality and temperature were undertaken. Searches for Striped Marsh Frogs and their foam egg nests also took place, with any captured Striped Marsh Frogs or collected egg masses removed from the recipient sites.

Husbandry and breeding of the captive GGBFs was undertaken by Symbio Wildlife Park in Helensburgh. Tadpoles resulting from fertilised spawnings were raised until ready for transfer to Arncliffe. Tadpoles were then placed in plastic bags containing water from the rearing tank and air. The bags were sealed at the top to minimise water movement during transportation and transported immediately to the release site in an air-conditioned vehicle.

At the release site, the bags were opened and placed in the target release pond to enable temperature equilibration before release. Water from the release pond was then gradually introduced to the bags. If no negative responses were apparent, the tadpoles were released into the pond. A sample of the tadpoles were released into enclosures placed in each pond, to assist with monitoring post-release development.

After release, tadpoles in the meshed enclosures were checked every 30 minutes for a period of at least 2 hours, then checked again after 24 hours, 72 hours, and then every 2-3 days until released. Each check involved an examination and count of the tadpoles, releasing any that were close to metamorphosis, and support feeding. Water levels and observations of tadpoles in the ponds were made and water was added if necessary. Net sweeps were avoided in order to minimise disturbance. A limited amount of support feeding of tadpoles in the ponds was undertaken.

2.2 Water Quality Monitoring and Maintenance Checks

Water quality and temperature surveys were undertaken approximately once per month between September 2024 and May 2025 (except for any ponds or waterbodies that were dry, too shallow for sampling, or overgrown with vegetation). Some sites were sampled in June instead of May due to access complications at the RTA Ponds and Kogarah Golf Course after the Kogarah Golf Club vacated the site.

Sample sites included the M8 Marsh Street habitat area, the RTA Ponds, the Enhancement Area, and a selection of sites in Kogarah Golf Course, the Riverine Park surrounds and the northern end of Barton Park (consistent with monitoring from previous seasons and monitoring previously undertaken by Dr Arthur White). Water was not present in all ponds in all months and some sites in the Riverine Park surrounds and Barton Park were inaccessible.

The water quality surveys were undertaken using a Hanna IC-HI98194 hand-held probe. The key parameters that were measured include:

- temperature (°C);
- salt concentration in either Practical Salinity Units (PSU) or parts per thousand (ppt);
- pH;
- dissolved oxygen (% saturation and milligrams per litre [mg/L]);
- conductivity and resistivity (uS/cm and ms/cm);
- turbidity (NTU or FNU);
- oxidation reduction potential (mV).

Results of the temperature, salinity, pH and dissolved oxygen were compared with thresholds for GGBF and GGBF tadpole survival identified by Mahony and Beranak (undated), which provided ranges within which frogs and tadpoles survive, as well as a “higher survival range” in which the highest number of tadpoles survive (Table 2.1).

Table 2.1: Survival Threshold Range and Higher Survival Range for GGBFs and GGBF tadpoles identified by Mahoney and Beranak.

Parameter	Higher Survival Range	Survival Threshold Range		
	Tadpoles	Tadpoles	Frogs	Calling Males
Water Temperature (°C)	20 – 37	10.8 - 40.7	3.6 - 40.7	14.1 - 33
Salinity (ppt)	< 4	< 8	< 26.2	< 8
pH	7.0 - 11.8	3.5 - 12.4	2.8 - 13.5	5.0 - 10.4
Dissolved Oxygen (mg/L)	0.14 – 16	0.13 - 17.6	0.13 - 18.2	0.15 - 18.2

Maintenance checks were generally undertaken at the same time as the water quality monitoring and included assessments of:

- water level;
- presence of the introduced fish *Gambusia holbrooki*;
- density of macrophytes (in the constructed ponds);
- weeds (in the constructed pond areas);
- the frog exclusion fence surrounding the M8 Marsh Street habitat area;
- evidence of feral predators;
- any other notes of relevance.

2.3 Tadpole Monitoring

Tadpole surveys were undertaken approximately once per month between September 2024 and May 2025. Some sites were sampled in June instead of May due to access complications at the RTA Ponds and Kogarah Golf Course after the Kogarah Golf Club vacated the site. Sample sites included the M8 Marsh Street habitat area, the RTA Ponds, the Enhancement Area and a selection of sites in Kogarah Golf Course, Riverine Park surrounds and the northern end of Barton Park. Water was not present in all ponds in all months. Some sites in the Riverine Park surrounds and Barton Park were inaccessible, including the Northern Phragmites area and Number 9 Pond for the entire season, and the Eastern Channel and Landing Lights East during parts of the season.

Survey techniques followed those previously undertaken in previous seasons and those of Dr White. Upon reaching each survey site, two ecologists observed the water surface to investigate whether there was tadpole activity. Sweeps of the waterbody were then made with a long-handled net (ten sweeps in most ponds and three sweeps in each of the small ponds in the Enhancement Area). Tadpoles captured in the net sweeps were identified to species when possible and life history stage recorded.

2.4 Frog Monitoring

2.4.1 M8 Marsh Street habitat area

Nine nocturnal frog surveys were undertaken in the M8 Marsh Street habitat area between November 2024 and May 2025. Survey techniques involved a combination of call detection, call playback, spotlighting, and mark-recapture. The frequency of surveys was highest between February and May 2025, in order to collect enough data to obtain a population estimate.

Call playback was undertaken at each pond prior to undertaking spotlighting as follows: listening for calling frogs – 3 minutes; GGBF call playback – 30 seconds; listening – 30 seconds; GGBF call

playback – 30 seconds; listening – 30 seconds. All frogs heard calling were identified and an estimate of the number of calling frogs of each species was made.

Spotlighting involved timed searches of each pond, with duration varying according to the size of the pond. All frogs observed were counted and as many GGBFs as possible were captured. All captured GGBFs large enough to have a tag were scanned and, if previously tagged, the tag number was recorded. All captured GGBFs were weighed, snout-urostyle length (SUL) was measured, any untagged animals over 40 mm SUL were tagged and then the frogs were released at the site of capture. The tags used were Trovan ID100 FXD-A Midichip Passive Integrated Transponders (PIT tags, also referred to as “microchips”), which were implanted subcutaneously. A Cyanoacrylate compound (Vetbond®) was applied to seal the insertion site, as per Murray *et al.* (2011).

Timed surveys were also undertaken around the inside of the perimeter fence and along a drainage swale located inside the habitat area downslope of the ponds. In these areas the frogs were counted but not captured.

2.4.2 RTA Ponds, Enhancement Area, Kogarah Golf Course, Underpass, Riverine Park surrounds and Barton Park

Twelve frog surveys outside of the M8 Marsh Street habitat were undertaken between November 2024 and May 2025, including six surveys of the RTA Ponds, Enhancement Area, Underpass, and a selection of sites in Kogarah Golf Course, and six surveys of the Riverine Park surrounds and the northern end of Barton Park. Water was not present in all ponds in all surveys. Some sites in the Riverine Park surrounds were inaccessible, including the Northern Phragmites area and Number 9 Pond for the entire season, and the Eastern Channel and Landing Lights East for parts of the season.

Survey techniques were the same as described for the M8 Marsh Street habitat area; i.e., call detection, call playback, a timed spotlight survey, with duration of the spotlight survey depending on the size of the pond, and measurement, tagging and release of any GGBFs able to be captured.

2.4.3 Population Estimate

GGBF population estimates were undertaken by The Analytical Edge using mark-recapture data collected from the M8 Marsh Street habitat area between March and May 2025, for which the sample sizes were the best. Closed population capture-recapture models were fitted in R (v. 4.5.0, R Core Team 2025) using RMark (v. 3.0.0, Laake 2013), which is an interface with the software package MARK.

3 Results

3.1 Captive Breeding and Tadpole Transfer

Approximately 6980 captive-bred GGBF tadpoles were collected from the captive breeding facility at Symbio Wildlife Park and transported to the M8 Marsh Street habitat area and the RTA Ponds, where they were released on four separate occasions during 2024-2025 (Table 3.1).

Table 3.1: Summary of GGBF tadpole releases in 2024-2025.

Date	Site	Number of tadpoles released
1 November 2024	RTA Pond West	3000
1 November 2024	M8 Marsh Street Habitat Area Pond C	80
27 November 2024	M8 Marsh Street Habitat Area Pond B	2340
10 January 2025	RTA Pond West	560
27 March 2025	M8 Marsh Street Habitat Area Pond C	1000
Total		6980

3.2 Water Quality Monitoring

Water quality data are presented in Appendix A.

In the M8 Marsh Street habitat area, water levels were managed such that one pond was allowed to dry out (Pond A) during a dry period in late winter and spring. While the pond was dry, the macrophytes in the ponds were cut to ground level on two occasions by TEC. The pond was completely refilled on 19 November 2024. Water was retained in the other two ponds (B and C) but allowed to gradually drop in response to the prevailing weather conditions in late winter and spring. Ponds B and C were topped up prior to the release of tadpoles.

In the M8 Marsh Street habitat area, water temperature fluctuated in response to the prevailing climatic conditions but was within the general survival threshold for tadpoles throughout the entire monitoring period. Results of salinity, dissolved oxygen and pH measures were all within the general survival threshold for the entire monitoring period. Water quality results generally fell within the survival threshold for tadpoles described by Mahony and Beranek.

Water levels in the Enhancement Area ponds varied throughout the monitoring period, with Ponds 2, 3, and 4 being dry for the entire season, and Pond 5 gradually drying out as the season progressed. Water quality measurements in the ponds that held water were generally within target thresholds, with the exception of dissolved oxygen content, which was below standard for Pond 6 of the Enhancement Area during October and November 2024. Pond 6 of the Enhancement Area is located between an outlet that drains water from the permanent facilities constructed for the M8 and a drainage line on Kogarah Golf Course that is connected to the Cooks River; whilst this means the pond fills quickly during wet periods and retains water for longer than most of the other Enhancement Area ponds, the water quality in the pond can vary considerably.

Most ponds regularly sampled on Kogarah Golf Course had water throughout the season. Water quality measurements in these Kogarah Golf Course ponds were generally within target thresholds, with a few exceptions, such as salinity in the Mangrove Pond (which is connected to the Cooks River), and also salinity and dissolved oxygen in the Circular Pond in May 2025.

Many of the sites in the Riverine Park surrounds and Barton Park were dry or too shallow to sample for most of the season, with the main exception being Landing Lights East, which held water throughout the survey period. When water was present, water quality parameters were generally

within the survivorship thresholds at most sites. Salinity was above the threshold for Landing Lights West during May 2025.

3.3 Tadpole Monitoring

Tadpole monitoring data are presented in Appendix B.

GGBF tadpoles were detected in both the M8 Marsh Street habitat area and the RTA Ponds as a result of both the release of captive-bred tadpoles and a natural breeding event. A large number of GGBF tadpoles were observed in Pond A of the M8 Marsh Street habitat area after the drying out and refilling of the pond, together with Peron's Tree Frog *Litoria peronii* and Striped Marsh Frog *Limnodynastes peronii* tadpoles. GGBF tadpoles were also observed after tadpole releases into the M8 Marsh Street habitat area Ponds B and C and the western RTA Pond.

Striped Marsh Frog tadpoles were frequently detected during the monitoring and recorded in a number of sites including the M8 Marsh Street habitat area, the RTA Ponds, the Enhancement Area Ponds and some of the Riverine Park surrounds and Barton Park sites.

Peron's Tree Frog *Litoria peronii* tadpoles were detected at all three ponds in the M8 Marsh Street habitat area, as well as the Eastern RTA Pond. Tadpoles of Eastern Dwarf Tree Frog *Litoria fallax* were detected in both RTA Ponds.

No tadpoles of any species were detected in the Kogarah Golf Course ponds. The introduced Plague Minnow *Gambusia holbrooki* was regularly detected in the Kogarah Golf Course ponds, often in high numbers.

3.4 Frog Monitoring

3.4.1 M8 Marsh Street habitat area

Two hundred and fifty-one (251) captures of GGBFs were made over nine survey events at the M8 Marsh Street habitat area between November 2024 and April 2025 (Table 3.2). Of the total, one hundred and seventy-seven (177) were "juveniles" (<40 mm in SUL length). The remaining seventy-four (74) frogs were "adults" (>40 mm in SUL length), of which fifty (50) were implanted with PIT tags (microchips), and twenty-four (24) were recaptures. These as whole, represent fifty-six (56) distinct adult frogs. Some individuals were recaptured more than once.

The majority of GGBF observations or captures took place in the latter half of the season, after the release of the captive-bred tadpoles. GGBFs were present in the surveys earlier in the season but only in small numbers, with three (3) individuals captured in November 2024. By comparison, the number of captures per survey averaged 36, 41 and 32 individuals in January, February and March 2025 respectively. In April 2025, 22 individuals were captured on average over the last three surveys. Another ninety-five (95) GGBFs were observed but not captured (Table 3.3).

This year, all of the GGBFs observed prior to the tadpole releases were adults and included a number of recaptures. Following the tadpole releases, a much larger proportion of juveniles was observed, with the proportion of adult frogs rising towards the end of the season.

Seven of the GGBFs that were capture were recaptures from previous seasons, including five originally captured and microchipped during the 2023-2024 season, and two that were first captured and microchipped during the 2022-2023 season, all from the M8 Marsh St habitat area.

Sex ratio in this survey season was slightly female biased, with males constituting almost half (47.5%) of all captured GGBFs whose sex was identified. This is similar to the previous season although there was slightly male bias in 2023-2024 (51.3%).

Analysis of the mark-recapture data indicated that the best fitting model was the null model (QAICc = -15.59), where capture and recapture probability did not change with time or behaviour. Based on this model, the resulting population estimate for adult GGBFs (>40 mm in SUL length) was 104 (with a 95% confidence interval of 70-184) individual GGBFs across the M8 Marsh Street habitat area in the 2024-2025 season.

Other frog species detected within the compound included the Striped Marsh Frog (*Limnodynastes peronii*), Peron's Tree Frog (*Litoria peronii*), as well as two Common Eastern Froglets (*Crinia signifera*) and two Eastern Dwarf Tree Frogs (*Litoria fallax*) (Table 3.3).

Table 3.2: M8 Marsh Street habitat area GGBF capture results, November 2024 to April 2025.

Date	Pond	Juvenile / Subadult / Not tagged	Recapture	Number microchipped	Total
21 Nov 2024	Pond A	0	0	0	0
	Pond B	0	1	0	1
	Pond C	0	1	1	2
	Subtotal	0	2	1	
9 Jan 2025	Pond A	5	0	0	5
	Pond B	15	0	1	16
	Pond C	14	1	0	15
	Subtotal	34	1	1	
4 Feb 2025	Pond A	5	0	0	5
	Pond B	12	0	0	12
	Pond C	6	1	3	10
	Subtotal	23	1	3	
17 Feb 2025	Pond A	21	0	3	24
	Pond B	4	0	1	5
	Pond C	22	0	4	26
	Subtotal	47	0	8	
4 Mar 2025	Pond A	16	0	0	16
	Pond B	1	0	0	1
	Pond C	6	1	0	7
	Subtotal	23	1	0	
19 Mar 2025	Pond A	13	2	2	17
	Pond B	0	0	0	0
	Pond C	14	5	4	23
	Subtotal	27	7	6	
2 Apr 2025	Pond A	4	2	9	15
	Pond B	0	0	2	2
	Pond C	10	3	6	19
	Subtotal	14	5	17	
15 Apr 2025	Pond A	1	0	0	1
	Pond B	1	1	0	2
	Pond C	4	1	3	8
	Subtotal	6	2	3	
29 Apr 2025	Pond A	0	2	4	6
	Pond B	0	0	2	2
	Pond C	3	3	5	11
	Subtotal	3	5	11	
Grand Total		177	24	50	251

Table 3.3: Frogs that were detected but not captured (all species), M8 Marsh Street habitat area. Numbers in parentheses indicate the number of individuals that were heard calling, but were not observed visually.

Date	Pond	<i>Litoria aurea</i>	<i>Limnodynastes peronii</i>	<i>Litoria peronii</i>	<i>Litoria fallax</i>	<i>Crinia signifera</i>
21 Nov 2024	Pond A	0	4 (1)	0	0	0
	Pond B	0	3 (3)	0	0	0
	Pond C	1 (1)	1 (5)	4 (2)	2	0
	Swale	0	0	0	0	0
	Perimeter	0	0	0	0	0
	Subtotal	1 (1)	8 (9)	4 (2)	2	0
9 Jan 2025	Pond A	5	0	(1)	0	0
	Pond B	7	(2)	0	0	0
	Pond C	2 (1)	(16)	(6)	0	0
	Swale	0	0	0	0	0
	Perimeter	12	0	0	0	0
	Subtotal	26 (1)	(18)	(7)	0	0
4 Feb 2025	Pond A	3	0	(1)	0	0
	Pond B	4	(4)	0	0	0
	Pond C	6	(14)	0	0	0
	Swale	2	0	0	0	0
	Perimeter	12	0	0	0	0
	Subtotal	27	(18)	(1)	0	0
17 Feb 2025	Pond A	0	0	0	0	0
	Pond B	0	0	0	0	0
	Pond C	1	(3)	1 (2)	0	0
	Swale	2	0	0	0	0
	Perimeter	0	0	0	0	0
	Subtotal	3	(3)	1 (2)	0	0
4 Mar 2025	Pond A	5	0	0	0	0
	Pond B	0	(5)	1	0	0
	Pond C	1	(25)	1	0	0
	Swale	0	0	0	0	0
	Perimeter	1	0	0	0	0
	Subtotal	7	(30)	2	0	0
19 Mar 2025	Pond A	7	0	0	0	0
	Pond B	0	(2)	0	0	0
	Pond C	2	1 (3)	0	0	(2)
	Swale	1	0	0	0	0
	Perimeter	0	0	0	0	0
	Subtotal	10	1 (5)	0	0	(2)
2 Apr 2025	Pond A	5	0	0	0	0
	Pond B	0	0	0	0	0
	Pond C	4	(30)	0	0	0
	Swale	0	0	0	0	0
	Perimeter	0	0	0	0	0
	Subtotal	9	(30)	0	0	0
15 Apr 2025	Pond A	1	0	0	0	0
	Pond B	0	0	0	0	0
	Pond C	2	(1)	0	0	0
	Swale	0	0	0	0	0
	Perimeter	0	0	0	0	0
	Subtotal	3	(1)	0	0	0
29 Apr 2025	Pond A	4	0	0	0	0
	Pond B	1	(1)	0	0	0
	Pond C	1	(2)	0	0	0
	Swale	0	(2)	0	0	0
	Perimeter	0	(4)	0	0	0
	Subtotal	6	(9)	0	0	0
Opportunistic	Pond A	1	0	0	0	0
	Pond B	2	1	0	0	0

Date	Pond	<i>Litoria aurea</i>	<i>Limnodynastes peronii</i>	<i>Litoria peronii</i>	<i>Litoria fallax</i>	<i>Crinia signifera</i>
	Pond C	0	0	0	0	0
	Swale	0	0	0	0	0
	Perimeter	0	0	0	0	0
	Subtotal	3	1	0	0	0
Grand Total		95 (2)	10 (123)	5 (12)	2	(2)

3.4.2 Underpass, RTA Ponds, Enhancement Area, Kogarah Golf Course, Riverine Park surrounds and Barton Park, Creek

Frog monitoring data from outside of the M8 Marsh Street habitat area are described below and summarised in Appendix C.

A total of seventy-three (73) GGBF captures were made outside of the M8 Marsh Street habitat area, including sixteen (16) juveniles and fifty-seven (57) adults, of which ten (10) were recaptures. These as a whole, represent forty-eight (48) distinct adult frogs. Another thirteen (13) GGBFs were observed, but were not captured. Seven (7) GGBFs were additionally heard calling, all of them in the Circular Pond on Kogarah Golf Course, but were not observed.

Most of the GGBFs observed outside of M8 Marsh Street habitat area were located in the Creek area, which is nearest to the compound, in April and May 2025 (i.e. after the tadpole releases). However, there were also several records across the season from the RTA Ponds and Enhancement Area and the Golf Course ponds nearest to the RTA Ponds (Circular Pond and Long Pond). One GGBF caught in the Circular Pond on Kogarah Golf Course was an across-season recapture, having been first microchipped in the 2023-2024 season, from the Skinny Pond on Kogarah Golf Course, and the same frog was later recaptured again from the Circular Pond.

GGBFs were also heard calling from the Circular Pond on Kogarah Golf Course during surveys in December, January and February.

Unlike in some of the previous seasons, we did not detect any dispersal out of the M8 Marsh Street habitat area this season, from individuals captured and tagged within the compound, nor movement back into the compound, from frogs captured in the adjacent Creek area.

Only one GGBF was observed in the Riverine Park surrounds and Barton Park areas, and this individual was located in the Landing Lights East pond, which is also the only pond in these areas that held water for the entire season.

Striped Marsh Frogs (*Limnodynastes peronii*) were frequently detected across multiple sites, in all areas, including the Creek area, both RTA Ponds, most ponds in the Enhancement Area (including the adjacent drainage line), Kogarah Golf Course, and the Riverine Park surrounds and Barton Park. Peron's Tree Frogs (*Litoria peronii*) were also observed in several locations including the Creek area, the Western RTA Pond, Circular Pond on Kogarah Golf Course, and the Underpass, and was heard calling in Long Pond and Eastern Pond on Kogarah Golf Course. Eastern Dwarf Tree Frogs (*Litoria fallax*) were observed at both RTA ponds, often in high numbers, as well as in Pond 3 of the Enhancement Area. Common Eastern Froglets (*Crinia signifera*) were heard calling at the Eastern RTA Pond.

Table 3.4: Observations of GGBFs outside of the M8 Marsh Street habitat area during the 2024-2025 monitoring season (numbers in parenthesis indicate frogs that were heard or observed but not captured).

Site	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25	Apr-25	May-25	Total
Creek				3	1	14 (3)	12	30 (3)
Underpass								0
RTA Pond West			2 (2)	2	1 (1)	3	2	10 (3)
RTA Pond East		1	1 (1)	2		2	3	9 (1)
Enhancement Area				2		1	1 (1)	4 (1)
Circular Pond		5 (3)	1 (3)	(1)		2 (1)	3	11 (8)
Long Pond		1	1 (1)	3	1 (2)		1	7 (3)
Eastern Pond				1	(1)			1 (1)
Skinny Pond								0
Northern Pond								0
Mangrove Pond								0
Eastern Channel								0
Southern Phragmites								0
Bend Swamp								0
Southern Jungle								0
Driving Range Wetland								0
Landing Lights East							1	1
Landing Lights West								0
Total Observations	0	7	5 (7)	13 (1)	3 (4)	22 (4)	23 (1)	73 (20)



Figure 3.1: GGBF observations during the 2024-2025 monitoring season

3.5 Maintenance

3.5.1 M8 Marsh Street habitat area

Habitat maintenance work within the M8 Marsh Street habitat area focussed on works involving Pond A, managing the height of vegetation around the inner perimeter of the fence, salting Pond B and creation of some potential overwintering sites.

Works on Pond A included allowing the pond to dry out completely, cutting back the macrophytes whilst dry, clearing some of the weedy bank vegetation, then refilling the pond and keeping it topped up.

Works on Pond B included adding salt to the during the winter (before the commencement of the current monitoring period), with salt levels slightly raised in accordance with published literature regarding Chytrid inhibition (Clulow et al. 2017). In addition, some of the macrophytes within the pond were cut low in order to create some open spaces, as the macrophyte cover was becoming too dense.

Overwintering sites in the form of the “frog hotels” designed by Matthew Waddell (Macquarie University) were installed in or adjacent to the ponds.

Targeted weed control was periodically undertaken by TEC, in order to remove infestations of Lantana and other problem weeds. However, the site has high weed abundance and weeds such as Morning Glory (*Ipomoea indica*) continues to pose challenges despite control efforts.

3.5.2 RTA Ponds

Both RTA Ponds were holding water for the duration of the monitoring season and the introduced Plague Minnow (*Gambusia holbrooki*) was not observed. Some weed control was undertaken by TEC and focused mainly on removing saplings of shading mid-storey species and cutting strips of clear water through areas of dense macrophyte cover.

3.5.3 Enhancement Area and Kogarah Golf Course

All ponds within the Enhancement Area were overgrown with weeds and grasses, and Ponds 2, 3 and 4 were dry throughout the survey period. The introduced Plague Minnow (*Gambusia holbrooki*) was detected on some occasions in Pond 6, which is the pond that sometimes has a connection to the Cooks River. Evidence of foxes was observed on the Kogarah Golf Course and the Enhancement Area during this monitoring period.

4 Discussion

Adult GGBFs were present at the beginning of the 2024-2025 season, with a small number of recaptures from the previous year recorded both inside and outside the M8 Marsh Street habitat area and calling GGBFs heard in Pond C and on Kogarah Golf Course. However, the number of GGBFs at the beginning of the season was small.

The works undertaken on Pond A (drying the pond and cutting back the macrophytes) appear to have yielded a positive result, with GGBF breeding being recorded in this pond for the first time, and a high density of tadpoles observed shortly after re-filling the pond. A relatively large number of juvenile GGBFs were observed around the pond in late February and early March.

Tadpoles from the captive breeding program were released into the Western RTA Pond and Ponds B and C in the M8 Marsh Street habitat area. After these tadpole releases, the number of GGBFs encountered increased, especially in the M8 Marsh Street habitat area and the adjacent Creek area. However, overall, the number of GGBFs observed was lower than in previous years when captive-bred tadpoles have been released.

The overall population estimate for adult GGBFs calculated for the M8 Marsh Street habitat area in the 2023-2024 season was approximately 104, which is considerably lower than the previous year. However, it is still much higher than the number of GGBFs observed across Arncliffe in the years prior to the construction of this habitat and the introduction of the captive breeding program.

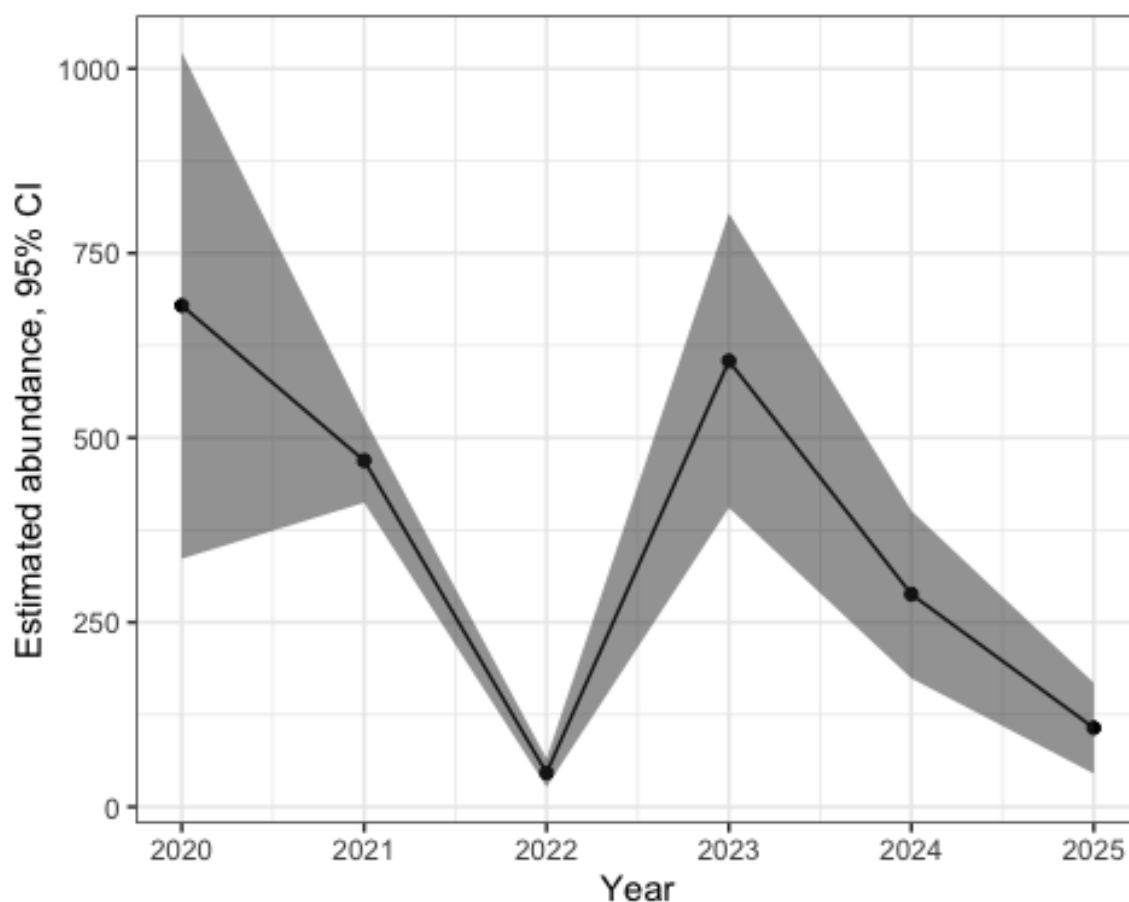


Figure 4.1: Estimated GGBF population size 2019-2025 (M8 Marsh Street habitat area only).

5 Conclusion

As stated in Section 1.4, the objectives of the monitoring program are stated in the PoM 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 Arncliffe population at the Kogarah Golf Course and within the RTA Ponds is still dependent on the captive breeding program and there have been no confirmed breeding events in the RTA Ponds since January 2020. However, the presence of GGBFs at the start of the season and the recapture of GGBFs from previous seasons is encouraging. GGBFs are now regularly being recorded from sites like the Circle Pond on the Golf Course.

In previous years, the M8 Marsh Street habitat area has been very effective at creating an environment suitable for the growth of captive-bred tadpoles, their metamorphosis into frogs, and the continued growth of the metamorphosed animals into adult frogs; however, evidence of recruitment outside of the captive breeding program has been limited. This year, the manipulations to Pond A appear to have been effective, with GGBFs breeding in this pond and tadpoles and juveniles recorded. However, the number of adult GGBFs seen at the beginning and end of the season was lower than in previous years. Continued monitoring of GGBFs at this site is recommended and if adult numbers remain low in 2025-2026, manipulation of the terrestrial habitats may be required.

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Appendix A: Water quality data

Water Quality Results for September 2024

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	11/9/2024	A	Dry											
	11/9/2024	B	75% full	-21	7.4	153.3	41.8	0.49	1650	833	0.84	16.3	14.1	No
	11/9/2024	C	75% full	12.9	6.8	147.2	29.6	0.29	324	162	0.16	11.1	15	No
RTA Ponds	11/9/2024	Western	75% full	-36.4	7.7	60.4	2.6	0.27	87	44	0.04	12.1	13.2	No
	11/9/2024	Eastern	75% full	37.1	6.4	54.5	2.5	0.26	116	59	0.06	14.5	12.8	No
Enhancement Area	11/9/2024	1	Full	8.9	6.9	134.2	2.5	0.25	203	102	0.1	9.2	14.1	No
	11/9/2024	2	Dry											
	11/9/2024	3	Dry											
	11/9/2024	4	Dry											
	11/9/2024	5	Full	5.9	7	132.5	2.4	0.25	462	211	0.2	36.1	13.8	No
	11/9/2024	6	25% full	12	6.9	159.2	2.4	0.23	10100	5002	0.2	9.2	13.8	No
Kogarah Golf Course	11/9/2024	Circular	75% full	-26.6	7.5	-27.7	2.6	0.26	4413	2210	2.37	44.7	14.8	No
	11/9/2024	Long	75% full	-66.1	8.2	20.4	3	0.29	3445	1778	1.88	53.8	17	Yes
	11/9/2024	Mangrove Pond	50% full	-61.6	8.2	-18.5	3	0.24	52260	26116	34.6	19	16.1	Yes
	11/9/2024	Eastern	Not sampled											
Riverine Park surrounds and Barton Park	11/9/2024	Eastern Channel	Not sampled											
	11/9/2024	Southern Phragmites	Very low	-9.3	7.3	-915	33.3	0.34	1370	683	0.69	17.7	14.4	No
	11/9/2024	Bend Swamp	Dry											
	11/9/2024	Southern Jungle	Dry											
	11/9/2024	Landing Lights West	Dry											
	11/9/2024	Driving Range Wetland	Very low	-1.3	7.1	-91.5	33.5	0.35	2403	1202	1.25	28.7	13.2	No
	11/9/2024	Landing Lights East	75% full	-28.3	7.6	-10.5	33.5	0.37	1199	599	0.6	15	12.7	No

Water Quality Results for October 2024

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	23/10/2024	A	Dry											
	23/10/2024	B	25% full	16.9	6.8	27.6	22.1	2.08	2056	1029	1.06	7	16.7	No
	23/10/2024	C	Full	NA	7.4	137.7	23	2.1	345	177	0.17	19.3	17.7	No
RTA Ponds	23/10/2024	Western	50% full	-17.6	7.4	50.3	10.2	0.98	105	53	0.05	11.6	16.6	No
	23/10/2024	Eastern	50% full	36.5	6.5	115.8	12.6	1.18	112	55	0.05	10.4	15.7	No
Enhancement Area	23/10/2024	1	Full	29.9	6.7	42.1	6.1	0.58	166	64	0.08	20.4	16.6	No
	23/10/2024	2	Dry											
	23/10/2024	3	Dry											
	23/10/2024	4	Dry											
	23/10/2024	5	Full	22.8	6.7	-76	1.9	0.17	281	146	0.13	11.1	16.4	No
	23/10/2024	6	Full	25.5	6.7	-124.6	1	0.09	13140	6570	7.61	24.8	16.5	No
Kogarah Golf Course	23/10/2024	Circular	75% full	-45.4	8.1	13.4	20.7	2.1	2959	1483	1.55	33.6	18.5	No
	23/10/2024	Long	75% full	-44.9	8	44.6	16.3	1.48	1953	977	1	39.5	20.3	Yes
	23/10/2024	Mangrove Pond	75% full	-21.3	7.6	29.4	10.1	0.88	45710	22920	29.9	57.3	18.8	Yes
	23/10/2024	Eastern	75% full	-66.3	8.4	62.2	9.9	0.9	1792	896	0.91	38.7	19.2	Yes
Riverine Park surrounds and Barton Park	23/10/2024	Eastern Channel	Not sampled											
	23/10/2024	Southern Phragmites	Dry											
	23/10/2024	Bend Swamp	Dry											
	23/10/2024	Southern Jungle	Dry											
	23/10/2024	Landing Lights West	Dry											
	23/10/2024	Driving Range Wetland	Dry											
	23/10/2024	Landing Lights East	25% full	-11.9	7.4	50.7	7.9	0.77	1606	803	0.82	18.7	15.7	Yes

Water Quality Results for November 2024

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	20/11/2024	A	25% full	15.6	7.4	222.9	27.1	2.49	210	105	0.1	1.2	21.1	No
	20/11/2024	B	75% full	24.6	6.8	209.6	21	1.91	2323	1163	1.2	7.8	18.2	No
	20/11/2024	C	25% full	23.2	6.9	172.1	13.3	1.21	384	192	0.18	3.3	19	No
RTA Ponds	20/11/2024	Western	Very low	15.5	7	69.4	6.3	0.59	160	80	0.08	17.1	18	No
	20/11/2024	Eastern	Very low	43.4	6.4	135.7	7.1	0.61	110	56	0.05	7.2	17.8	No
Enhancement Area	20/11/2024	1	Full	25.4	6.8	38.8	7.8	0.72	188	102	0.1	23	18	No
	20/11/2024	2	Dry											
	20/11/2024	3	Dry											
	20/11/2024	4	Dry											
	20/11/2024	5	Full	42.6	6.5	-20	5.6	0.52	395	197	0.19	34.6	18.5	No
	20/11/2024	6	75% full	23.7	6.7	-27.6	0.8	0.07	9686	4853	5.46	22.2	18.5	No
Kogarah Golf Course	20/11/2024	Circular	Very low	-31.2	7.7	-74.9	1.7	0.15	5067	2534	2.74	39.7	17.5	No
	20/11/2024	Long	75% full	-69.5	8.5	-30.4	33.1	3	4201	2130	2.27	46	20.1	Yes
	20/11/2024	Mangrove Pond	Full	-44.1	8	24.9	19.8	1.45	50050	25040	32.8	5.8	19.8	No
	20/11/2024	Eastern	75% full	-48.1	8.1	-27.6	4.4	0.38	6386	3191	3.48	57.1	20.2	Yes
	20/11/2024	Skinny	Not sampled											
Riverine Park surrounds and Barton Park	20/11/2024	Eastern Channel	Not sampled											
	20/11/2024	Southern Phragmites	Dry											
	20/11/2024	Bend Swamp	Dry											
	20/11/2024	Southern Jungle	Dry											
	20/11/2024	Landing Lights West	Dry											
	20/11/2024	Driving Range Wetland	Dry											
	20/11/2024	Landing Lights East	Very low	15.8	6.9	-47.9	17.4	1.46	1719	859	0.87	48	17.1	No

Water Quality Results for December 2024

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	15/12/2024	A	Full	11.9	7	117.3	43.6	3.29	238	120	0.11	13.1	28.2	No
	15/12/2024	B	75% full	26.8	6.7	56.6	12	0.96	1042	521	0.51	9	24.3	No
	15/12/2024	C	75% full	20.4	6.9	84.6	97.2	7.61	375	186	0.18	11.5	25.6	No
RTA Ponds	15/12/2024	Western	75% full	18.6	7.1	69.8	5.2	0.44	137	69	0.06	14.1	23.9	No
	15/12/2024	Eastern	75% full	52.6	6.2	119.7	5.1	0.43	114	57	0.05	12.8	23.1	No
Enhancement Area	15/12/2024	1	Full	25.7	6.7	23.6	7	0.59	212	106	0.1	13.5	23.5	No
	15/12/2024	2	Dry											
	15/12/2024	3	Dry											
	15/12/2024	4	Dry											
	15/12/2024	5	50% full	53.3	6.3	41.6	12.2	1.03	272	136	0.13	11.1	24.5	No
	15/12/2024	6	50% full	29.8	6.6	-121.7	2.2	0.18	7705	3854	4.26	26.5	23.8	No
Kogarah Golf Course	15/12/2024	Circular	75% full	-24.7	7.5	-33.3	11.5	0.93	2284	1144	1.17	10.4	26	No
	15/12/2024	Long	Full	-45.6	8	-27.1	10.3	0.81	2940	1470	1.52	8.4	27.7	Yes
	15/12/2024	Mangrove Pond	Full	-15.2	7.4	-136.3	3.7	0.24	48140	24090	31.6	10.5	25.3	Yes
	15/12/2024	Eastern	Full	-36.5	7.8	105	14.9	1.12	5233	2625	2.81	10.7	22.5	Yes
Riverine Park surrounds and Barton Park	15/12/2024	Eastern Channel	Not sampled											
	15/12/2024	Southern Phragmites	50% full	19.3	6.8	-113.7	3.1	0.27	461	230	0.22	21.6	22.4	No
	15/12/2024	Bend Swamp	Too shallow											
	15/12/2024	Southern Jungle	Too shallow											
	15/12/2024	Landing Lights West	Dry											
	15/12/2024	Driving Range Wetland	Dry											
	15/12/2024	Landing Lights East	33% full	15.6	7.3	-135.6	4.6	0.37	2171	1086	1.11	35.2	22.8	No

Water Quality Results for January 2025

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	17/01/2025	A	33% full	32.6	6.8	140.3	10.7	0.96	200	100	0.09	3.4	19.4	No
	17/01/2025	B	Full	38.8	6.7	74.9	10.3	0.94	1133	567	0.57	4.1	19.2	No
	17/01/2025	C	Full	25.3	6.7	73.4	5.5	0.49	414	207	0.2	2.9	20.5	No
RTA Ponds	17/01/2025	Western	75% full	56.7	6.8	128.4	8.5	0.79	122	61	0.06	5.8	18.9	No
	17/01/2025	Eastern	75% full	65.5	6.4	129.1	6	0.53	115	58	0.05	6.6	18.7	No
Enhancement Area	17/01/2025	1	Full	63.4	6.1	-25.6	3.6	0.33	205	103	0.1	8	19.3	No
	17/01/2025	2	Dry											
	17/01/2025	3	Dry											
	17/01/2025	4	Dry											
	17/01/2025	5	Very low	55.3	6.1	68.6	2.6	0.22	200	100	0.1	11.6	19.7	No
	17/01/2025	6	Full	7.7	7.3	20.2	3.2	0.28	9171	4565	5.13	3.2	19.8	No
Kogarah Golf Course	17/01/2025	Circular	Full	2.4	6.9	-34.7	3.5	0.3	6093	3053	3.3	23.2	19.7	No
	17/01/2025	Long	Full	-9.3	7.4	-18.5	4.7	0.41	3505	1752	1.05	8.5	20.2	Yes
	17/01/2025	Mangrove Pond	Full	-3.9	7.5	-106.3	5.9	0.51	68000	128500	9.57	25	18.2	Yes
	17/01/2025	Eastern	Full	-35.7	7.7	8.6	5.6	0.47	8794	4393	4.03	28.5	20.1	Yes
Riverine Park surrounds and Barton Park	17/01/2025	Eastern Channel	Dry											
	17/01/2025	Southern Phragmites	Very low	33.7	6.1	-61.4	4.8	0.43	580	290	0.28	19.5	18.5	No
	17/01/2025	Bend Swamp	Dry											
	17/01/2025	Southern Jungle	Dry											
	17/01/2025	Landing Lights West	Dry											
	17/01/2025	Driving Range Wetland	Very low	-25.7	7.6	84.2	4.5	0.41	1335	667	0.62	10.5	16.5	No
	17/01/2025	Landing Lights East	50% full	19.7	6.8	-142.5	8.5	0.74	2272	1141	1.18	22.2	19.1	No

Water Quality Results for February 2025

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	14/03/2025	A	50% full	21.4	7	103.8	9.2	0.8	230	116	0.11	21.3	22.6	No
	14/03/2025	B	75% full	19.7	6.9	104.3	9.6	0.85	1916	958	0.98	9.5	20.7	No
	14/03/2025	C	50% full	14.3	6.9	119	10.7	0.95	324	164	0.16	1.5	22	No
RTA Ponds	14/03/2025	Western	25% full	46.9	6.3	-13.2	6.5	0.51	231	115	0.11	19.6	19.8	No
	14/03/2025	Eastern	25% full	57.5	6.2	75.6	8.8	0.78	172	87	0.08	23.2	19.6	No
Enhancement Area	14/03/2025	1	50% full	39.4	6.5	32.2	5	0.44	278	138	0.13	9.3	20.8	No
	14/03/2025	2	Dry											
	14/03/2025	3	Dry											
	14/03/2025	4	Dry											
	14/03/2025	5	Dry											
	14/03/2025	6	50% full	37.8	6.5	-82.4	3.9	0.33	1072	5367	6.09	2.2	21.3	Yes
Kogarah Golf Course	14/03/2025	Circular	33% full	-37.7	7.8	-115.8	5.5	0.46	11090	5553	6.32	12.1	21	Yes
	14/03/2025	Long	50% full	-55.2	8.1	-93.8	6.1	0.52	38930	1948	2.06	11	24.1	Yes
	14/03/2025	Mangrove Pond	75% full	-38.3	7.9	-21.9	7.8	0.57	43700	21850	28.2	5.7	22.7	Yes
	14/03/2025	Eastern	Full	-104.6	9	-85.3	9	0.73	10410	5211	5.89	14.6	23.9	Yes
	14/03/2025	Skinny	Not sampled											
Riverine Park surrounds and Barton Park	14/03/2025	Eastern Channel	Not sampled											
	14/03/2025	Southern Phragmites	Dry											
	14/03/2025	Bend Swamp	Dry											
	14/03/2025	Southern Jungle	Dry											
	14/03/2025	Landing Lights West	Dry											
	14/03/2025	Driving Range Wetland	Dry											
	14/03/2025	Landing Lights East	75% full	11.8	6.9	-92.9	7.5	0.67	2017	1407	1.42	23.5	19.5	No

Water Quality Results for March 2025

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	28/03/2025	A	33% full	-10.6	7.3	10.4	51.6	4.6	137	67	0.06	18.2	20.9	No
	28/03/2025	B	66% full	23.6	6.7	13.8	47.6	4.27	1984	1026	1	16.3	20.2	No
	28/03/2025	C	Full	17.4	6.9	25.9	41.2	3.86	144	80	1	10.1	20.4	No
RTA Ponds	28/03/2025	Western	33% full	18.4	6	26.8	37.1	3.35	97	39	0.04	10.9	20.2	No
	28/03/2025	Eastern	33% full	53.4	6.2	35.5	34.8	3.28	50	22	0.02	18.5	19.7	No
Enhancement Area	28/03/2025	1	Full	8.5	7.4	18.6	35	3.16	285	143	0.14	9.6	20.3	No
	28/03/2025	2	Dry											
	28/03/2025	3	Dry											
	28/03/2025	4	Dry											
	28/03/2025	5	Dry											
	28/03/2025	6	75% full	-6.7	7.3	157.7	40.1	3.44	9991	5003	5.46	29	20.6	Yes
Kogarah Golf Course	28/03/2025	Circular	33% full	-39.2	7.9	-150.5	34.3	3.04	5681	2041	0.06	3.3	20.3	Yes
	28/03/2025	Long	50% full	-13.7	8	-153.6	30.3	2.6	3997	2001	2.12	47.2	21.8	Yes
	28/03/2025	Mangrove Pond	Full	-31.2	7.7	38.5	34.5	2.31	47500	2370	30.8	18.9	22.3	Yes
	28/03/2025	Eastern	Full	-96.6	9	-130.3	28.1	2.34	11150	5580	6.36	33.1	22.2	Yes
Riverine Park surrounds and Barton Park	28/03/2025	Eastern Channel	Not sampled											
	28/03/2025	Southern Phragmites	Dry											
	28/03/2025	Bend Swamp	Dry											
	28/03/2025	Southern Jungle	Dry											
	28/03/2025	Landing Lights West	Dry											
	28/03/2025	Driving Range Wetland	Dry											
	28/03/2025	Landing Lights East	33%	19.4	6.81	-105.6	46.7	4.29	2788	1148	1.19	9.17	19.3	No

Water Quality Results for April 2025

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	07/05/2025	A	Full	12.4	6.9	162.7	17.3	1.69	289	142	0.13	2.1	16.3	No
	07/05/2025	B	Full	37.6	6.5	164.3	17.5	1.72	937	469	0.47	10.3	15.8	No
	07/05/2025	C	Full	48.3	6.3	182.1	14.7	1.43	353	177	0.17	1	16.3	No
RTA Ponds	07/05/2025	Western	Not sampled											
	07/05/2025	Eastern	Not sampled											
Enhancement Area	07/05/2025	1	Not sampled											
	07/05/2025	2	Not sampled											
	07/05/2025	3	Not sampled											
	07/05/2025	4	Not sampled											
	07/05/2025	5	Not sampled											
	07/05/2025	6	Not sampled											
Kogarah Golf Course	07/05/2025	Circular	Not sampled											
	07/05/2025	Long	Not sampled											
	07/05/2025	Mangrove Pond	Not sampled											
	07/05/2025	Eastern	Not sampled											
Riverine Park surrounds and Barton Park	07/05/2025	Eastern Channel	Not sampled											
	07/05/2025	Southern Phragmites	75% full	29.3	6.6	-62.4	10.4	1.04	325	164	0.16	21.1	14.9	No
	07/05/2025	Bend Swamp	50% full	37.1	6.5	22.4	10.2	1.01	217	108	0.1	13.5	15.2	No
	07/05/2025	Southern Jungle	Too shallow											
	07/05/2025	Landing Lights West	Dry											
	07/05/2025	Driving Range Wetland	Too shallow											
	07/05/2025	Landing Lights East	75% full	18.4	6.8	-126.6	7.4	0.7	2284	1151	1.21	13.4	16.6	No

Water Quality Results for May 2025

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	13/06/2025	A	25% full	10.2	7.1	228.6	42.1	4.71	480	217	0.21	3.3	9.94	No
	13/06/2025	B	Full	10.8	6.95	237.4	41.6	4.73	824	412	0.47	2.5	9.52	No
	13/06/2025	C	Full	6.4	7.04	240.8	53.7	6.01	329	165	0.16	9.3	10.04	No
RTA Ponds	13/06/2025	Western	Full	19.7	6.78	243.6	27.8	3.18	144	72	0.07	5.2	9.36	No
	13/06/2025	Eastern	Full	45.5	6.33	255.6	49.7	5.52	138	69	0.07	3.2	9.53	No
Enhancement Area	13/06/2025	1	Full	-28.6	7.91	77.3	29.4	3.22	377	189	0.18	9.9	10.49	No
	13/06/2025	2	Dry											
	13/06/2025	3	Dry											
	13/06/2025	4	Dry											
	13/06/2025	5	Dry											
	13/06/2025	6	Full	72	7	3.9	34	3.6	12.42	6228	7.18	9.2	10.76	Yes
Kogarah Golf Course	13/06/2025	Circular	Full	-49.8	8.14	127.1	202.7	19.8	19.29	9665	11.55	44.5	13.05	No
	13/06/2025	Long	Full	-83.6	8.81	76.8	141.9	15.36	2774	1380	1.45	78.8	10.61	No
	13/06/2025	Mangrove Pond	Full	8.6	7.01	-236.8	25	2.01	39.76	18.52	23.17	44.9	14.38	No
	13/06/2025	Eastern	Full	-40	7.91	-59.9	36.7	3.47	6855	3476	3.85	776	11.67	No
	13/06/2025	Skinny	Not sampled											
Riverine Park surrounds and Barton Park	13/06/2025	Eastern Channel	Not sampled											
	13/06/2025	Southern Phragmites	Full	15.1	7.4	72.6	19.1	2.74	485	242	0.24	2	9.77	No
	13/06/2025	Bend Swamp	Full	15.1	7.4	72.6	19.1	2.74	485	242	0.24	2	9.77	No
	13/06/2025	Southern Jungle	Dry											
	13/06/2025	Landing Lights West	Very low	-2.6	7.22	-284.5	72.3	1.15	24.94	12.5	15.29	68.2	12.65	No
	13/06/2025	Driving Range Wetland	Dry											
	13/06/2025	Landing Lights East	Full	7.7	7.02	-253.4	7.8	0.8	8990	4532	5.1	12.4	12.28	No

Appendix B: Tadpole net sweep results

Summary of tadpole net sweep results September 2024

Area	Pond	Tadpoles Present	Species	Number and Stage			
				A	B	C	D
M8 Marsh Street habitat area	A	Dry	-	-	-	-	-
	B	Yes	<i>Limnodynastes peronii</i>	-	1	-	-
	C	No	-	-	-	-	-
RTA Ponds	Western	No	-	-	-	-	-
	Eastern	No	-	-	-	-	-
Enhancement Area	1	Yes	<i>Limnodynastes peronii</i>	-	15	-	-
	2	Dry	-	-	-	-	-
	3	Dry	-	-	-	-	-
	4	Dry	-	-	-	-	-
	5	No	-	-	-	-	-
	6	Yes	<i>Limnodynastes peronii</i>	-	2	-	-
Kogarah Golf Course	Circular	No	-	-	-	-	-
	Long	No	-	-	-	-	-
	Eastern	N/s	-	-	-	-	-
	Mangrove	No	-	-	-	-	-
Riverine Park surrounds and Barton Park	Eastern Channel	N/s	-	-	-	-	-
	Southern Phragmites	No	-	-	-	-	-
	Bend Swamp	Dry	-	-	-	-	-
	Southern Jungle	Dry	-	-	-	-	-
	Landing Lights West	Dry	-	-	-	-	-
	Driving Range Wetland	No	-	-	-	-	-
	Landing Lights East	No	-	-	-	-	-

Summary of tadpole net sweep results October 2024

Area	Pond	Tadpoles Present	Species	Number and Stage			
				A	B	C	D
M8 Marsh Street habitat area	A	Dry	-	-	-	-	-
	B	Yes	<i>Limnodynastes peronii</i>	-	-	3	-
	C	No	-	-	-	-	-
RTA Ponds	Western	No	-	-	-	-	-
	Eastern	No	-	-	-	-	-
Enhancement Area	1	Yes	<i>Limnodynastes peronii</i>	-	12	-	-
	2	Dry	-	-	-	-	-
	3	Dry	-	-	-	-	-
	4	Dry	-	-	-	-	-
	5	No	<i>Limnodynastes peronii</i>	-	1	-	-
	6	No	-	-	-	-	-
Kogarah Golf Course	Circular	No	-	-	-	-	-
	Long	No	-	-	-	-	-
	Eastern	N/s	-	-	-	-	-
	Mangrove	No	-	-	-	-	-
Riverine Park surrounds and Barton Park	Eastern Channel	N/s	-	-	-	-	-
	Southern Phragmites	No	-	-	-	-	-
	Bend Swamp	Dry	-	-	-	-	-
	Southern Jungle	Dry	-	-	-	-	-
	Landing Lights West	Dry	-	-	-	-	-
	Driving Range Wetland	No	-	-	-	-	-
	Landing Lights East	No	-	-	-	-	-

Summary of tadpole net sweep results November 2024

Area	Pond	Tadpoles Present	Species	Number and Stage			
				A	B	C	D
M8 Marsh Street habitat area	A	No	-	-	-	-	-
	B	Yes	<i>Limnodynastes peronii</i>	-	1	2	-
			<i>Litoria peronii</i>	-	1	-	-
RTA Ponds	Western	Yes	<i>Litoria aurea</i>	-	1	-	-
			<i>Litoria fallax</i>	-	1	-	-
	Eastern	No	-	-	-	-	-
Enhancement Area	1	Yes	<i>Limnodynastes peronii</i>	-	9	-	-
	2	Dry	-	-	-	-	-
	3	Dry	-	-	-	-	-
	4	Dry	-	-	-	-	-
	5	Yes	<i>Limnodynastes peronii</i>	-	1	-	-
	6	No	-	-	-	-	-
Kogarah Golf Course	Circular	No	-	-	-	-	-
	Long	No	-	-	-	-	-
	Eastern	N/s	-	-	-	-	-
	Mangrove	No	-	-	-	-	-
Riverine Park surrounds and Barton Park	Eastern Channel	N/s	-	-	-	-	-
	Southern Phragmites	No	-	-	-	-	-
	Bend Swamp	Dry	-	-	-	-	-
	Southern Jungle	Dry	-	-	-	-	-
	Landing Lights West	Dry	-	-	-	-	-
	Driving Range Wetland	No	-	-	-	-	-
	Landing Lights East	No	-	-	-	-	-

Summary of tadpole net sweep results December 2024

Area	Pond	Tadpoles Present	Species	Number and Stage			
				A	B	C	D
M8 Marsh Street habitat area	A	Yes	<i>Litoria aurea</i>	-	40	-	-
			<i>Litoria peronii</i>		20		
	B	Yes	<i>Litoria aurea</i>	-	9	4	1
	C	Yes	<i>Litoria peronii</i>	10	4	4	-
RTA Ponds	Western	Yes	<i>Litoria fallax</i>	-	5	-	-
	Eastern	No	-	-	-	-	-
Enhancement Area	1	Yes	<i>Limnodynastes peronii</i>	-	3	-	-
	2	Dry	-	-	-	-	-
	3	Dry	-	-	-	-	-
	4	Dry	-	-	-	-	-
	5	Yes	<i>Limnodynastes peronii</i>	-	2	-	-
	6	No	-	-	-	-	-
Kogarah Golf Course	Circular	No	-	-	-	-	-
	Long	No	-	-	-	-	-
	Eastern	N/s	-	-	-	-	-
	Mangrove	No	-	-	-	-	-
Riverine Park surrounds and Barton Park	Eastern Channel	N/s	-	-	-	-	-
	Southern Phragmites	No	-	-	-	-	-
	Bend Swamp	Dry	-	-	-	-	-
	Southern Jungle	Dry	-	-	-	-	-
	Landing Lights West	Dry	-	-	-	-	-
	Driving Range Wetland	Dry	-	-	-	-	-
	Landing Lights East	No	-	-	-	-	-

Summary of tadpole net sweep results January 2025

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

Summary of tadpole net sweep results February 2025

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

Summary of tadpole net sweep results March 2025

Area	Pond	Tadpoles Present	Species	Number and Stage			
				A	B	C	D
M8 Marsh Street habitat area	A	No	-	-	-	-	-
	B	Yes	<i>Litoria peronii</i>	-	3	2	-
	C	Yes	<i>Litoria aurea</i>	-	25+	-	-
			<i>Litoria peronii</i>	-	10	2	-
RTA Ponds	Western	Yes	<i>Limnodynastes peronii</i>	-	5	-	-
	Eastern	Yes	<i>Litoria fallax</i>	-	-	2	-
			<i>Litoria peronii</i>	-	3	-	-
Enhancement Area	1	Yes	<i>Litoria peronii</i>	-	2	-	-
	2	Dry	-	-	-	-	-
	3	Dry	-	-	-	-	-
	4	Dry	-	-	-	-	-
	5	Dry	-	-	-	-	-
	6	No	-	-	-	-	-
Kogarah Golf Course	Circular	No	-	-	-	-	-
	Long	No	-	-	-	-	-
	Eastern	No	-	-	-	-	-
	Mangrove	No	-	-	-	-	-
Riverine Park surrounds and Barton Park	Eastern Channel	N/s	-	-	-	-	-
	Southern Phragmites	Dry	-	-	-	-	-
	Bend Swamp	Dry	-	-	-	-	-
	Southern Jungle	Dry	-	-	-	-	-
	Landing Lights West	Dry	-	-	-	-	-
	Driving Range Wetland	Dry	-	-	-	-	-
	Landing Lights East	No	-	-	-	-	-

Summary of tadpole net sweep results April 2025

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	N/s	-	-	-	-	-
	Eastern	N/s	-	-	-	-	-
Enhancement Area	1	N/s	-	-	-	-	-
	2	N/s	-	-	-	-	-
	3	N/s	-	-	-	-	-
	4	N/s	-	-	-	-	-
	5	N/s	-	-	-	-	-
	6	N/s	-	-	-	-	-
Kogarah Golf Course	Circular	N/s	-	-	-	-	-
	Long	No	-	-	-	-	-
	Eastern	N/s	-	-	-	-	-
	Mangrove	N/s	-	-	-	-	-
Riverine Park surrounds and Barton Park	Eastern Channel	N/s	-	-	-	-	-
	Southern Phragmites	Yes	<i>Limnodynastes peronii</i>	2	3	-	-
	Bend Swamp	Yes	<i>Limnodynastes peronii</i>	-	25+	-	-
	Southern Jungle	Dry	-	-	-	-	-
	Landing Lights West	Dry	-	-	-	-	-
	Driving Range Wetland	Dry	-	-	-	-	-
	Landing Lights East	Yes	<i>Limnodynastes peronii</i>	25+	25+	-	-

Summary of tadpole net sweep results May 2025

Area	Pond	Tadpoles Present	Species	Number and Stage			
				A	B	C	D
M8 Marsh Street habitat area	A	No	-	-	-	-	-
	B	Yes	<i>Limnodynastes peronii</i>	-	1	-	-
	C	No	-	-	-	-	-
RTA Ponds	Western	No	-	-	-	-	-
	Eastern	No	-	-	-	-	-
Enhancement Area	1	Yes	<i>Limnodynastes peronii</i>	-	7	-	-
	2	Dry	-	-	-	-	-
	3	Dry	-	-	-	-	-
	4	Dry	-	-	-	-	-
	5	Dry	-	-	-	-	-
	6	Yes	<i>Limnodynastes peronii</i>	-	4	-	-
Kogarah Golf Course	Circular	No	-	-	-	-	-
	Long	No	-	-	-	-	-
	Eastern	No	-	-	-	-	-
	Mangrove	No	-	-	-	-	-
Riverine Park surrounds and Barton Park	Eastern Channel	N/s	-	-	-	-	-
	Southern Phragmites	Yes	<i>Limnodynastes peronii</i>	15+	15+	-	-
	Bend Swamp	Yes	<i>Limnodynastes peronii</i>	15+	15+	-	-
	Southern Jungle	Dry	-	-	-	-	-
	Landing Lights West	Dry	-	-	-	-	-
	Driving Range Wetland	Dry	-	-	-	-	-
	Landing Lights East	Yes	<i>Limnodynastes peronii</i>	-	7	-	-

Appendix C: Frog monitoring data (non-target species) in sites outside the M8 Marsh Street habitat area

September to November 2024 (numbers in parentheses indicate the number of individuals that were heard calling, but were not observed visually)

Area	Pond	<i>Limnodynastes peronii</i>	<i>Litoria peronii</i>	<i>Litoria fallax</i>	<i>Crinia signifera</i>
Eastern Frog Corridor	Creek (west)				
	Creek (east)				
	Underpass				
RTA Ponds	Western			(1)	
	Eastern				(1)
Enhancement Area	1				
	2				
	3				
	4				
	5				
	6				
	Creek				
Kogarah Golf Course	Circular				
	Long				
	Eastern				
	Skinny				
	Northern				
	Mangrove				
Riverine Park surrounds and Barton Park	Eastern Channel				
	Southern Phragmites				
	Bend Swamp				
	Southern Jungle				
	Driving Range Wetland				
	Landing Lights West				
	Landing Lights East				
Grand Total		0	0	(1)	(1)

December 2024 to February 2025 (numbers in parentheses indicate the number of individuals that were heard calling, but were not observed visually)

Area	Pond	<i>Limnodynastes peronii</i>	<i>Litoria peronii</i>	<i>Litoria fallax</i>	<i>Crinia signifera</i>
Eastern Frog Corridor	Creek (west)	4			
	Creek (east)		(1)		
	Underpass		2		
RTA Ponds	Western	1	2 (6)	250 (21)	
	Eastern			100 (16)	(3)
Enhancement Area	1	6 (2)			
	2				
	3	4			
	4				
	5	(1)			
	6	3 (4)			
	Creek				
Kogarah Golf Course	Circular	3 (1)	3 (9)		
	Long	1	(3)		
	Eastern		(2)		
	Skinny	1			
	Northern	2			
	Mangrove				

Area	Pond	<i>Limnodynastes peronii</i>	<i>Litoria peronii</i>	<i>Litoria fallax</i>	<i>Crinia signifera</i>
Riverine Park surrounds and Barton Park	Eastern Channel				
	Southern Phragmites	2			
	Bend Swamp	(2)			
	Southern Jungle	(5)			
	Driving Range Wetland	5			
	Landing Lights West				
	Landing Lights East	(1)			
Grand Total		32 (16)	7 (21)	350 (37)	(3)

March to May 2025 (numbers in parentheses indicate the number of individuals that were heard calling, but were not observed visually)

Area	Pond	<i>Limnodynastes peronii</i>	<i>Litoria peronii</i>	<i>Litoria fallax</i>	<i>Crinia signifera</i>
Eastern Frog Corridor	Creek (west)	2	6		
	Creek (east)	2	1		
	Underpass				
RTA Ponds	Western	(1)		32	
	Eastern	1		45 (1)	
Enhancement Area	1				
	2				
	3			1	
	4				
	5				
	6	2 (3)			
	Creek	1			
Kogarah Golf Course	Circular				
	Long				
	Eastern				
	Skinny				
	Northern	3			
	Mangrove				
Riverine Park surrounds and Barton Park	Eastern Channel	(1)			
	Southern Phragmites				
	Bend Swamp	(4)			
	Southern Jungle	(4)			
	Driving Range Wetland				
	Landing Lights West	(1)			
	Landing Lights East	2 (1)			
Grand Total		13 (15)	7	78 (1)	0