

Plan of Management

Green and Golden Bell Frog Habitat.

Morgan Cement (MCI), Foreshore Port Kembla.



Figure 1. Green and Golden Bell Frog. *Photo © C Wade.*

Morgan Cement International (MCI Pty Ltd) Green and Golden Bell Frog Habitat



Figure 2. MCI Habitat, Photo © Google Earth 2008

Main Pond Location. 34 ° 28' 38' 22 S. 150 ° 54' 35' 12 E

East Pond Location. 34 ° 28' 38' 48 S. 150 ° 54' 36' 05 E

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MCI Plan of Management 2013

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Introduction

The Morgan Cement International (formerly Incitec /Kembla Properties) Green and Golden Bell Frog (GGBF) colony on Foreshore Road has been the significant population of the North Port Kembla sub-population over the past 13 years. This colony is one of the four sub-populations identified in the principal Department of Environment and Conservation (DEC) NSW Management Plan for the GGBF Key Population at Port Kembla, 2007.

This plan has three objectives:

1. To maintain the four existing GGBF sub-populations
2. To increase the population of GGBFs at Port Kembla
3. To further connect the four GGBF sub-populations.

Strategy to achieve these objectives outlined a number of actions. Two of these actions that involved the Morgan Cement International (MCI) site were:

- a. The improvement of the breeding habitat of industry sites
- b. The development and implementation of site specific GGBF management plans.

The Morgan Cement Green and Golden Bell Frog Plan is an outcome of this request for site specific plans.

In recent years, through the rollout of actions identified in the recovery plan for the GGBF key population at Port Kembla, focus and support for the MCI site by the regional DEC and the Office of Environment and Heritage (OEH) has grown. The recent funding obtained to implement actions from the DEC principal plan will produce the first major rejuvenation of the habitat since its creation in 2001. This rejuvenation will considerably improve the breeding habitat of the fragile GGBF population on Foreshore Rd.

History; 2001 to today

The Morgan Cement International (MCI) Green and Golden Bell Frog (GGBF) habitat is the original Incitec site where the GGBF habitat was first constructed in 2001 after the species was discovered in Tank 12 Sulphuric Acid bund on 13 March 2001. This discovery of the Green and Golden Bell Frog (*Litoria aurea*) initiated a plan of management by Dr Arthur White of Biosphere Environmental Consultants. Dr White was engaged by Incitec to manage the collection, care and translocation of the frogs to a Bell Frog attracting habitat. This habitat was designed by Dr White and consisted of a large mound of dirt that had been excavated during the construction of Tank 12 Sulphuric acid tank and bund area. Three clay lined ponds were designed and built on this mound site situated approximately 100 metres away from the tank 12 bund. The habitat and endangered species have been managed to this original plan and more recently to the newer DEC Management Plan for the GGBF Key Population at Port Kembla (2007).

The MCI colony is one of the key sub-populations in the Port Kembla plan.

Over the past 12 years the species and site have been managed by Chris Wade under a Section 132c Licence (early years through Dr Arthur White's licence and mentoring). This Scientific licence allows for Green and Golden Bell Frog capture, handling and microchipping. This collected data is reported annually to the OEH. To date over 320 adult frogs have been microchipped on site as a result of seasonal monitors/surveys. These surveys have also included numerous local people in the Illawarra community who have shown an interest in the Green and Golden Bell Frog Population.

Plan of management; Incitec 2001 to MCI today

The original management plan encompassed a number of separate operational areas that were owned solely by Incitec. In approximately 2003 the Incitec property became Orica. These Orica operational areas have changed ownership over the past decade.

In 1999 MCI leased the idle Broadfield site plant and commenced cement production. In August 2004 MCI purchased the site outright. In August 2011 MCI also purchased the GGBF habitat and the adjacent #2 fertiliser shed with the intention of using this shed to store and dry blast furnace slag to use in the production of cement.

Since the habitat creation in 2001 until today, 3 different business activities have continued to operate.

1. Acid receipt and despatch at Orica's Tank 12, originally Incitec.
2. Cement Production and Despatch at Morgan Cements Batch Plant, originally the Incitec Broadfield Superphosphate Plant
3. Fertiliser receipt and despatch occurring in the adjacent (south) #2 fertiliser shed formerly operated by Incitec and Kembla Properties. This fertiliser activity ceased at the end of March 2013. This shed is now owned by MCI and proposed to store and dry slag for their cement production in late 2013.

The GGBF site and habitat since its construction in June 2001 has remained designated solely as a GGBF frog refuge with very limited access to the public by the discipline of locked exterior gating. Site staff presence on the GGBF habitat has also been rare due to the nature of the respective businesses and the commitment to the endangered species. Any access to the site today requires an MCI induction. This induction references the access protocol for the GGBF habitat and the steps required if a frog is located on any area of the MCI property.

The GGBF frog sightings over the last decade have been largely within the identified habitat and the nearby Orica Tank 12 bund. Striped Marsh Frogs (*Lymnodynastes Peronii*) and Peron's Tree Frogs (*Litoria Peronii*) are also present within the habitat. The former in ever increasing numbers as the pond vegetation increased from 2007 to 2011. A number of adult frogs are sporadically found and removed from Tank 12 bund during the breeding season and relocated to the MCI habitat. The Orica tank 12 area remains a likely frog area because of the water holding bunds.

No frogs have been located at the #2 shed (formerly Incitec and Kembla Properties fertiliser shed). This shed is directly south of the GGBF habitat. The nature of the product and the lack of water bearing structures or pooled drains are likely the reason for this.

The 2001 management plan mentions three ponds of which today only two ponds are functional. The third pond was never successful in holding water.

Pond design has fundamentally remained unchanged and pond drainage has occurred seasonally. The subterranean pipe work installed to enable the ponds to be drained in winter have been removed as the piping was a common source for pond leakage and not necessary. The addition of a portable suction pump will easily drain a pond when required. This still allows the ponds to be “fluctuating or ephemeral” (Pyke and White 1999, cited in Green and Golden Management Plan, A White, 2001) and offer the Bell Frogs opportunity to “out compete other species” such as the resident Striped Marsh frogs.

The East pond lining failed in 2009 after winter vegetation removal. Repeated efforts to re-seal the clay lining failed.

In August 2011 the heavily vegetated (Typhus orientallis rushes) but dry East pond was cleared of vegetation and a pond lining was fitted.

Immediately after filling the pond there was a number of GGBF tadpoles spawning's and adult frogs were seen regularly.

Once the east pond was returned to a successful Bell Frog friendly habitat in 2011, remediation of the Main pond was then planned.

In the winter of 2012 the Office of Environment and Heritage (OEH) with the support of the Environment Protection Agency (EPA) obtained funding to enhance the breeding habitat at the Morgan Cement site. This support enabled resources for a significant remediation of the habitat. Recent years had resulted in a heavily vegetated pond and the past number of years (2008-2011) saw the vegetation inevitably thicken and virtually cover the entire pond. This coincided with an increase in the Striped Marsh frog (*Lymnodynastes peronii*) population. Frequent cutting of Typhus and other vegetation below water level (A White, 2001) was only successful for 4 to 6 weeks as these rushes grew back rapidly. Physical removal of any pond vegetation was not possible due to the clay lining which would have been immediately breached resulting in a dry pond.

In August 2012 after confirmation that no tadpoles or Bell Frogs were present the vegetation was removed from the centre area of the main pond. An area of approximately 15 % at both ends of the main pond was left untouched. This enabled 70% of the pond surface to be cleared of rush and lined with an Ethylene Propylene Diene Monomer (DDPM) lining. This returned the Main pond to a relatively clear water body with the retained emergent vegetation restricted to both ends of the ponds. Replanting of potted shelter vegetation along the length of the pond was designed to implement additional cover along the pond body.

The past decade has seen the grassed foraging area repeatedly maintained with a limited number of small trees that are trimmed to retain a sunny pond site. Management of the perpetual emergent weeds has required substantial effort to prevent the site over running with Bitou bush and other unwanted vegetation.

Identified Threats

➤ Loss of Habitat

The site has remained dedicated as a GGBF habitat with controlled access. Numerous owners and varying levels of vegetative maintenance has seen the habitat drift from the early years of significantly open ponds and well mown grass to an overgrown habitat. Since 2010 when Morgan Cement purchased the site from Kembla Properties, significant steps have been achieved in returning the habitat to the typical GGBF friendly site.

➤ Predators, introduced and native

The major predator threat in the past decade has been the local feral cat population. This has been removed periodically and is not currently a problem.

White Ibis (*Threskiornis molucca*), White faced Heron (*Egretta novaehollandiae*) and the occasional fox (*Vulpes vulpes*) are also seen on site. Recently in the spring and summer of 2012 a local population of rabbits had infested the foraging vegetation (*Lomandra*). This was a concern as they were disturbing the GGBF habitat. No Plague Minnows (*Gambusia Holbooki*) have been found in the ponds.

➤ Water Quality

The site design requires tap water to keep the ponds at the optimal level. There is no potential for polluted storm water run-off because of the raised banks of both ponds situated upon the mounded habitat.

➤ Disease.

Frog Chytrid (*Chytridiomycosis*) has not been routinely tested for on the colony in the past 12 seasons

➤ Site Management

Mowing and vegetation trimming is done at selected times when high levels of frog activity are unlikely. Contractors engaged are inducted into the specific care required when working in the habitat. Significant site maintenance is done from June to September with no disturbance to the over-winter boulder sites at the pond ends. Pesticides are not used on site.

➤ Direct Human Impact

The habitat has controlled access and direct human contact is largely with the supervised volunteers participating in torchlight surveys. The vehicular traffic around the site has the potential to inflict road mortality although this has not been obvious at any recorded time.

MCI Plan of Management 2013



Figure 3. Juvenile GGBF in Lomandra. *Photo © C Wade*

1.0 Objective

The objective of the Plan of Management is:

1. To maintain or increase the current Green and Golden Bell Frog Population at the Morgan Cement Bell Frog Refuge
2. To provide a connective point for the other existing sub- populations of the Port Kembla Area

2.0 Strategy

The strategies used will be consistent with the principal Port Kembla GGB Management Plan (2007)

1. Improvement and maintenance of site habitat to attract GGBF species
2. Reduction of emergent threats to the species
3. Monitoring and reporting of data of the Morgan Cement GGBF population

3.0 Management and Maintenance of the Frog Habitat Area

3.1 Frog Ponds

The two ponds should be maintained to retain approximately 80% open water. The pond ends will be covered in emergent tall rush to provide cover for frogs and tadpoles. These plants will also provide nutrients for the developing tadpole populations. A line of potted water plants will be distributed along the length (North and South) of the main pond to provide additional cover for the species. The secondary weeds should also be suppressed by expedient removal. Both ponds will be drained periodically over the winter to control emergent plant growth, facilitate pond maintenance and remove any unwanted pests such as the Plague minnow. The water level will be maintained at a minimum of 50% volume during August to June to maximise the likelihood of successful breeding events. Dramatic loss of water volume through evaporation in these months would increase the potential to harm the tadpole population.

3.2 Shelter and Foraging Habitat

The frog habitat consists of 2 ponds situated on a large heavily grassed mound. These ponds have good exposure to sunlight and the existing sparse tree growth should be controlled to prevent shading and pollution of the water bodies. The grass maintenance on the site will require mowing a number of times over the summer period. This should be done by a “GGBF educated” horticulturist who is familiar with the GGBF habit and follows the protocol of inspecting the site prior to the commencement of mowing. The sighting of frogs during mowing or other maintenance should be reported.

The grassed foraging area has a number of boulder fields that provide shelter for the frogs during the day and over the winter months.

Extensive grass and plant remediation should be completed in winter when the frogs are in torpor. Each ends of the ponds have the original rock piles which also provide protection habitat for the frogs. Significant clusters of Sword grass (*Lomandra*) are found at the ends of both ponds. These provide good cover for active adult frogs, and are particularly populated with juveniles and froglets in late summer and autumn. These Sword grasses also provide good habitat for insects.

Maintenance of the vegetation at the pond ends should be done in winter with particular care not to disturb or dislodge the rocks in situ as they provide over winter habitat for the species.

4.0 Licence requirements

The activities undertaken on site including frog surveys will be reported annually as per the licence conditions of the Section 132c Scientific Licence. Specific requirements also note that:

- a) Fauna is to be managed in accordance with a current Animal Care and Ethics Committee approval
- b) No frogs are to be removed from the site
- c) The NPWS Frog hygiene protocol is to be followed at all times.

Interested people from the Illawarra community and beyond will be invited to visit the GGBF habitat. These people will be site inducted into the MCI access requirements and escorted during their time within the GGBF habitat.

5.0 Species Surveys

5.1 Nocturnal searches and aural monitoring

Frog Surveys (Monitoring) will occur throughout the GGBF season. This is typically from September to May. These surveys consist of headlamp searches and calling to identify male frogs situated on the site. The frog hygiene protocol and responsibilities of interacting with endangered species are key detail and guidelines for people participating in this activity. These night time activities although fully supervised are at the risk of the participant. No children under 10 will be able to participate.

Located frogs will be collected and placed in separate aquarium cages to enable them to be sexed, sized and micro-chip tagged. This activity is currently done by Chris Wade under Scientific Licence, National Park & Wildlife Act, 1974 section 132c.

5.2 Diurnal visual surveys /sightings

Daylight visual searches throughout the GGBF habitat will occur throughout the season. This is more likely to be in or directly adjacent to the water bodies with “basking” frogs and tadpole activity. Vegetation maintenance may produce sightings of frogs within the habitat in the warmer months. All employees and contractors on site at MCI should be familiar on what to do if frogs are located.

6.0 Dip-netting surveys for tadpoles

Seasonal dip-netting to confirm breeding events will be undertaken from September through to May. This dip-netting will allow identification of the Green and Golden Bell Frog tadpoles from the Striped Marsh frog and Peron’s tree Frog tadpoles which also habituate the ponds.

7.0 Site Threats

7.1 Habitat

The site will remain a dedicated GGBF habitat with controlled access. Mowing and vegetation trimming should be done at selected times when high levels of frog activity are unlikely. Contractors engaged to undertake this work should be trained in the specific care required when working in the site habitat. Significant site maintenance will be done from June to September with no disturbance to the over-winter boulder sites on the grassed mound or at the pond ends. Pesticides are not to be used on site.

7.2 Predators, introduced and native

The habitat will be monitored for feral cats, foxes and rabbits. Any significant predator population should be managed as previously through ethical means. The ponds will be strategically drained to remove the risk of plague minnows and discourage competing frog species.

7.3 Water Quality

The site design allows for very little potential pollution from storm water run-off because of the raised bank levels of both ponds situated on the mounded habitat. The pond water levels will be raised slowly at no more than 10% volume increase /day to allow for the removal of chloramine and fluorine to prevent harming the developing tadpoles.

7.4 Disease

Evidence of sick frogs possibly infected by the Chytrid pathogen will be recorded and reported to the OEH and the Wildlife Licencing and management unit. The colony would be a good sample population to swab for Chytrid seasonally.

7.5 Direct Human Impact

The habitat should continue to have limited controlled access. Direct human contact with the GGBF should be under the supervision of a GGBF scientific licence holder, typically this would involve participating in torchlight surveys. The vehicular traffic around the site has the potential to inflict road mortality although this has not been obvious at any recorded time since the habitat was created in 2001.

The highest traffic volume currently occurs in daylight hours further reducing the risk of road mortality. Changes to the volume or pattern of vehicular flow will require additional surveys to ascertain the impact on the GGBF population.

8.0 Reporting

An annual report is required detailing all activities carried out during the year. Survey data that is collected under licence including night time headlamp events is to be summarised. All adult frogs collected should have their sex, size and health recorded. The frogs are to be tagged with a unique ID micro-chip. Previously chipped frogs are to be recorded. This data is provided to the NP&WS Wildlife Licencing and Management Unit. Records are then incorporated into the OEH Atlas of NSW Wildlife.

9.0 Appendix

Photos of the MCI habitat, surveys, frogs and tadpoles

Figure 4. Site Plan. *Photo © Google Earth 2008*

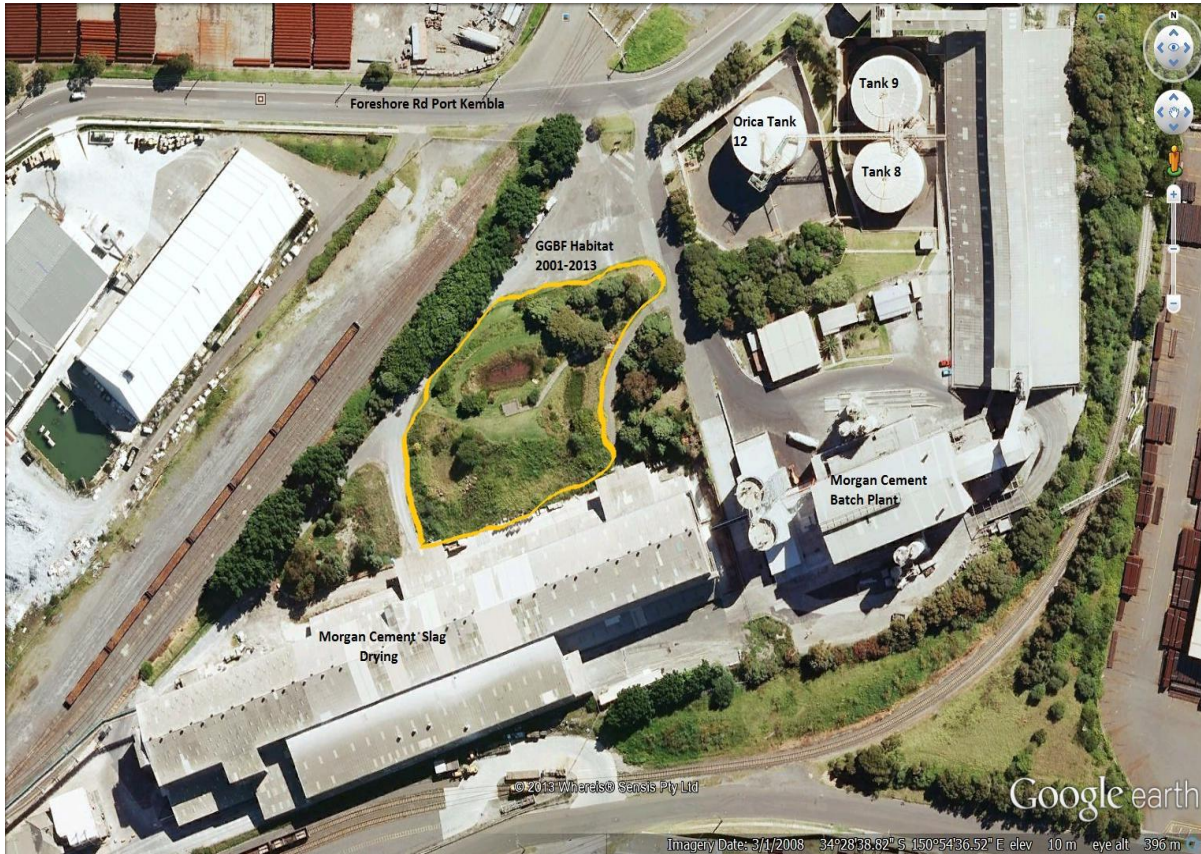


Figure 5. Community of Froggers at night survey.

Photo © C Wade.

Figure 6. Data Collection

Photo © C Wade.



Figure 7. Tagging/Recording

Photo © C Wade.



Figure 8. Adult in East Pond

Photo © C Wade.



Figure 9. Adult GGBfrog in transit.

Photo © C Wade.

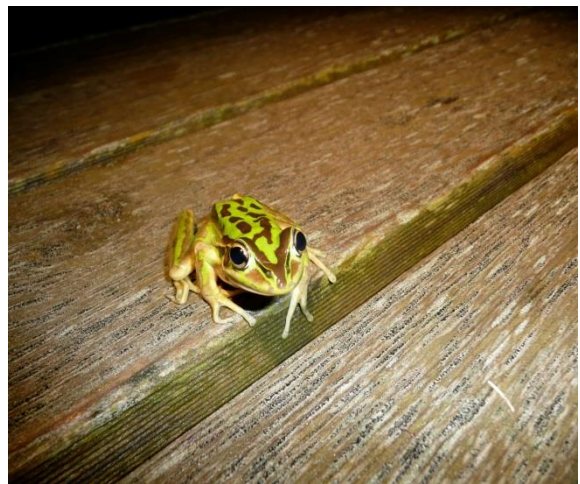


Figure 10. Juvenile Frog

Photo © C Wade.



Figure 11. Juvenile Frog

Photo © C Wade.



Figure 12. Tadpole Identification

Photo © C Wade.



Figure 13. GGBF Tadpoles

Photo © C Wade.

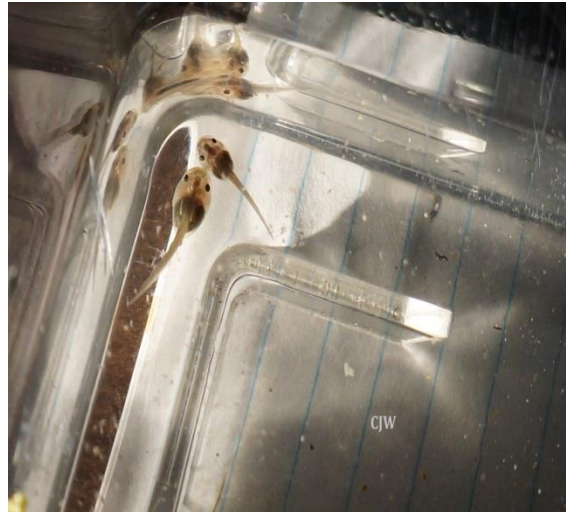


Figure 14. East Pond. 2009

Photo © C Wade.



Figure 15. Main Pond

Photo © C Wade.



10.0 References

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11.0 Acknowledgements

This is a site specific plan for the landowner Morgan Cement International (MCI Pty Ltd).

This plan has been compiled by referencing and following Dr Arthur White's original management plan in 2001 and the current principal DEC Management Plan for the Green and Golden Bell frog Key Population at Port Kembla 2007.

The author has obtained his expertise through 12 years' experience (initially as the Green and Golden Bell Frog discoverer at Incitec in 2001) as guardian and carer for the endangered species. Expert assistance and guidance has been provided by Dr Arthur White and the numerous identities in the DEC and OEHL for which I am indebted.

