Green and Golden Bell Frog Plan of Management for the M6 Stage 1

Prepared by AMBS Ecology & Heritage Pty Ltd
for CPB Contractors Pty Limited and Ghella Pty Ltd

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Glossary of terms and abbreviations

Term	Meaning
Arncliffe construction compound	Area within Kogarah Golf Course where construction facilities for the M6 Stage 1 are located.
Barton Park	In this report, "Barton Park" refers to the open areas and wetlands south of the Spring St canal.
BC Act	NSW *Biodiversity Conservation Act 2016.*
CDS	CPB Dragados Samsung Joint Venture; constructed the M8.
CGU	CPB Ghella UGL Joint Venture; constructing the M6 Stage 1.
Creek and surrounds	An area containing two small un-named drainage lines north of Eve Street and east of the M8 Marsh Street habitat area.
DPIE	NSW Department of Planning, Industry and Environment
EES	Environment, Energy and Science Group (part of DPIE)
Enhancement Area	Part of Kogarah Golf Course to the east of the RTA ponds and south of the Arncliffe construction compound in which six small ponds are located.
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999.*
GGBF	Green and Golden Bell Frog, *Litoria aurea.*
Green and Golden Bell Frog Plan of Management	Management plan for the Arncliffe GGBF population prepared for the M8.
Habitat Creation and Captive Breeding Plan	Captive breeding plan for the Arncliffe GGBF population prepared for the M8.
M5 East	Motorway between the M5 at Kingsgrove and the M1 at Sydney Airport, opened in 2001.
M8	Motorway tunnel between St Peters and Kingsgrove, previously known as the "New M5". Opened in 2020.
M8 Marsh Street habitat area	Habitat area for the GGBF constructed as part of the M8 project. Previously known as the New M5 Marsh Street habitat area.
New M5	See M8. Motorway tunnel between St Peters and Kingsgrove, now referred to as the M8.
New M5 Marsh Street habitat area	The M8 Marsh Street habitat area.
Riverine Park	In this report, "Riverine Park" refers to the open areas and wetlands south of the M5 East, north of the Spring Street canal and east of Eve Street and West Botany Street.
RMS	NSW Roads and Maritime Authority, subsequently became part of TfNSW.
RTA	NSW Roads and Traffic Authority, subsequently became RMS.
RTA ponds	Two ponds constructed as habitat for the GGBF as part of the M5 East project.
TfNSW	Transport for New South Wales.
Underpass	The area in and around the pedestrian and bicycle underpass beneath the M5 East.

1 Introduction

1.1 Background

AMBS Ecology & Heritage Pty Ltd (AMBS) was commissioned to prepare a Green and Golden Bell Frog Plan of Management for the M6 Stage 1 Project. The M6 Stage 1 was approved in December 2019 by the Minister for Planning and Public Spaces and is classified as critical State significant infrastructure. A Joint Venture of CPB Contractors, Ghella and UGL (CGU) was appointed by Transport for New South Wales (TfNSW) to construct the project.

The M6 Stage 1 will be a new Motorway tunnel linking the recently constructed M8 Motorway in St Peters with President Avenue, Kogarah (Figure 1.1). The northern end of the M6 Stage 1 will be underground at Arncliffe. A 4-kilometre, multi-lane tunnel will connect existing underground "tunnel stubs" to Bicentennial Park in Rockdale. The tunnel will surface on the eastern side of Bicentennial Park, with on and off-ramps passing through Bicentennial Park to a new intersection to be constructed on President Avenue.

A number of "construction compounds" will be needed on the surface in order to complete the work. One of these will be located in Arncliffe, within Kogarah Golf Course. The Arncliffe construction compound will be located within the same construction compound that was established in 2016 for the construction of the M8. This area currently contains site offices, stockpiles, temporary construction facilities, a car park and permanent infrastructure associated with the operation of the M8. The location of the Arncliffe construction compound is shown on Figure 1.1 as "C1" and an aerial image of the site is shown on Figure 1.2.

The Arncliffe construction compound is located next to a known breeding site for the Green and Golden Bell Frog, *Litoria aurea* (GGBF), a species that is listed as Endangered under the NSW *Biodiversity Conservation Act 2016* and as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. The breeding site is known as "the RTA ponds" and comprises two large ponds that were constructed as habitat for the GGBF about 20 years ago, as well as a small area of terrestrial habitat around the ponds, surrounded by a security fence.

Prior to the M8, the area currently occupied by the Arncliffe construction compound contained habitat that was used by the GGBF population. It was part of the Kogarah Golf Course and contained typical golf course features such as fairways, tees, greens, roughs, sand traps and ponds of various sizes and configurations. GGBFs were frequently recorded in the area, either within the Golf Course ponds or foraging or dispersing in the areas between the ponds.

Consent conditions for the M6 Stage 1 Project Approval include Condition E44, which relates to the GGBF and states:

> "*The Proponent must prepare a Green and Golden Bell Frog Plan of Management. The Plan must be approved by the Planning Secretary prior to commencing construction at the Arncliffe construction compound. The Plan must be developed by a suitably qualified and experienced frog specialist, in consultation with EES.*
>
> *The Plan must detail:*
>
> *a. the on-site management and mitigation measures for limiting impacts on Green and Golden Bell Frogs;*
> *b. the monitoring that would be undertaken during construction to ascertain the effectiveness of the on-site management and mitigation measures; and*
> *c. measures to re-instate habitat affected by the Arncliffe construction compound within the returned open space post construction*."

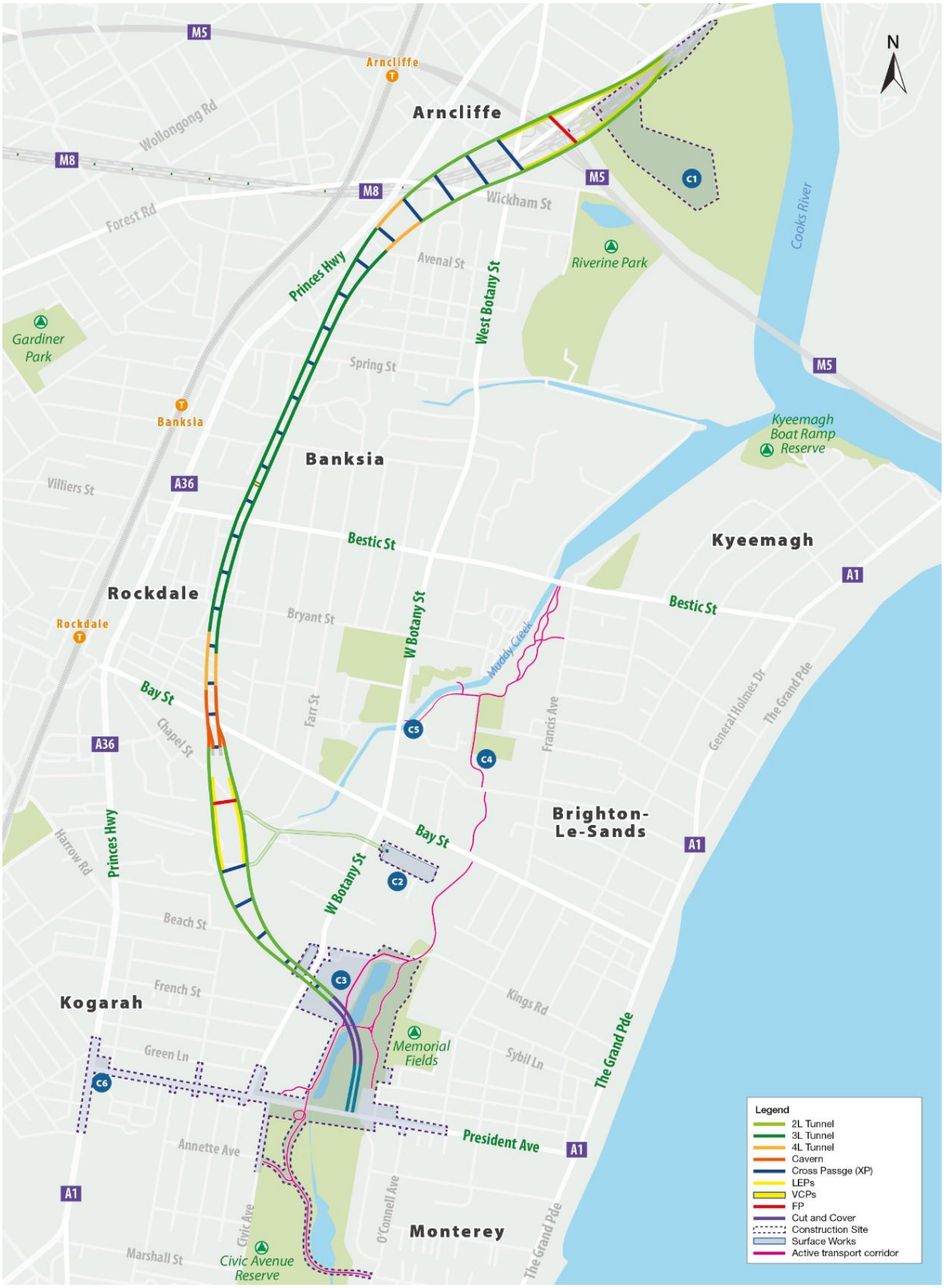


Figure 1.1: Concept Design for the M6 Stage 1. Image provided by CGU.

Figure 1.2: Existing site compound at Arncliffe. Image provided by CGU.

1.2 The Arncliffe GGBF Population, the M5 East and the M8 Project

The GGBF was once common and widespread between north-eastern NSW and north-eastern Victoria. The species has declined dramatically since the 1980's. The species' distribution in the Sydney region has contracted to a few, relatively isolated locations. A population of the species has persisted in the Arncliffe area and is referred to by DEC (2005) as the "Arncliffe/Lower Cooks River" key population.

The construction of the M5 East in the late 1990's impacted on an area of GGBF habitat known as the "Marsh Street Wetland", south of the Kogarah Golf Course, and as a mitigation strategy the RTA ponds were built (White 1998). The Arncliffe GGBF population soon became centred around these purpose-built ponds and the adjacent Kogarah Golf Course. However, after 2012-2013 the population appears to have been in decline. In February 2016 only eight GGBFs were captured over five consecutive nights of survey (ELA 2017).

Also in 2016, work on the M8 commenced and included the establishment of the Arncliffe construction compound. The compound is an approximately 8 ha area located within 50 metres of the area containing the RTA ponds (Figure 1.3). The western corner of the site now contains permanent operational facilities for the M8, which can be seen in Figure 1.2 and which are also located within about 50 metres of the area containing the RTA ponds.

At that time the M8 was referred to as "the New M5" (including in the Project Approval). Consent conditions for the project included a requirement for the preparation of a Green and Golden Bell Frog Plan of Management (ELA 2018) and a Habitat Creation and Captive Breeding Plan (ELA 2017). These plans were implemented and works associated with the M8 (i.e., the New M5) included:

- pre-construction GGBF management, involving the establishment of a "frog exclusion" zone at the site of the Arncliffe construction compound, and the removal of GGBFs from the exclusion zone;
- protection of GGBF habitat during construction, involving avoiding or minimising light spill, noise and dust, installation of sediment and erosion controls etc;
- the establishment of a new purpose-built habitat area for the GGBF south of the M5 East, containing three ponds and surrounding terrestrial habitat, known as the "M8 Marsh Street habitat area" (previously referred to as the "New M5 Marsh Street habitat area");
- the establishment of six small "stepping-stone" ponds along the southern boundary of Kogarah Golf Course, east of the RTA ponds (the "Enhancement Area"); and
- the establishment of a GGBF captive breeding facility at Symbio Wildlife Park.

During surveys undertaken in 2016-2017, small numbers of GGBFs (1-3 individuals) were recorded in the RTA ponds, Circular Pond, Number 9 Pond, Eastern Channel, Southern Phragmites area and a drain along the southern boundary of the golf course (White 2017). A number of these animals were collected for the captive breeding program at Symbio Wildlife Park.

Between 2018 and 2021, thousands of GGBF tadpoles were raised at Symbio Wildlife Park and transferred to the M8 Marsh Street habitat area, with a small number also released into one of the RTA ponds in December 2020. Monitoring surveys recorded juvenile GGBFs in the M8 Marsh Street habitat area shortly after the first tadpole release. Large numbers of GGBFs were recorded within the M8 Marsh Street habitat area in 2019-2020 and 2020-2021.

After heavy rainfall events in January and February 2020, surveys outside of the M8 Marsh Street habitat area began to detect adult or juvenile GGBFs in nearby creeks and wetlands, the RTA ponds, some sites on Kogarah Golf Course and occasionally in the Enhancement Area (Figure 1.3). A GGBF breeding event was recorded in one of the RTA ponds in February 2020 (AMBS 2020).

Figure 1.3: Locations where GGBFs were recorded between January 2020 and May 2021.
Note 1: Each record represents a number of sightings.
Note 2: Surveys were not undertaken in the Northern Phragmites or Number 9 Pond in 2020-2021 due to access limitations.

1.3 Scope of this Plan of Management

1.3.1 Purpose of this Plan

This GGBF Plan of Management specifically relates to the M6 Stage 1 project and the Arncliffe construction compound. It sets out the management, mitigation and monitoring measures that are to be implemented by CGU and it's contractors at the Arncliffe construction compound during the construction of the M6 Stage 1. It also provides guidelines for the post-construction re-instatement of habitat at the site of the Arncliffe construction compound.

1.3.2 Relationship to other plans

This GGBF Plan of Management for the M6 Stage 1 is intended to complement the GGBF management plans and requirements prepared and implemented for the M8 project (aka the New M5 project). These plans include the Green and Golden Bell Frog Plan of Management (ELA 2018) and the Habitat Creation and Captive Breeding Plan (ELA 2017). It is expected that these plans will continue to be implemented by TfNSW and it's contractors in accordance with the M8 project approval.

However, some of the elements contained within these plans will be implemented for TfNSW by the M6 Stage 1 contractor (CGU). These include the requirement to re-instate habitat at the site of the Arncliffe construction compound (Table 2 and Table 3 in ELA 2018). This GGBF Plan of Management for the M6 Stage 1 expands upon this element of the Green and Golden Bell Frog Plan of Management (ELA 2018) prepared for the M8.

1.3.3 Management of the M8 Marsh Street habitat area and the RTA ponds

As described in Section 1.2, a number of significant measures with the objective of conserving the Arncliffe GGBF population, including the establishment of the M8 Marsh Street habitat area and the captive breeding program, commenced during the construction of the M8. AMBS has been advised that the ongoing responsibility for the management of the M8 Marsh Street habitat area and the captive breeding program will rest with TfNSW, as will the management of the RTA ponds.

1.3.4 Monitoring of the Arncliffe GGBF population

Responsibility for the monitoring of the Arncliffe GGBF population will rest with TfNSW (with two exceptions, being GGBF use of the Enhancement Area and the underpass). This will include the monitoring of the M8 Marsh Street habitat area, the RTA ponds, and GGBF use of other selected ponds and wetlands on Kogarah Golf Course, Riverine Park and surrounds, Barton Park, and the Creek and surrounds (Figure 1.3).

AMBS has been advised that during construction of the M6 Stage 1, CGU will (on behalf of TfNSW) be responsible for monitoring GGBF use of the ponds in the Enhancement Area (with the permission of Kogarah Golf Club) and also the area in and around the underpass (Figure 1.3). After construction of the M6 Stage 1, monitoring of these areas will revert to TfNSW.

Monitoring of on-site management and mitigation measures during construction of the M6 Stage 1 will be undertaken as described in Section 3.1.

1.3.5 Management of other areas

Management of the Kogarah Golf Course (including the Enhancement Area), Riverine Park and surrounds, Barton Park, the Creek and surrounds and the area around the underpass currently vests with a range of landowners and land managers, including Bayside Council, Kogarah Golf Club, Sydney Water, the Commonwealth Government and the M5 East maintenance contractor.

1.3.6 Scope of this Plan

The scope of this GGBF Plan of Management for the M6 Stage 1 is intended to be consistent with the above, and includes:

- on-site management and mitigation measures to limit impacts from the Arncliffe construction compound on GGBFs;
- monitoring of those on-site management and mitigation measures;
- monitoring of GGBF use of the Enhancement Area;
- monitoring of GGBF use of the underpass; and
- measures to re-instate habitat affected by the Arncliffe construction compound within the returned open space post construction.

Table 1.1 sets out the scope of the GGBF Plan of Management for the M6 Stage 1 in the context of the management and monitoring of the overall GGBF population at Arncliffe.

Table 1.1: Scope of this GGBF Plan of Management for the M6 Stage 1.

Item	Responsible Party
Implement Arncliffe construction compound GGBF management and mitigation measures	CGU
Monitor Arncliffe construction compound GGBF management and mitigation measures	CGU
Monitor GGBF use of the Enhancement Area	CGU (with the permission of Kogarah Golf Club)
Manage the Enhancement Area	Kogarah Golf Club and TfNSW (subject to agreement with Kogarah Golf Club)
Monitor GGBF use of the underpass	CGU
Management and monitoring of the M8 Marsh Street habitat area	TfNSW
Management and monitoring of the RTA ponds	TfNSW
Monitoring of GGBFs on Kogarah Golf Course	TfNSW (subject to permission of Kogarah Golf Club)
Monitoring of GGBFs in the Creek and surrounds, Riverine Park and surrounds and Barton Park	TfNSW
Re-instatement of habitat affected by the Arncliffe construction compound	CGU, in accordance with the requirements of the approved project

1.4 Consultation with EES

Consultation with the Environment, Energy and Science Group (EES) was undertaken in September 2021 and a table indicating how their comments have been addressed is provided in Appendix B.

Further consultation will be undertaken with EES when the designs for the habitat re-instatement area have progressed.

2 Impacts and Measures to Avoid, Minimise or Mitigate

2.1 Impacts

The M6 Stage 1 will utilise the construction compound that was built for the M8. The main impact on the Arncliffe GGBF population that will result from the continued utilisation of the Arncliffe construction compound is the ongoing loss of the terrestrial habitat and water features that were within the Arncliffe construction compound, for a number of years.

The key mitigation measures for this loss of habitat are the establishment of the M8 Marsh Street habitat area and the implementation of the captive breeding program. These measures are described in ELA (2018) and ELA (2017) respectively and are currently being implemented by TfNSW in accordance with the M8 project approval.

Pre-clearance surveys and relocation of GGBFs from the Arncliffe construction compound area was undertaken during site establishment for the M8. A "frog-exclusion zone" was established at that time and will be continued during construction of the M6 Stage 1. This is discussed in Section 2.2. In the event that frogs are found on the Arncliffe construction compound, a "GGBF Stop Work Procedure" procedure will be implemented (Section 2.3; Appendix A). If GGBFs are found on any of the other M6 Stage 1 worksites apart from Arncliffe, it will be treated as an Unexpected Find and procedures in the Construction Flora and Fauna Management Plan (CFFMP) will apply.

Potential indirect impacts on the Arncliffe GGBF population resulting from the M6 Stage 1 are disturbance due to lights, noise and vibration, dust and spills or runoff. Mitigation measures are discussed in Sections 2.4 to 2.7.

Construction of the M6 Stage 1 will take place inside the existing construction compound and, provided that the works continue to be physically separated from the GGBF habitat by the compound wall, the potential for inadvertent impacts on GGBF habitat is limited. However, there will be some occasions when staff or contractors are required to access the area outside the compound (for monitoring or repairs to the frog fence; for example) or use the publicly accessible areas outside the compound (walking to work after parking in nearby streets, for example). In order to minimise the potential for inadvertent impacts, hygiene procedures for staff and contractors required to access areas outside the compound will be implemented and all staff and contractors will be provided with an induction regarding the GGBF.

2.2 Frog exclusion fence

During the construction of the M6 Stage 1, the Arncliffe construction compound will be an active construction site, with hazards such as moving vehicles, operation of heavy machinery, pedestrian traffic, pits and obstacles, stockpiles of materials etc. Any GGBFs entering this area would be at a high risk of being injured or killed. GGBFs have recently been recorded outside of the compound on three sides and a breeding event occurred in the RTA ponds in 2020.

Although they spend most of their time near the ground, GGBFs are a member of the family Hylidae (tree frogs and their allies) and are quite capable of climbing, particularly the juveniles. Individuals of the species have been observed climbing frog exclusion fences (G. Muir pers. obs.; C. Jackson pers. obs.; McHenry and Callen 2020). However, GGBFs cannot move completely upside-down (McHenry and Callen 2020).

The minimum requirements for a frog exclusion fence should include these features:

- comprise a continuous vertical (or overhanging) barrier or curtain of impervious material;
- have no holes, gaps or unsealed overlaps in the material;
- be at least 1 metre high;
- have a horizontal external lip of at least 25 centimetres;
- be buried at least 10 cm deep at the base;
- be supported by internal struts and supports;
- be clear of grass, weeds, shrubs etc. greater than 10 cm high to a distance of 1 metre, on the outside;
- be clear of overhanging vegetation.

In order to minimise the potential for GGBFs to enter the construction compound, the existing frog exclusion zone will be maintained and will be enhanced by the installation of a solid barrier along the side of the compound facing the RTA ponds. This will comprise a "hoarding" that is 2.4 metres high, with a horizontal lip at the top. This will extend eastwards along the southern side of the compound from Marsh Street. The existing compound wall around the remainder of the site currently comprises a solid barrier at least 1 metre high with a horizontal lip at the top and this barrier will be maintained during the construction of the M6 Stage 1.

The purpose of the hoarding is to provide:

- a barrier which excludes construction activities from the frog habitat and clearly separates the construction area from the frog habitat area;
- a wall to reduce sound and dust and block light, but not exclude daylight.

The structure and integrity of the frog exclusion fence will be inspected and approved by the Project Herpetologist prior to the commencement of construction within the compound.

Maintenance of the frog exclusion fence will be the responsibility of CGU. The fence will be inspected for holes or other damage at least weekly and repaired immediately if damage is observed. The Project Herpetologist will inspect the fence once per month during the GGBF breeding season between September and May.

Maintenance of the height of the vegetation around the fence will be the responsibility of CGU in consultation with Kogarah Golf Club. Currently, most of the area around the compound is kept short by the Golf Club as part of regular golf course maintenance, with the exception being the part of the southern boundary where the compound is close to the RTA ponds. This section will be enclosed by the 2.4-metre-high frog exclusion hoarding. The hoarding will be placed 1 metre inside the project boundary and the vegetation between the fence and the project boundary will be kept to less than 10 cm in height and clear of branches.

The Project Herpetologist will inspect the vegetation around the enclosure once per month during the GGBF breeding season between September and May.

2.3 Pre-construction survey

A pre-construction survey will be undertaken within the Arncliffe construction compound in spring 2021. This will involve a diurnal hand search of vegetation and loose objects around the inner perimeter of the fence and at least two spotlighting sessions in areas assessed by the Project Herpetologist as having high potential to harbour frogs. Areas of dense ground vegetation will be cleared using a staged search and slashing procedure. This will involve a spotlight and hand search, followed by slashing of the vegetation to approximately 30 cm in height, using a hand-held whipper snipper or brush cutter, followed by a second spotlighting session, slashing of the vegetation to

approximately 10-15 cm in height, followed by a third spotlighting session and slashing of the vegetation to 3 cm or less.

2.4 Frog rescue procedure

It is possible that some individuals will make their way into the construction compound, regardless of the barriers. If GGBFs do make their way into the construction compound, they would most likely be active at night and seek shelter during the day, perhaps hiding in one of the stockpiles or in low vegetation growing on the rubble mound. GGBFs can change colour and often turn brown when under shelter, in which case they can easily be confused with some of the other local frog species.

In the event that frogs, of any colour, are found within the Arncliffe construction compound, the "GGBF Stop Work Procedure" set out in Appendix A will be implemented.

The Project Herpetologist will determine the fate of rescued frogs. Healthy and active GGBFs collected between September and May will be released into a GGBF habitat area outside of the compound (the RTA ponds, Enhancement Area or Golf Course). Animals in "torpor" or that are collected in winter will be assessed and will be cared for in captivity until spring, if required. Animals that are injured may be cared for in captivity for subsequent release, taken to a vet or euthanased, depending on the extent of the injuries. The Project Herpetologist will keep a log of any frogs found within the compound and their fate.

In the event that a large number of GGBFs (more than five at any one time, or more than ten over the course of a season [September to June]) are found within the compound, a review of the frog exclusion barrier may be necessary.

GGBFs have not been recorded near any of the M6 Stage 1 worksites apart from Arncliffe. If GGBFs are detected in or near any of the other construction areas for the M6 Stage 1, it will be treated as an Unexpected Find and the Unexpected Finds Procedure set out in the Construction Flora and Fauna Management Plan (CFFMP) will apply.

2.5 Lights

Directional lighting will be used within the Arncliffe construction compound with the objective of minimising light spillage to surrounding properties. In particular, lighting will be directed so as to avoid light spill into the RTA ponds as much as possible and to minimise light spill to the Enhancement Area and other parts of the Golf Course.

The Project Herpetologist will assess the level of light spill from the compound during nocturnal frog monitoring and will advise CGU if any adjustments are considered necessary. This may include re-positioning or re-directing lights and/or providing a barrier between the lights and the frog habitat areas.

2.6 Construction noise and vibration

Construction noise and vibration should be managed in accordance with the Project Approval and Environmental Management Measures (EMMs).

At the Arncliffe construction compound, mitigation measures will include acoustic sheds and the installation of the 2.4-metre hoarding near the RTA ponds as described in Section 2.2.

Condition E72 of the Project Approval requires that:

"*Mitigation measures must be implemented with the aim of achieving the following construction noise management levels and vibration criteria:*

(a) construction 'Noise affected' noise management levels established using the Interim Construction Noise Guideline (DECC, 2009);

(b) vibration criteria established using the Assessing vibration: a technical guideline (DEC, 2006) (for human exposure);

(c) Australian Standard AS 2187.2 - 2006 "Explosives - Storage and Use - Use of Explosives";

(d) BS 7385 Part 2-1993 "Evaluation and measurement for vibration in buildings Part 2" as they are "applicable to Australian conditions"; and

(e) the vibration limits set out in the German Standard DIN 4150-3: Structural Vibration effects of vibration on structures (for structural damage).

(f) residential ground-borne noise levels of -

(i) evening (6:00 pm to 10:00 pm) — internal LAeq(15 minute): 40 dB(A), and

(ii) night (10:00 pm to 7:00 am) — internal LAeq(15 minute): 35 dB(A)".

The RTA ponds and M8 Marsh Street habitat area are environmentally sensitive areas and the effects of noise and vibration on these areas will be minimised as much as possible.

2.7 Dust, sediment and erosion controls

The potential for dust generated from the construction site to enter adjacent frog habitat areas and particularly the RTA ponds should be minimised as much as possible. Dust may be generated from vehicle movements, movement or storage of spoil and other construction activity.

The Arncliffe construction compound will use bulk water carriers and sprayers to apply rainwater and/or tunnel water / potable water to reduce dust. Slurry run-off should be managed in accordance with the sediment and erosion control measures.

Appropriate sediment and erosion controls will be established to prevent runoff, spills and contaminants, silt etc. from the construction compound from entering adjacent habitats, including the RTA ponds, the area between the RTA ponds and the compound, the Enhancement Area and waterbodies on the Golf Course. Controls should be maintained in good condition by CGU and inspected regularly and after heavy rain.

2.8 Chemical and herbicide use

Herbicides and other chemicals will not be used near the RTA ponds.

2.9 Inductions

All personnel, including employees, contractors and sub-contractors, are required to complete a Project Induction and/or a Site Induction containing relevant environmental information before they are authorised to work at the Arncliffe construction compound.

Personnel working at the Arncliffe construction compound should be provided with information specifically about the GGBF including:

- the importance of the species and the Arncliffe population;
- measures to avoid, minimise and mitigate impacts at the Arncliffe construction compound;
- what to do in the event of unexpected finds of frogs within the construction zone; and
- hygiene protocols.

Specific training will be provided for site Environmental Officers who may be required to rescue frogs from the construction site and/or personnel likely to be required to work outside of the compound (for example, to inspect or make repairs to the frog fence). This will include:

- how to recognise a GGBF;
- how to handle frogs;
- what to do with a rescued frog;
- the location of frog holding tanks; and
- hygiene protocols.

2.10 Hygiene Procedures

GGBFs can be affected by a range of pathogens including the chytrid fungus *Batrachochytrium dendrobatidis*, which is listed as a Key Threatening Process under the Commonwealth EPBC Act and the NSW BC Act. It is a water-borne pathogen that can be transmitted by contaminated water, contaminated frogs, handling of contaminated frogs and possibly contaminated mud or similar on boots or equipment.

Chytrid fungus has previously been recorded in the Arncliffe population and as the Kogarah Golf Course is frequently traversed by golfers, the presence of the Arncliffe construction compound is not in itself likely to significantly increase the existing risk of transmission. However, the RTA ponds have been managed to reduce chytrid and are fenced off from pedestrians. The area between the RTA ponds and the compound is not used for golfing and is rarely traversed. It is important that the potential for transmission of chytrid fungus to these areas is minimised as much as possible.

Personnel required to work in these areas will be required to clean and disinfect boots and equipment before entering the area, consistent with the *Hygiene Protocol for the Control of Disease in Frogs* (DECC 2008) and the *Hygiene protocols for the control of diseases in Australian frogs* (Murray et al. 2011).

3 Monitoring and Reporting

3.1 Monitoring during construction

Monitoring of the on-site management and mitigation measures will involve:

1. regular checks that GGBF-specific protection mechanisms (such as the frog exclusion barrier) are in place and undamaged;
2. monitoring of management and mitigation measures that are required for the project generally (such as dust, noise and vibration);
3. visual checks of light spill into GGBF habitat areas;
4. monitoring of GGBF habitat in the Enhancement Area; and
5. monitoring of GGBF use of the underpass.

Monitoring of GGBF use of the Enhancement Area and underpass will incorporated into the broader Arncliffe GGBF population monitoring program being undertaken for the M8 by TfNSW and will apply the same frequency and techniques.

Monitoring will be undertaken for the period that the Arncliffe construction compound is in use for the construction of the M6 Stage 1 and will continue until such time as the re-instatement of the compound area is complete.

3.2 Reporting during construction

The Project Herpetologist will report any issues observed in relation to the frog exclusion barrier, light spill and dust to CGU.

The results of the monitoring of GGBF use of the Enhancement Area and the underpass will be reported by the Project Herpetologist to CGU and TfNSW quarterly.

CGU will provide a report to TfNSW quarterly, describing the management and monitoring works undertaken, within the scope of the M6 Stage 1 responsibilities identified as CGU in Table 1.1. These reports will include any issues raised by the Project Herpetologist to CGU and any responses or actions to these issues. These reports will be provided to EES.

3.3 Monitoring post-construction

The Project Approval condition E44 does not require post-construction monitoring, or monitoring during the operation of the M6 Stage 1, in relation to the GGBF.

Monitoring of the RTA ponds and Kogarah Golf Course (including the Enhancement Area and the re-instated habitat on Kogarah Golf Course) will continue post-construction in a manner consistent with the project approvals and management plans for the M5 East and the M8 and will be the responsibility of TfNSW.

Table 3.1: Management, mitigation and monitoring

Item	Task	Who	When
Frog fence	Install hoarding along southern boundary of compound near RTA ponds	CGU	Prior to construction
Frog fence	Walk around length of frog exclusion barrier, check for suitability and fix as required	CGU & PH	Prior to construction
Frog clearance	Undertake targeted searches for GGBFs within the compound and move any animals found to safety.	PH	Prior to construction
Frog fence	Walk around length of frog exclusion barrier, check for damage and fix as required	CGU	Weekly
Frog fence	Walk around length of frog exclusion barrier, report any damage to CGU for repairs	PH	Monthly between Sep and May
Light spill	Ensure lights are directed internally and away from frog habitat areas	CGU	Duration of construction
Light spill	Visual assessment of light reaching the RTA ponds and other frog habitat areas	PH	During frog surveys between Sep and May (four to six surveys)
Noise and vibration	Implement Construction Noise and Vibration Management Plan and monitoring	CGU	Duration of construction
Dust	Implement construction dust management and monitoring programs as required	CGU	Duration of construction
Dust	Visual check for signs of excessive dust in frog habitat areas	PH	Monthly between Sep and May
Runoff, sediment and erosion controls	Check capacity and integrity of runoff, sediment and erosion controls and repair or install as necessary	CGU	Prior to construction
Runoff, sediment and erosion controls	Implement Construction Soil and Water Management Plan and monitoring	CGU	Duration of construction
Runoff, sediment and erosion controls	Check and repair as necessary	CGU	Weekly and after heavy rain (>20 mm in 24 hrs)
GGBF inductions	Provide inductions to personnel working at the Arncliffe compound	CGU	Prior to personnel commencing work
GGBF inductions	Specific training for site Environment Officers who may be required to handle frogs or check frog exclusion barriers	CGU & PH	Prior to personnel commencing work
Frog rescue	Provide disposable gloves, holding tank and paper towels in suitable accessible location	CGU & PH	Duration of construction
Frog rescue	Implement GGBF Stop Work Procedure if required	CGU & PH	As required

Item	Task	Who	When
Hygiene procedure	Provide bleach and water for disinfection / wash-down and implement hygiene procedure as required	CGU	Prior to entry to frog habitat areas
Chemical and herbicide use	Prevent use of chemicals or herbicides near frog habitat areas	CGU	Duration of construction
Enhancement Area	Surveys for GGBF tadpoles	PH	Monthly between Sep and May
Enhancement Area	Nocturnal surveys for GGBFs	PH	Four to six surveys between Sep and May
Underpass	Nocturnal surveys for GGBFs	PH	Four to six surveys between Sep and May

CGU = CPB Ghella UGL Joint Venture
PH = Project Herpetologist

4 GGBF Habitat Re-instatement

4.1 Current status and objectives

The Arncliffe construction compound is currently being utilised by CGU and the works to re-instate the area will be undertaken by CGU under the terms of their contract with TfNSW. At the conclusion of the re-instatement work, it is expected that TfNSW will hand the area over to the jurisdiction of Bayside Council.

At the present time, detailed designs for the re-instated habitat area are not complete and so are not presented here. GGBF habitat requirements that should be included are presented in Section 4.3 below. This plan of management will be updated and re-submitted for consultation with EES and DPIE approval after detailed design development and at least 6 months prior to the commencement of the re-instatement works.

The long-term objectives stated in the M5 East Plan of Management (White 1998) are "to protect and conserve the colony of Green and Golden Bell Frogs at Arncliffe before, during and after the construction of the M5 East motorway; to create additional and more secure Green and Golden Bell Frog habitat at Arncliffe; to initiate management structures that will ensure the survival of the frog conservation areas at Arncliffe in the future."

The objectives stated in the M8 GGBF Plan of Management (ELA 2018) were "designed to increase the security of the species at Arncliffe which is the ultimate aim of this management plan" and include the objective of providing "At least double the availability of suitable habitat in the vicinity of the Kogarah Golf Course by creating new breeding habitat ponds on Marsh Street and re-instating habitat within Kogarah Golf Course where feasible post construction".

The M6 Stage 1 will include the construction of permanent infrastructure adjacent to that previously approved for the M8. It may not be feasible to re-instate habitat in the areas that will be required for the permanent operational structures associated with the M8 and the M6 Stage 1 (approximately 0.77 ha). However, re-instatement of habitat anywhere outside these areas is feasible.

A concept design for the re-instated habitat area has been drafted for TfNSW by an external designer. Adjustments to the concept design will be required in order to meet the objectives stated above and to accommodate issues such as flood management across the site.

4.2 Habitat present prior to establishment of the Arncliffe construction compound

The construction compound was built on Kogarah Golf Course. The area incorporated fairways, tees, greens, roughs, sand traps, several ponds of different sizes and configurations, and some trees, the latter generally planted in rows or patches between the fairways. Overall, the area could be described as a broad open grassland with grass of varying heights, interspersed with water features and a few patches/rows of trees.

Many of the ponds had patches of fringing vegetation and/or emergent aquatic vegetation, but were largely comprised of open water with grassed edges. Some ponds contained shelter in the form of drainpipes or small piles of rocks. Some ponds were relatively saline and many ponds had high densities of an introduced fish, *Gambusia holbrooki*.

GGBFs were regularly recorded in the area occupied by the construction compound, within the ponds and foraging or dispersing between the ponds. GGBF breeding had been recorded occasionally on the Golf Course.

The key features that made the area suitable for GGBFs were:

- Freshwater ponds of varying sizes;
- Open water with patches of rushes and sedges;
- Surrounding landscape of broad, open, grassy areas with a mosaic of heights, few shrubs and limited shading from trees;
- Proximity to a key breeding area; and
- Possibly, the presence of some relatively saline ponds within the landscape*.

* Exposure to salinity in small amounts can kill or inhibit a GGBF pathogen known as "Chytrid fungus", without causing mortality to frogs or tadpoles.

Key features that would have detracted from the habitat value for GGBFs were:

- Presence of Gambusia;
- Presence of other predators (e.g., turtles, eels, birds, foxes, cats), combined with insufficient shelter habitat, both within and outside of the ponds;
- Regular mowing of the majority of the area;
- The size of some of the larger ponds; and
- Possibly, water quality in some of the ponds.

4.3 Features required for habitat re-instatement

Habitat re-instatement should provide a range of freshwater ponds (with the objective of providing both breeding and non-breeding waterbodies) set in a mosaic of grassland habitats, shelter sites such as logs and rock piles, overwintering sites and good connectivity between the RTA ponds and Enhancement Area ponds and the rest of the golf course.

There is considerable potential for the re-instatement of the site to incorporate measures that would improve upon the quality of the habitat that was available for the GGBF prior to construction of the compound. For example, the configuration of the ponds, larger areas of unmown grasslands, more shelter sites, Gambusia-free water sources and enabling the ability for ponds to be periodically emptied and re-filled.

The provision of a mosaic of water bodies and terrestrial areas that will provide foraging and shelter is critical, as is the potential for the habitat to be managed in the future through draining and re-filling of ponds, weed management and cyclic disturbance of vegetation.

4.3.1 Freshwater Ponds

Recommended habitat re-instatement at this site includes a few (at least two) relatively large, deep (approx. 1 metre), semi-permanent ponds. These would be of dimensions similar to that of the current RTA ponds and smaller than some of the larger lakes on the Golf Course. Ideally these ponds should contain patches of emergents (rushes) in the middle of the pond and/or at the edges, but at least one of these ponds should be designed to maintain broad patches of open water.

The site should also contain several smaller ponds scattered through the landscape, ranging from shallow scrapes and depressions a few metres wide to raised "swimming pool" type ponds, such as that shown in Figure 18 of DECC (2008). McHenry and Callen (2020) used water tanks with besser blocks to support emergent vegetation in pots and these are recommended. Stormwater basins have also been used by the species (G. Muir, pers. obs.; McHenry and Callen 2020).

The ponds should be designed to enable active management where possible, including draining and re-filling, flushing with salt water and management of aquatic vegetation. Ponds should have access to a supply of clean water.

McHenry and Callen (2020) found that ponds that intersected with groundwater provided a level of permanency, which may be suitable for some (but not all) of the ponds, provided that salinity is less than 8 ppt.

Considerations for "constructability" of ponds at this site include depth (potential for acid sulphate soils and seepage of saline groundwater), water retention (i.e., ability of ponds to hold water), and water sources (availability of fresh, clean water). The ability to drain a pond periodically is useful for managing habitat and threats such as Gambusia.

Considerations for the location of ponds include hydroperiod, proximity to lights, proximity to human activity, and safety. Ideally, ponds will be located within 100 metres of each other.

Documents prepared in 2008 by DECC provide some useful information regarding GGBF habitat requirements, including potential species lists for aquatic and terrestrial habitats.

4.3.2 Terrestrial Habitat

Terrestrial habitat is an important component that provides shelter, food and cover for dispersing animals. Recommended is a mosaic of grasslands of varying heights. Ideally the majority of GGBF habitat would comprise tall, native grasses, interspersed with areas maintained as lawn. Dense, shrubby areas are not recommended, trees should be sparse and shading of ponds limited or avoided.

GGBFs will shelter under a range of items placed around ponds or in a grassland (for example, logs, roof tiles, pieces of wood and sheets of corrugated iron) and will sometimes use these for basking if placed at the edge of a pond. Hay bales have been used as overwintering sites and provide a food source for invertebrates as they break down.

4.4 Minimum Commitment

GGBF habitat will be re-instated within the construction compound area such that, as a minimum, the area of GGBF habitat available in the vicinity of Kogarah Golf Course will be doubled.

AMBS has been advised that within the construction compound area, the minimum commitment will include:

- at least 4,300 m² (0.43 ha) of aquatic breeding habitat, including at least four large ponds containing a mix of open water and macrophytes;
- at least 9,200 m² (0.92 ha) of predominantly native grassland surrounding the aquatic habitat, providing terrestrial foraging and shelter habitat; and
- good connectivity with the RTA ponds, and between the RTA ponds and the rest of the golf course.

References

AMBS (2020). Green and Golden Bell Frog Monitoring, Arncliffe, Annual Report for 2019-2020. Prepared by AMBS Ecology & Heritage Pty Ltd for Roads and Maritime Services.

CDS (2017). GGBF Enhancement Area Maintenance and Management Principles. Prepared by CPB Dragados Samsung Joint Venture.

DECC (2008). Best practice guidelines, Green and Golden Bell Frog habitat.

ELA (2017). Habitat Creation and Captive Breeding Plan – Green and Golden Bell Frog at Arncliffe. Prepared by Eco Logical Australia for NSW Roads and Maritime Services.

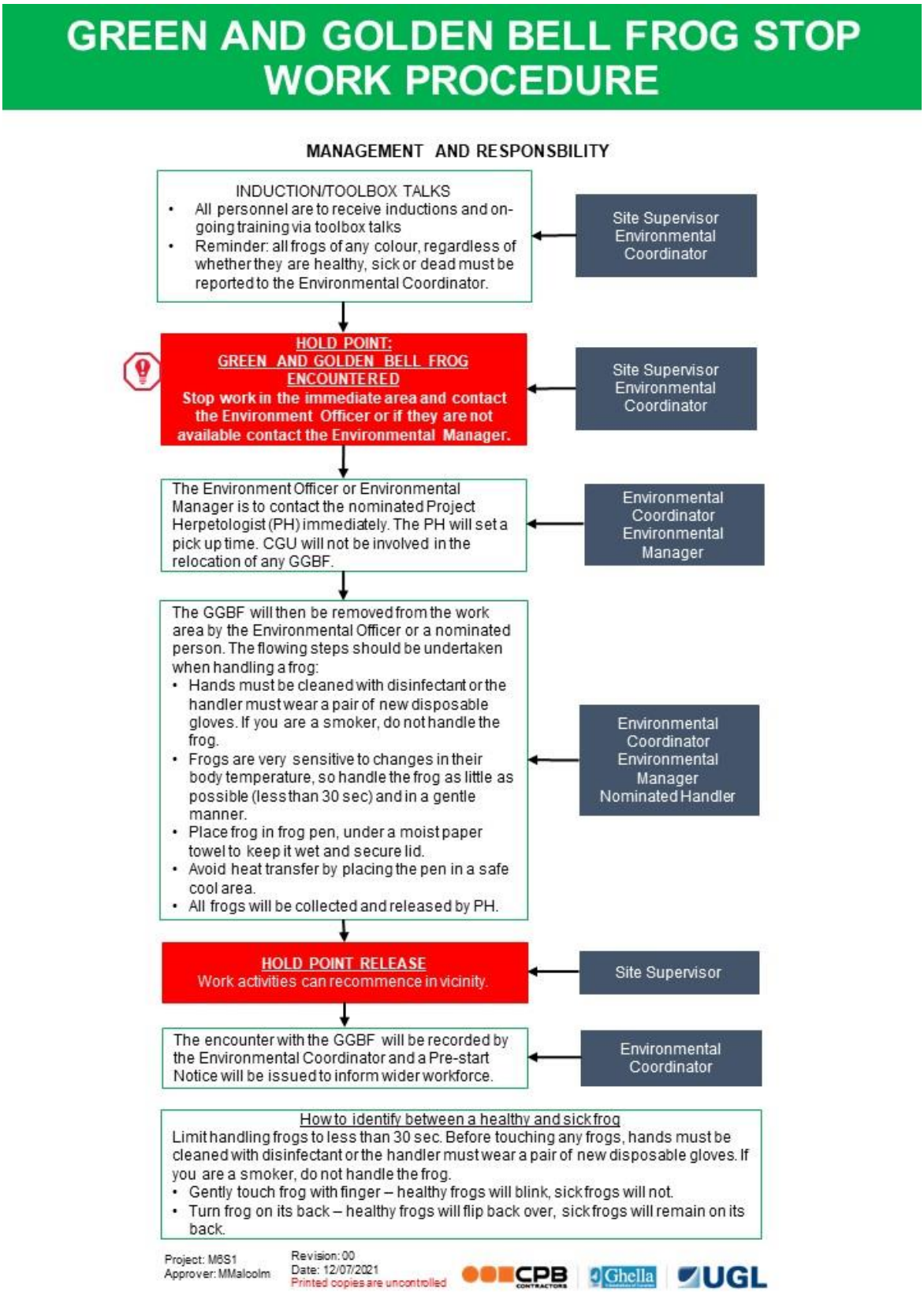
ELA (2018). Green and Golden Bell Frog Plan of Management - Arncliffe. Prepared by Eco Logical Australia for NSW Roads and Maritime Services.

McHenry & Callen (2020). Putting the pieces together: Industrial Ecosystem Success on Kooragang Island. Presentation at GGBF conference at Sydney Olympic Park.

White (1998). Management Plan for the Green and Golden Bell Frogs at Arncliffe. Prepared by Dr. Arthur White.

White (2017). Annual Report of Green and Golden Bell Frog Monitoring Results and Review of Plan of Management by Independent Frog Expert, July 2016-April 2017, Arncliffe. Prepared by Dr. Arthur White.

Appendix A: GGBF Stop Work Procedure



Appendix B: Consultation with EES

Comments provided by EES in September 2021 and responses are provided in the following table.

Section	Comment	Response
1.2	Figure 1.3 should be made consistent with Figure 1 of the most recent report *Green and Golden Bell Frog Monitoring, Arncliffe, September - November 2020* by AMBS Ecology & Heritage, 2021 (shown below), by identifying all of the features referred to in the plan and their boundaries/extents. At the least, all the areas or features mentioned in the plan should be shown. 'Barton Park', the 'Eastern Frog Corridor', the extent (boundary) of the 'Enhancement Area' and the individual ponds within the Enhancement Area are referred to in the plan but are currently not shown in Figure 1.3.	Figure 1.3 has been updated to identify the locations of the features referred to in the plan, with some exceptions and caveats. In relation to the Enhancement Area, the boundary is not shown on Figure 1.3 because the boundary has not been defined, and Figure 1 of the monitoring report shows the approximate area covered during spotlighting surveys, rather than the actual frog habitat, which is a much smaller area. References to the 'Eastern Frog Corridor' have been changed to 'underpass', consistent with the terminology used in the management plans prepared for the M8.
1.2	It would also be good if this and any other plans for the M6 Stage 1 and M8 projects could refer to the two different areas of recreational parklands to the south of the M5 in the same way that Bayside Council does. Council now appears to apply the name "Barton Park" to only those parklands south of Spring Street Canal to Muddy Creek; and "Riverine Park" to the area between the M5 East and the Spring St Canal, though EES has not been able to find map to support this. In previous M8 GGBF reports, White referred to both areas as "Barton Park".	This plan has been updated to refer to Barton Park and Riverine Park as requested by EES. However, it should be noted that the nomenclature attached to these areas differs between reports and mapping products and may have changed over time. For example, the cadastre has lots labelled as Barton Park both north and south of the Spring St canal. The Barton Park Golf Driving Range is located north of Spring St canal. One internet-based mapping product currently shows an area called "Riverine Park Wetlands" south of Spring St canal.
1.2	It is suggested this section include mention of surveys conducted following approval of the M8 project and commencement of construction and use of the Arncliffe compound, where GGBF were found, including south of the M5 East as far south as the 'Southern Phragmites Area', and that some or all of the individuals found were collected for captive breeding stock at the Symbio facility.	This section has been updated.
1.3	Section 1.3.2 states that the plan is "intended to compliment the GGBF management plans and requirements prepared and implemented for the M8 project (aka the New M5 project), not replace them. These plans include the Green and Golden Bell Frog Plan of Management (ELA 2018) and the Habitat Creation and Captive Breeding Plan (ELA 2017)". However, section 1.3.1 states that the plan "also provides guidelines for the post-construction re-instatement of habitat at the site of the Arncliffe construction compound." This suggests that, in relation to reinstatement of habitat following construction, the plan does expand upon, if	This has been clarified in Section 1.3.2.

Section	Comment	Response
	not replace, the requirements in the current Golden Bell Frog Plan of Management (v. 22, ELA 2018). It is suggested this be clarified in the plan.	
1.3	Typo error “compliment” should be "complement"	Typo has been corrected.
1.3	Clarification is sought of sections 1.3.4 and 1.3.5 which contain apparent contradictions with respect to monitoring of GGBF in the Enhancement Area during the construction of the M6 Stage 1. Section 1.3.4 refers to monitoring of GGBFs in the *Kogarah golf course* (and certain other places) being continued in accordance with the M8 management plans (ELA 2017, 2018) by the Project Herpetologist appointed by Transport for NSW (TfNSW). Whereas in section 1.3.5 the monitoring of the Enhancement Area, which is an area in the Kogarah golf course (though not owned by the Golf Club*), is stated to be the responsibility of the M6 Stage 1 construction contractor, CGU, with the permission of Kogarah Golf Club.	Sections 1.3.3 to 1.3.6 have been revised to provide clarity regarding management and monitoring. In summary, CGU will monitor GGBF use of the Enhancement Area ponds and the underpass. TfNSW will monitor GGBF use of all other areas. Monitoring of the on-site management and mitigation measures described in Section 3.1 will also be undertaken.
1.3	Additionally, monitoring of GGBF use of the Eastern Frog Corridor is omitted here, yet section 3.2 requires reporting by the Project Herpetologist to CGU and TfNSW of monitoring of GGBF use of that corridor.	Monitoring of GGBF use of the Eastern Frog Corridor was included as Section 1.3.6. Sections 1.3.3 to 1.3.6 have been revised for the purpose of clarity and references to the Eastern Frog Corridor have now been changed to ‘underpass’.
1.3	GGBF have recently been observed on other parts of Kogarah golf course (Figure 1.3) so monitoring of water bodies in parts of the golf course other than the Enhancement Area should also be undertaken.	Monitoring of GGBF use of water bodies in parts of the golf course other than the Enhancement Area will be undertaken by TfNSW.
1.3	*Going on figures in the recent monitoring reports, EES understands the Enhancement Area is on Lot 20 in DP1224233, owned by Sydney Water, and Lot 1 in DP 108492, owned by Rockdale Council, but subject to Charitable Trusts, however, the land is currently occupied, presumably under lease, by the Kogarah Golf Club and Course.	Noted.
1.3	Furthermore, section 1.3.5 also states that “[m]anagement of the Enhancement Area will need to be undertaken by Kogarah Golf Club and/or TfNSW, with the permission of the Golf Club.” The use of “and/or” provides inadequate clarity for responsibility for management of the Enhancement Area during the period of the M6 Stage 1 construction, and this should be redressed.	Management of the Enhancement Area is not part of the scope of this M6 Stage 1 GGBF Plan of Management and this text has been removed, as has the habitat monitoring requirement in Table 3.1. Monitoring will be undertaken as described in Section 3.
1.3	EES also considers that any agreement between parties regarding the management of the Enhancement Area should be included as an appendix to the plan of management. Further, EES is of the view that ultimate responsibility for all monitoring and all	Management of the Enhancement Area is not part of the scope of this M6 Stage 1 GGBF Plan of Management.

Section	Comment	Response
	management actions under the plans for both the M8 and M6 Stage 1 projects rests with TfNSW which has the benefit of the development consent for the M6 Stage 1 project, which provides the defence to the threatened species offences under the BC Act. This should also be made clear in Section 1.3.	
1.3	EES has concerns with respect to inappropriate management of the Enhancement Area under the previous agreement (referenced as "CDS 2017") between the Kogarah Golf Club, the construction contractor for the M8 (CDS) and Dr Arthur White of Biosphere Environmental Consultants. Section 1.3.5 states that, "*the intention* was that Kogarah Golf Club would manage the area, in accordance with the agreement (CDS 2017)", under which water was supplied to the Enhancement Area ponds (except Pond 6) by Kogarah Golf Club. However it was reported in *New M5 GGBF Monitoring (Arncliffe Enhancement Area) 2019-2020)* (AMBS 2020) that during parts of the reporting period some ponds were dry or had low water levels; also that "[A]t times, the grassland around the ponds was cut too short", Additionally, "[w]eeds and/or dense aquatic vegetation became established in most of the ponds over the course of the season and it is recommended that some hand weeding is undertaken (N.B. it is AMBS' understanding that management of weeds in the ponds is not part of the responsibilities assumed by the Golf Club)." These indicate that some required management actions were/are not being undertaken and/or there was/is a lack of lack of clarity as to who is responsible.	Management of the Enhancement Area is not part of the scope of this M6 Stage 1 GGBF Plan of Management.
2.1	Has the integrity of the Arncliffe construction compound as a "frog exclusion zone" been maintained since the end of the M8 works within the compound? If not, there may be a need for new pre-construction frog clearance surveys prior to the M6 Stage 1 works commencing.	The existing frog-fence has been left in place since the end of the M8 works. However, GGBFs have sometimes been seen climbing frog fences elsewhere. Pre-construction frog clearance surveys have been included as a new Section 2.3.
2.1	There is what appears to be a drainage feature, recently formed, inside the south-western fence of the construction compound, shown marked by an arrow in the following Nearmap image, dated 16 May 2021. Does this pose any threat to the RTA Ponds or Enhancement Area?	This drainage feature was built during construction of the M8 and is not part of the M6 Stage 1. AMBS has been advised that it will collect surface water runoff (rainfall) from the pavement and roofs in the permanent infrastructure area for the M8. Construction of the M6 Stage 1 will not utilise this area and no water from the M6 Stage 1 construction site will be discharged into it.

Section	Comment	Response
2.2	Is the increase in height and addition of horizontal lip to the barrier along the side of the compound facing the RTA ponds (page 10) because the existing fence was ineffective or deficient?	GGBFs have been observed climbing frog exclusion fences elsewhere. GGBFs are known to occur near the compound. Improvements to the existing fence will reduce the likelihood of GGBFs entering the compound.
2.2	The plan should identify triggers for management actions on vegetation around the enclosure following the stated inspections by the Project Herpetologist during the GGBF breeding season (page 10).	The hoarding will be placed 1 metre inside the project boundary and the vegetation between the fence and the project boundary will be kept to less than 10 cm in height and clear of branches.
2.3 (now 2.4); App. A	States that the "GGBF Stop Work Procedure" set out in Appendix A will be implemented in the event that frogs *of any colour* are found within the Arncliffe construction compound, however, this point is not clear in the procedure, which should be amended to make it so.	Appendix A has been amended.
2.3 (now 2.4); App. A	Additionally, there are at two typo errors in the procedure: § 4th box, 2nd last dot point: "Avoid heat transfer but placing the pen in a safe cool area"; § 6th box: "The encounter with the GGB will be recorded by ...".	Typos amended.
2.3 (now 2.4); App. A	The plan should more precisely define what is the "large number of GGBFs … within the compound" that will trigger a review of the frog exclusion barrier.	The number has been defined and the text updated accordingly.
2.5 (now 2.6)	These objective levels for noise and vibration of the guidelines and standards listed in condition E72 of the project approval are based around limiting effects on humans and building structures. Are these appropriate to apply to GGBF? Is there any data from the M8 project, or any other construction project, that could inform what levels and duration of noise deleteriously affect GGBF (or other *Litoria* species)?	These are the levels of noise and vibration that have been approved in the EIS. AMBS has been advised that noise will be less during construction of the M6 Stage 1 than it was for the M8, because there are no permanent shafts at the boundary nearest to frog ponds, surface building works are reduced in scope and the ventilation buildings are already in place.
2.5 (now 2.6)	If the RTA ponds and M8 Marsh Street habitat area are to be treated as "sensitive receivers" (page 12), EES notes that: § conditions of approval A20 and A21 require boundary screening that must *minimise* visual, noise and air quality (including dust) impacts, however, for noise and vibration at least, condition E72 sets objective levels which are not necessarily minimisation and, as noted, are anthropogenic in purpose. § condition E84 has requirements for an Operational Noise and Vibration Review (ONVR) and consequent conditions.	These are the levels of noise and vibration that have been approved in the EIS. AMBS has been advised that noise will be less during construction of the M6 Stage 1 than it was for the M8, because there are no permanent shafts at the boundary nearest to frog ponds, surface building works are reduced in scope and the ventilation buildings are already in place. The term "sensitive receivers" has been replaced by "environmentally sensitive areas".
2.5 (now 2.6)	How do these GGBF "sensitive receivers" get treated in relation to these requirements?	The term "sensitive receivers" has been replaced by "environmentally sensitive areas". Indirect impacts on these areas will be minimised as much as possible.

Section	Comment	Response
2.5 (now 2.6)	Will the "monitoring of management and mitigation measures that are required for the project generally (such as dust, noise and vibration)" identified in section 3.1 be applied at these particular sensitive receivers and, if not, how useful would such monitoring be in determining impacts on them?	Monitoring of these items will be undertaken for the purposes of nearby human receptors. The Project Herpetologist will also make a subjective judgement regarding the levels of light, dust and noise during nocturnal GGBF monitoring. AMBS has been advised that the level of vibration reaching these areas will be so low as to be undetectable to humans.
3.2	Reporting requirements should be revised in line with any changes to monitoring and management responsibilities and locations made in response to EES comments on section 1.3.	Reports will discuss items in Table 1.1 that are identified as the responsibility of CGU.
3.2	Quarterly report by construction contractor to TfNSW should also include any issues raised by the Project Herpetologist to CGU and any responses or actions to these issues.	Quarterly reports will include this information and Section 3.2 has been updated accordingly.
3.2	EES requests that it be provided a copy of quarterly reports.	Quarterly reports will be provided to EES and Section 3.2 has been updated accordingly.
3.2	Any issues observed by the Project Herpetologist in relation to habitat in the Enhancement Area should be notified to TfNSW, as well as to Kogarah Golf Club whilst it continues to occupy the land (rather than one "and/or" the other), noting that TfNSW is the proponent granted the development consent which provides the defence to the threatened species offences under the BC Act.	Management of the Enhancement Area is not part of the scope of this M6 Stage 1 GGBF Plan of Management and this text has been removed, as has the habitat monitoring requirement in Table 3.1.
4	EES welcomes the continued planning and additional detail about the reinstatement of GGBF habitat in the Arncliffe construction compound area following completion of its use for the M6 Stage 1 works. EES also welcomes the minimum area commitments to habitat reinstatement outlined in the dot points in section 4.4, although it is not clear what defines "the area of GGBF habitat available in the vicinity of Kogarah Golf Course", or its size, that, as a minimum, is to be doubled.	CGU will engage with EES throughout the design development.
4	EES requests that it be engaged early in the design development and in discussions about ensuring security and conservation management in perpetuity.	CGU will engage with EES throughout the design development.