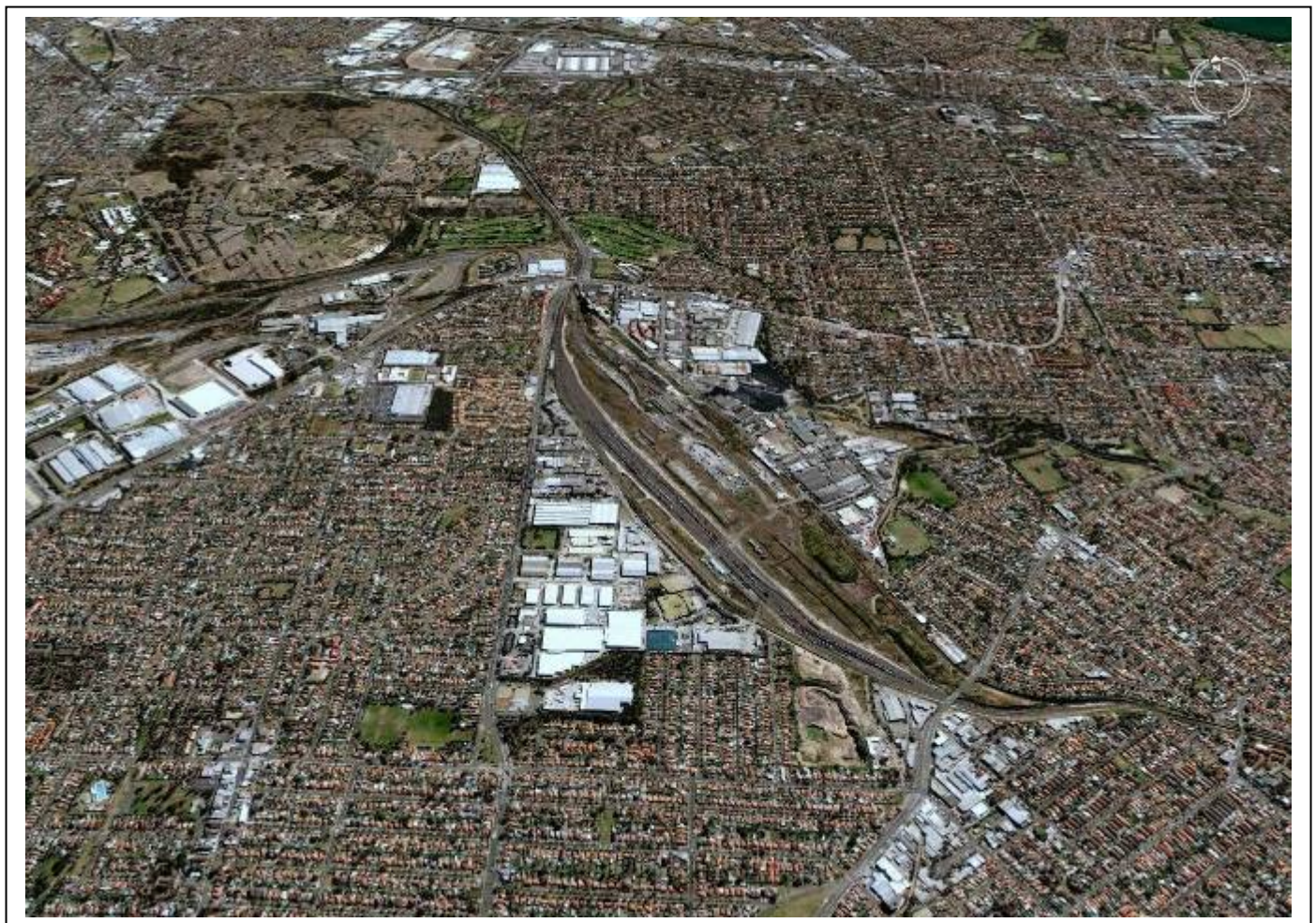


# The Green and Golden Bell Frog Key Population at Greenacre



May 2007

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**Cover photograph:** Aerial photograph of Greenacre, Chullora and Strathfield South

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## INTRODUCTION

### The Green and Golden Bell Frog

The Green and Golden Bell Frog *Litoria aurea* is a relatively large, muscular frog species with robust form. Adult sizes range from approximately 45mm to 100mm with most individuals being in the 60-80mm size class.

The colouration of the back is quite variable, being a vivid pea green spotted with almost metallic brass brown or gold (Figure 1). The backs of some individuals may be almost entirely green whilst in others, the golden brown markings may almost cover the whole back.

The Green and Golden Bell Frog was formerly distributed from the NSW north coast near Brunswick Heads southwards along the NSW coast to Victoria, where it extends into East Gippsland, and west to Bathurst, Tumut and the ACT. In the 1960s, the species was considered widespread, abundant and commonly encountered. Today, the species exists as a series of isolated populations within its former known range.

The Green and Golden Bell Frog is listed as an Endangered Species under Schedule 1 of the NSW *Threatened Species Conservation Act 1995*. At the national level, the species is listed as Vulnerable under Schedule 1 Part 2 of the *Environment Protection and Biodiversity Conservation Act 1999*.

The consequences of being listed as a threatened species under both state and national legislation has been that a recovery plan must be prepared and considerations given to the species when assessing the impacts of developments and activities on populations of the species and its habitats. Whilst preparation of recovery plans has been made optional under the most recent legislation changes, a NSW recovery plan has been drafted for this species.

The draft Green and Golden Bell Frog Recovery Plan defines Key Populations as conservation management units and gives recognition and focus for conservation to 43 such populations across the former extent of the species almost state-wide distribution.

### The Greenacre Management Plan

This Management Plan relates to the Greenacre Key Population located in the Sydney Green and Golden Bell Frog (GGBF) Management Region as identified in the draft NSW GGBF Recovery Plan.

This Management Plan has been prepared to satisfy Action 11.3.4 of the draft GGBF Recovery Plan that was developed in accordance with the *Threatened Species Conservation Act 1995*. Action 11.3.4 calls for the NSW Department of Environment and Climate Change (DECC) to prepare and implement a GGBF Management Plan for each key population on its own land and liaise with other landowners as necessary (e.g. local councils, industry, residents) to prepare and implement site specific Management Plans across the extent of the species distribution in NSW. The implementation tables of this Management Plan further identify links to other actions, within the draft Green and Golden Bell Frog Recovery Plan, and which are further satisfied in part by the implementation of this plan.

Under the Sydney Metropolitan Catchment Management Authority (SMCMA) Draft Catchment Action Plan (CAP) there are a number of Catchment Targets that specifically relate to this management plan, these are Catchment Targets B3, B4, B5, W1 and W2. This Management Plan addresses aspects of the above sections of the CAP and implementation of this plan will, in addition, assist the SMCMA meet these and other related CAP targets.

There is also a requirement under the Local Government Act for local councils to develop and implement Management Plans, where GGBFs occur on public land under their care, control and management. It is therefore envisaged that this Management Plan will satisfy this requirements of Bankstown City and Strathfield Municipal Councils (with respect to the Greenacre key population components occurring on public land). This plan can also aid in the development of the Cox's Creek Reserve PoM that also addresses GGBF issues and is presently under review. Furthermore, this plan is also intended to provide guidance, direction and coordination for other stakeholders, land owner/managers at Greenacre where the frog and/or its habitat occurs.



**Purpose**

The Greenacre GGBF Management Plan has been prepared to ensure that the Greenacre population is successfully managed and monitored such that the species continues to persist at the location and measures of the population's viability are maintained or improved over time.

There are two aims of the Management Plan.

1. To identify and, where possible, address the threats and other issues/factors affecting or likely to affect the conservation of the species at Greenacre.
2. To manage the species in accordance with the strategies outlined within the draft GGBF Recovery Plan.



**Figure 1.** *Green and Golden Bell Frog.* Photo ©Garry Daly.

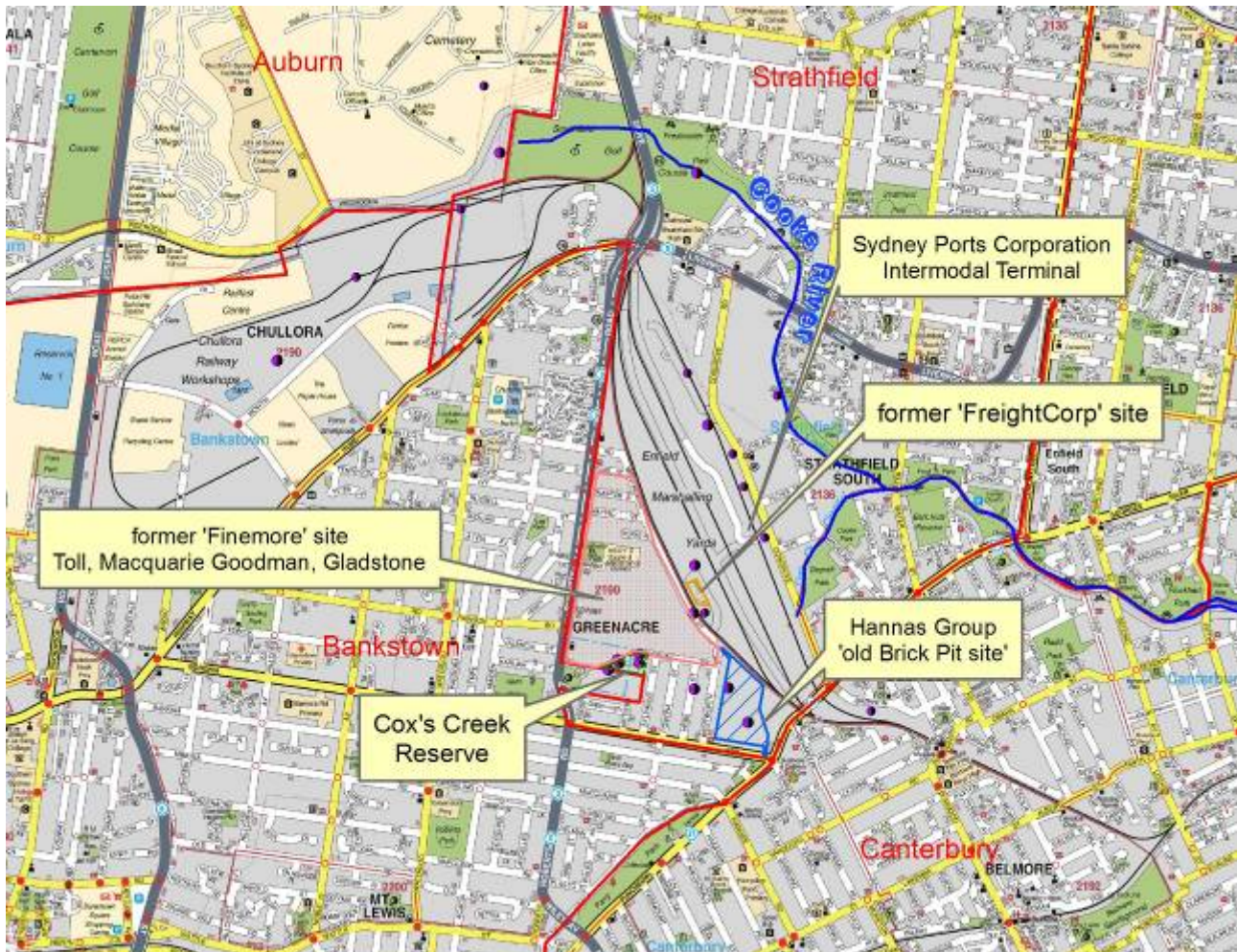


## THE GREENACRE POPULATION

### Location

The Greenacre GGBF Key Population is located eight kilometres west of the Sydney central business district in the upper parts of the Cooks River catchment (33° 54' S, 151° 04' E; Figure 2). It consists of three population satellites, or sub-populations, at or around the following sites:

1. Juno Parade former brick pit site;
2. Old Enfield Marshalling Yards; and
3. Cox's Creek Reserve



**Figure 2** Map of Greenacre. purple and black circles show the location of recorded sightings of Green and Golden Bell Frogs (these records include both historic and contemporary observations from the 1970s to the present)

The Key Population incorporates the Cooks River and its tributaries and is included within Bankstown City and Strathfield Council Local Government Areas (LGA). The population is known to occur across residential areas where the species has been detected in frog friendly gardens between Cox's Creek Reserve and the former brick pit site at Greenacre. The site of the former sewage treatment plant (STP) that straddles Bankstown and Strathfield Council boundaries (now in part Cox's Creek Reserve) also provides GGBF habitat. The frogs also occur across the site of the former 'NSW Railways' Enfield Marshalling Yards that are now divided up amongst a number of state government departments and private or semi-private enterprises.

Owners or managers of lands in the vicinity of where GGBFs or their habitat have been found in the Greenacre area include:

- Pacific National (formerly FreightCorp) – now a Toll Group subsidiary
- Sydney Ports Corporation (SPC)
- RailCorp
- Toll Holdings (formerly Finemores Transport) – lessee of this site
- Macquarie Goodman/Gladstone Properties (land owner)
- Sadliers Transport
- Hannas Civil Engineering
- Other industrial operators occupy the fringes of the area along Cosgrove Road
- Strathfield Municipal Council
- Bankstown City Council

Other lands that have either historically been occupied by GGBF or have strategic potential as habitat include the former Chullora Railway workshops site and nearby wetland area, the Rookwood Cemetery and the riverfront areas along the Cooks River, Cox's Creek and their canals and tributaries. These lands are likely to be at least transiently occupied by GGBFs, they furthermore retain some strategic movement corridor and/or other habitat values for possible migrations or reintroductions.

### Habitat

The upper Cooks River catchment is a generally highly developed area with dense areas of residential and industrial land along with disused land now proposed for re-development. It also consists of other small areas with fragments of original vegetation intermingled with residential development and associated green areas. The catchment has been highly modified with only a few areas preserving the original vegetation. Of these, the Cox's Creek Reserve supports the Cooks River Clay Plain Scrub Forest, a subunit of the Cooks River/Castlereagh Ironbark Forest Endangered Ecological Community (EEC). The bushland at the reserve is a mix of closed paperbark scrubland (*Melaleuca decora*, *Melaleuca stypheloides* and *Meleleuca nodosa*), rushland/sedgeland and (introduced) grassland. In historic times, before substantial vegetation change, the Bankstown City and Strathfield Municipality were dominated by the now EEC, and remnants in the area still reflect this today. The GGBF population utilises these remnants and is afforded additional protection by the EEC status however it is not confined to these remnants and has survived in the area by using other local features such as:

- Breeding habitat e.g. in permanent water bodies such as the 'Frog Habitat Area' ponds on the former brick pit site and former 'FreightCorp' pond. More ephemeral breeding habitat that fills after heavy rain including ponds, drainage depressions, stormwater detention basins and culverts. Most of these habitat areas are human constructions made for purposes other than frog habitat. Such features are located within Cox's Creek Reserve and at a few locations along Cosgrove Road.
- Foraging habitat, including areas of native or introduced grasses, tussock vegetation and emergent sedges and reeds such as *Schoenoplectus validus*, *Gahnia spp.* and sparse *Typha orientalis* bordering water features. A Kikuyu grass (*Pennisetum clandestinum*) bank on the northern side of Cox's Creek has been identified as important foraging habitat and, in the absence of other extensive areas of foraging habitat, is likely to continue being an important foraging area for the local population. These areas are vital for the GGBF to feed in relative safety from predators and for basking in the sun by day.
- Shelter habitat, includes similar vegetation to that used for foraging and, most particularly, rock/brick piles, ground timber, tussock forming vegetation and other features that are difficult to categorise (e.g. crevices in the ground, around root systems of plants and under on-ground debris). Shelter habitat has been provided as part of the created habitat on the former brickpit site (Hannas development), although substantial areas of shelter habitat were removed by the infilling of the brickpit. Additional shelter habitat is also provided

around the former 'FreightCorp' ponds and in a few sympathetic residential gardens bordering the area.

- Movement habitat, generally typified by wet areas such as creeklines, canals, drains, periodically damp areas, connecting or partially connecting vegetation, gardens, easements, and even by open areas that do not restrict movement. Movement habitat is believed to be limited between sub-populations at Greenacre. Where the frogs do move between sub-populations, they generally do so along any open areas without traffic, such as stormwater drains, swales, easements, laneways, depressions and vegetated areas including parts of residential areas.
- Over wintering habitat. Some of this habitat is most likely similar to shelter habitat, such as rock and rubble piles, ground timbers and logs and dense tussock vegetation. Most shelter habitat is provided by embankment structures of the former 'FreightCorp' ponds and the boulder habitat areas created on the old brickpit site. There is evidence that males and females often differ in their selection of over wintering habitat and may seek to shelter in different areas, such as amongst boulders, inside logs or even amongst overgrown or dense and moist vegetation in residential gardens.

### Species status

The Greenacre Key Population is a relatively small remnant population. It inhabits an area that is already highly developed and experiencing further re-development pressures. It is a remnant of a larger population that formerly stretched across the various wetlands associated with the Georges River and Cooks River sub-catchments of Botany Bay. Elsewhere, the species was once widespread and abundant in the Sydney Region. In the lower Cooks River area, the species was abundant throughout the wetlands surrounding the western and north western margins of Botany Bay, and it was regularly detected in and around the market gardens at Rockdale along West Botany Road. The species was also known from the former Turrella wetlands of Wolli Creek in the Canterbury LGA and from similar flood plain features that once existed in the near vicinity of Cooks River at Marrickville. It was also found along parts of what was Shea's Creek (now Alexandra Channel), Eastlakes and Rosebery.

The Greenacre Key Population is one of only eight remaining Key Populations in the Sydney Region, all of which are more or less isolated from each other by the major developments that have occurred within the greater area of Sydney. These Key Populations are at:

- Homebush Bay;
- Kurnell;
- Greenacre (the focus of this plan);
- Clyde/Rosehill;
- Merrylands;
- Arncliffe (in the lower Cooks River catchment);
- St Marys/Mt Druitt/Riverstone; and
- Hammondville

Declines of the GGBF had gone largely unnoticed or documented between the late 1960s and 1980s. It wasn't until the first threatened species legislation was introduced in 1991 (*Endangered Fauna Interim Protection Act 1991*) that attention began to be focused on these declines.

Developments at the site of the current Toll Network (former Finemore) site on Roberts Road first triggered concerns about the GGBF in the local area. Soon after, the development of the then FreightCorp facilities again raised the GGBF into prominence, and at about the same time the species also triggered concerns at Rosebery in the lower Cooks River catchment where a Meriton Apartments development was being proposed. Most attention, however, was paid to the GGBF when Sydney was awarded the 2000 Olympics and the species was detected in the Homebush Bay precinct in the Parramatta River catchment (now Sydney Olympic Park). Here, a major conservation effort was implemented to actively manage the species at that site.

During the various re-developments in the Greenacre area during the early to mid 1990s the GGBF was variously detected on the Juno Parade brick pit site (*Punchbowl Brickpit*), the Cox's Creek Reserve and former Bankstown STP site, the Enfield Marshalling Yards, the Finemore's Trucking

Facility (now Toll Networks), the Chullora Railway site and in various residential properties. A monitoring program was commenced in 2000 as a requirement of the brick pit re-development and continues to this day. This monitoring program has incidentally also made observations that have continued to detect GGBFs at some of the above sites and also along Cosgrove Road and other areas in the vicinity and towards the Cooks River.

Significant numbers of the GGBF were historically recorded from the old brick pit lake before infilling took place in 2001. Since that development, two habitat ponds have been created and have been colonised by the species. Breeding events have occurred in at least the first two seasons following the habitat creation and tadpoles have been found in one of the two ponds during 2003/04 and 2005/06. The sustainable functionality of this habitat via contribution to recruitment, subsequent breeding and long term viability still requires demonstration.

Monitoring work by Arthur White in 2006 has produced mark and re-capture results that have enabled estimates of the Juno Parade brick pit population to be made. This research showed that the population is currently comprised of about 58 adult frogs. Additional individuals have also been found at the former 'FreightCorp' pond. Arthur White maintains that the Juno Parade former brick pit site supports a population element that is fundamental to the long term survival of the whole Greenacre key population of the species.

The sub-population at Cox's Creek Reserve was estimated at about 8 adult frogs in 1995. However, since that time, no formal and systematic census has been undertaken to determine the current status of GGBFs there. Anecdotal evidence from bush regenerators, council staff and nearby residents in the early 2000s indicates the frog was still present occasionally. Strathfield Council has developed a Plan of Management (PoM) for Cox's Creek Reserve dealing with the management of both the Endangered Ecological Community vegetation of the site as well as the GGBF population element. To date, some of the GGBF related PoM actions have been implemented, though with apparent marginal success. However, the site needs to be sampled more frequently, to compare the results with the more frequently surveyed Juno Parade brick pit site and adjacent former FreightCorp site. Future Cox's Creek Reserve PoM revision needs to give consideration to this plan.

Various local residents in the area between the former brick pit site and Cox's Creek Reserve provide "frog friendly" gardens and periodically have the species occupying their premises. These properties possibly provide an important reservoir of specimens and a vital habitat component often in short supply elsewhere in this highly urbanised environment. This management plan also focuses on including private landholders in future management actions.

Little is known about the present status of GGBF recordings and sightings in the upper Cooks River, Rookwood Cemetery, and in the former Chullora Railway and wetland sites. It is known that the species did inhabit this area historically albeit much industrial development has proceeded in the area since, particularly in the industrial area south of Rookwood cemetery (in part owned by Pacific National/Toll).

Conclusions that can be drawn from the studies in the area to date are that the Greenacre population is critically endangered. Also, that the Juno Parade brickpit site is vital to the ongoing survival of the species at Greenacre, and that urgent and coordinated actions are required to maintain all the existing sites at the same time as promoting the establishment of additional habitat components and enhancement of existing habitat areas. Linkages between the various sites containing elements of the population must also be established and, where they exist already, maintained and strengthened.



## THREAT ASSESSMENT

The major factors that potentially threaten the Greenacre GGBF Key Population are loss of habitat, habitat degradation, predation by introduced pests, and disease.

The identified threats to the Greenacre Key Populations of the Green and Golden Bell Frog that are known to be operating include:

1. Loss of habitat. The GGBFs occupy and utilise a wide variety of habitats across varying land tenures at Greenacre. Currently, there are several developments at various stages of the approval process that could affect this Key Population. These include the proposed industrial subdivision of the Hannas Juno Parade former brick pit site and a major "intermodal logistics centre" (ILC) proposed by the Sydney Ports Corporation for parts of the former Enfield Marshalling Yard area. Given the precarious status of the Greenacre GGBF Key Population it would be prudent for proposals like these to be required to provide adequate and proven offsetting/compensation for the GGBF in the local area.
2. Introduced predators that include:
  - Plague Minnow – *Gambusia holbrooki* (Listed as a Key Threatening Process) present in Cox's Creek and in many other water bodies and stream systems in the Upper Cooks River catchment.
  - The Red Fox *Vulpes vulpes* (listed as a Key Threatening Process for a number of threatened species) is known to inhabit Pacific National lands.
  - Feral and Domestic Cats - *Felis catus*
3. Disease. Frog Chytrid is listed as a Key Threatening Process at state and national levels. This disease is rapidly emerging as possibly the single biggest threat to the species (as well as to many other species of frogs). Frog Chytrid fungus has been found to be widespread.
4. Habitat degradation. Vegetation overgrowth in various artificial habitat ponds particularly from Cumbungi (*T. orientalis*) in the 'Frog Habitat Area' can reduce the habitat value of the ponds by reducing open water areas. The artificial nature of the 'Frog Habitat Area' at Juno Parade allows drainage of the ponds to simulate ephemeral conditions (and eliminate *G. holbrooki*); currently this is not possible with water restrictions but could be augmented with tanks for rainwater collection;
5. Water quality. Stormwater quality, refuelling leakages, and spillages may pollute GGBF habitat such as wetlands and other drainage areas. Studies have indicated Cox's Creek has high levels of oils, grease, heavy metals and pesticides and is subject to reduced levels of dissolved oxygen in places.
6. Small population size. The current small population size leaves it vulnerable to stochastic and catastrophic events that might otherwise, with more robust population size, be overcome. The fragmented nature and tenuous interconnection of population elements is another contributing factor in the precarious status of the Greenacre GGBF population. Opportunities to create, maintain and enhance interconnection should be fully explored and are a priority.
7. Anthropogenic climate change (Listed as a Key Threatening Process). May result in changes to rainfall patterns that would most likely influence the GGBFs ability to utilise certain sites for breeding. For example drought may prevent the species breeding in ephemeral waterbodies and permanent waterbodies may be unavailable due to other KTPs. Long term reduction of rainfall may therefore reduce recruitment and lead to population decline or collapse at some sites. This may be especially the case where populations are represented only by mature adults due to previous repeated breeding failures and lack of recruitment. Resultant senescent populations may then be unable to recover even when/if conditions do become suitable.

## THE PLANNING PROCESS

### Strategic considerations

The Greenacre GGBF population seems to be currently isolated from all other known Key Populations in the Sydney Region. The closest population geographically is that at Homebush Bay where the intervening land exhibits minimal possible movement corridors with the Greenacre population and lies outside the same natural drainage catchment. Historically, the Greenacre population was most likely connected to the population in the lower Cooks River at Arncliffe and to the north and east of Arncliffe at Rosebury and East Lakes. A long term vision should include strategies to create and enhance habitat features along the length of the Cooks River, with the view to reconnecting upper and lower Cooks River populations. Small remnant population size in association with its isolation makes the Greenacre population highly vulnerable to stochastic or catastrophic events. This makes insurance strategy considerations a high priority, including possible reintroduction and supplementation initiatives at a number of created and/or existing sites in the area, e.g. Chullora Wetlands, Cox's Creek Reserve and Rookwood Cemetery.

At present, little secure interconnecting movement habitat exists between the critically important habitats at the Juno Parade former brick pit site, the former FreightCorp pond area, Cox's Creek Reserve, as well as previous and currently proposed habitat creation sites. GGBF have been observed to move between some of these habitats and most likely also move between others, but facilitating interconnectivity would be highly beneficial. Intervening land between the Juno Parade former brickpit site and the former FreightCorp site is owned by the NSW State Rail Authority and/or RailCorp. The former FreightCorp site (currently operated by National Pacific) is understood to be soon handed back to the NSW government (RailCorp). These intervening linear lands adjacent to existing railway corridor present an ideal opportunity for improvement in movement habitat between these lands. They were the subject of previous habitat creation offsetting proposals that did not proceed (Hannas Development).

Interconnections between Cox's creek Reserve and the Juno Parade site are more problematic. Vacant land adjoining the Juno Parade site, on the Wentworth Street side of the property, would strategically link with Cox's Creek Reserve via Drone Street. Drone Street is a narrow low traffic road bordering the northern section of the intervening residential properties. This road has been the subject of previous suggestions for closure as a vehicular road and conversion to a passive 'greenspace' and landscaped walkway that would also be more conducive to frog movements between these two important GGBF habitat nodes.

The ILC development proposal for part of the former Enfield Marshalling Yards (understood to be with the Minister for Planning for consideration of approval) proposes setting aside eight hectares of the southern portion of that land ('Ecological Community' land) ostensibly as GGBF habitat. Properly designed, constructed, managed, and proved functional, this amount of habitat could provide the additional area needed to boost and secure longer term the conservation of the Greenacre Key Population. Linkages outlined above between the Juno Parade site and the former FreightCorp site would also strategically link with the ILC site and benefit the GGBF habitat compensation component of this initiative, development approval pending. This proposed compensatory habitat should also be further strategically linked to potential and possibly future created habitat along the Cooks River in Strathfield South and Belfield and coordinated with other 'Green Web' and Cooks River Foreshore initiatives.

Large areas of former or potential habitat exist in the upper Cooks River, at Rookwood Cemetery and at the former Chullora Railways site. A systematic survey for GGBFs in these areas will determine both the GGBF status in the area and the habitat potential. Systematic surveying of these areas could prove fruitful for resolving actual population status and also to possibly identify certain areas as opportunities for reintroduction.

The existence of suitable or previous GGBF habitat (notably former Chullora Railways site, Rookwood Cemetery and the upper Cooks River) scattered across the Bankstown and Strathfield LGAs suggests that an improvement in habitat connectivity could be beneficial. The creation of a habitat 'mosaic' between such areas to facilitate migration between sub-populations, and assisting expansion of the species into currently unoccupied areas, should be considered.

Monitoring and micro chipping of the GGBF in Greenacre over the last 10 years or so by Arthur White has revealed mature adult frogs irregularly appearing during the tagging process that are not micro chipped. This suggests there is perhaps a second pool of GGBF occupying different site(s) and that are occasionally dispersing to the existing monitoring site. Some efforts should be concentrated on locating and protecting this vital 'missing link' as part of the aforementioned systematic survey.

The occasional presence of GGBFs in the residential sector between Cox's Creek Reserve and the Juno Parade brick pit site suggests this area may be utilised as foraging, shelter and possible over-wintering habitat. There is thus a good opportunity to raise awareness of the frogs in these and possibly surrounding residential areas. The support of these residents should be enlisted and the residents should be provided with information and incentives to facilitate the creation of 'frog-friendly' gardens and elevate community awareness about GGBF issues.

The absence of GGBFs from former habitat at Cox's Creek Reserve for several years could be of some concern. Although it is likely the population is fluctuating spatially and temporally, and dispersing amongst other available habitat, a more regular monitoring program at past and present habitats could prove fruitful in accurately validating the population's status. This should be coupled with some further habitat creation and enhancement initiatives within the reserve and also within the adjoining properties, where possible.

A major portion of the Greenacre GGBF Key Population is, at present, on land owned by numerous companies or organisations and has little conservation security. The formation of a group of interested parties could be beneficial in attracting the required funding for undertaking the necessary initiatives and for coordinating management actions.

### **Previous Actions**

This plan builds upon a range of past and current actions to manage the GGBF populations and habitat. The *Cox's Creek Environmental Management Area Plan of Management* was prepared for Strathfield Council and details local GGBF issues and recommends management strategies for the GGBF in the reserve. The GGBF has also been a consideration involved in a number of developments in the area over the past 15 years. Some of these developments were required to undertake measures to ensure that the species survived in the area. These actions along with other measures undertaken by local government include:

- The former NSW 'FreightCorp', (commercial freight section of the former NSW Railways - later privatised and taken over by National Rail now - Pacific National/Toll), constructed some of the earliest artificial frog ponds as an offset against potential impacts from development on the GGBF when they developed the office facilities off Wentworth Street Greenacre. These ponds were designed to function as stormwater detention in addition to providing breeding and other habitat functions for the GGBF. Available evidence suggests that the ponds functioned as breeding habitat for a couple of seasons before ceasing to provide this habitat component. These ponds are still transiently occupied by the GGBF and the ponds and surrounds are most likely to function as foraging and shelter/over-wintering habitat. Additional upslope detention swale areas were originally intended as components of this development but were never implemented. These would, if constructed as intended, provide additional ephemeral habitat.
- Strathfield Council has been active in undertaking a number of initiatives that either directly or indirectly benefits the GGBF. Council has issued consent with conditions for GGBG for the initial Hannas brick pit infilling re-development. They have also developed a Cox's Creek Reserve Plan of Management (PoM), funded and gained external funding to undertake some habitat creation and enhancement initiatives on the reserve, funded occasional survey/monitoring of frogs within the reserve, and continue to undertake/support revegetation initiatives along the Cooks River and its tributaries. Council continues to be supportive of initiatives for the endangered GGBF in the LGA.
- Hannas Civil Engineering was required to construct GGBF breeding habitat during its infill re-development of the former Sydney Water Juno Parade brick pit at Greenacre. The "Frog Habitat Area" was created as an offset to the loss of the brick pit margins that were being



utilised by the frog, and these ponds were also required to demonstrate functionality for at least two breeding events. Monitoring is being undertaken to this day. Hannas also agreed to provide offsite habitat initiatives in the form of interconnecting habitat between their site and the old FreightCorp ponds. These initiatives were unable to be coordinated through the then disparate rail entities controlling the lands in question and lapsed, but could still be undertaken with benefit to the GGBF.

- Hannas Civil Engineering, as a requirement of its development consent, has funded a “Bell Frog Monitoring” program that reports annually on the status of GGBF populations at the former brick pit, the adjacent former FreightCorp pond, and Cox’s Creek Reserve.

### **Stakeholder Workshop**

A stakeholder workshop was facilitated by consultants Molino Stewart Pty Ltd to identify these and other possible management initiatives as a basis for preparing this plan as an action arising out of the draft GGBF Recovery Plan. The workshop was held on 23 February 2007 with representation from:

- RailCorp
- Sydney Ports Corporation (SPC)
- Gladstone Properties
- DECC
- Bankstown City and Strathfield Municipal Councils
- Cooks River Foreshores Working Group
- Biosphere Environmental Consultants

This plan was then distributed in draft form for comment to these and other stakeholders including Toll Networks Group, Sadleir’s Transport Group, Macquarie Goodman, Sam the Paving Man and Rookwood Anglican and General Cemetery.

Further comments by any interested parties are encouraged as the plan is implemented. These comments should be sent to DECC (see details in Contacts).

## THE GREENACRE MANAGEMENT PLAN

### Objectives

The three objectives of the Greenacre GGBF Management Plan are as follows:

1. To maintain the three existing GGBF sub-populations;
2. Where possible enhance existing GGBF habitat and thus measures of population viability over time; and
3. To increase connectivity between sub-populations.

### Strategies

The following six strategies will be used to achieve these objectives:

1. Further development of GGBF breeding and other habitat components on public and private lands;
2. Improvement of habitat within the GGBF key populations;
3. Education and communications to build awareness of the GGBFs and encourage further on-ground actions;
4. Reduction of external threats to GGBFs;
5. Monitoring and research to better understand the extent and dynamics of the Greenacre GGBF population; and
6. Coordination and communication between the various stakeholders, land managers and the community.

### Duration

The duration of this plan will be three years, starting mid-2007 and ending mid-2010.

### Implementation plan

The following implementation plan provides a framework for management actions related to the above strategies and the draft GGBF Recovery Plan. It describes the actions for each strategy, links it to the draft Recovery Plan, identifies responsibilities for the management actions, provides a cost estimate for the actions, and possible sources for funding. A time frame for undertaking the various tasks is also provided. This plan should be read and actioned with appropriate reference to the draft GGBF Recovery Plan.

It should be noted that some management actions are relevant to more than one strategy in the plan.

## IMPLEMENTATION PLAN

### Strategy 1: Further development of GGBF breeding and other habitat components on public and private lands

ACTION	RECOVERY PLAN LINKS	RESPONSIBILITY	COST*	FUNDING SOURCES	TIMEFRAME
1.1 Active maintenance and management of former brick pit constructed habitat ponds and old FreightCorp ponds (link with Action 5.1), e.g. extent of vegetation and water level control etc and linkage points to other offsite habitat.	Action 11.3.3	RailCorp and Hannas Group	\$5,000	Recurrent	2007-2008
1.2 Subject to pending Intermodal DA, creation of GGBF habitat including breeding habitat, trenches/swales and interconnecting habitat in the offset area proposed on SPC land as outlined in SPC proposal (link with Action 2.3).	Actions 10.3.1, 11.3.3	Sydney Port Corporation (SPC)	undetermined	Project offsetting	Mid 2007 - 2009
1.3 Creation of GGBF habitat on Bankstown Council land (old STP site remnant) bounded by Drew and Sylvanus Streets, Greenacre. Subject to investigation of drainage patterns and land suitability in consultation with DECC (link with Action 5.6).	Action 11.3.3	Bankstown City Council, DECC	\$5,000	Works program	2007-2008
1.4 Investigate possibility of sourcing water to supply former brick pit site GGBF habitat ponds and surrounding conservation area in times of drought, e.g. installation of water tanks (link with Action 1.1).	Action 10.3.1	Hannas Group, Strathfield Council	\$10,000	Project costs	2007-2009
1.5 DECC to liaise with council (or those responsible for surveys and audits of habitat) on where to create habitat (link with Actions 5.2, 5.3).	Actions 10.3.1, 11.3.3	Bankstown City and Strathfield Councils, consultants	No cost	In-kind	2007
1.6 Creation of over-wintering habitat via placement of sandstone boulders and logs in the vicinity of existing or created breeding habitat (link with Action 3.4).	Actions 10.3.1, 11.3.3	RailCorp, Strathfield Council, Bankstown Council, SPC, Hannas Group, Pacific National	undetermined	unsourced	2007-2009

**\*Note: Costs are indicative only and subject to available funding**



**IMPLEMENTATION PLAN (continued)****Strategy 2: Improvement of habitat within and between the GGBF sub-populations**

<b>ACTION</b>	<b>RECOVERY PLAN LINKS</b>	<b>RESPONSIBILITY</b>	<b>COST*</b>	<b>FUNDING SOURCES</b>	<b>TIMEFRAME</b>
2.1 Creation of movement and shelter habitat between former brick pit site and old FreightCorp pond. Landscaping along sound wall embankment, additional habitat area 'triangle' east of old FreightCorp pond and swales up slope of 'old FreightCorp' ponds and linkages to proposed Community Ecology area. (link with Action 2.3).	Actions 10.3.1, 11.3.3	Hannas Group, RailCorp, SPC, Strathfield Council	\$10,000	Recurrent or project funds	2007-2008
2.2 Subject to pending Intermodal DA approval, creation of habitat mosaic at the southern end of the SPC site (Community Ecological Area). Also providing linkages to former brick pit site and to the north (Cox's Creek/Cooks River linkage).	Actions 10.3.1, 11.3.3	SPC	Undetermined but approx. \$60,000	Project funds	2008
2.3 With instruction/advice from the DECC and with reference to Recovery Plan, RailCorp will alter the maintenance practices on their lands at Greenacre to improve movement habitat between the former brick pit and old FreightCorp pond and also landscape the 'to be installed' ephemeral swales upslope of the former FreightCorp Pond. RailCorp will also facilitate others assisting with such work where appropriate via access permission and safety matters.	Actions 10.3.1, 11.3.3	RailCorp, DECC	Minimal cost	Recurrent	2007-2008
2.4 Where possible, re-establish existing culverts (particularly those entering Cox's Creek) as functional vegetated creek lines to facilitate GGBF movement and improve biodiversity values.	Actions 10.3.1, 11.3.3	Strathfield and Bankstown Councils and SMCMA	Undetermined	Recurrent funds and Environmental Trusts	2008-2009
2.5 DECC will meet with Strathfield Council, Hannas and SPC to discuss the possibility of closing Drone St as a vehicular thoroughfare and converting to a passive 'greenspace' corridor between Cox's Creek Reserve and the former brick pit site.	Actions 10.3.1, 11.3.3	Strathfield Council, DECC, SPC, Hannas Group	Undetermined	Council works funds, SPC offsetting costs, Hannas In-Kind, Env. Trust	2007-2009

**\*Note: Costs are indicative only and subject to available funding**

**IMPLEMENTATION PLAN (continued)****Strategy 3: Education and communications to build awareness of the GGBFs and encourage further on-ground actions lands**

<b>ACTION</b>	<b>RECOVERY PLAN LINKS</b>	<b>RESPONSIBILITY</b>	<b>COST*</b>	<b>FUNDING SOURCES</b>	<b>TIMEFRAME</b>
3.1 Prepare and distribute a community-wide survey that focuses on locating and formalising GGBF sightings, and seeking community support in GGBF conservation initiatives. This should include all neighbouring industrial and special use property owners/occupiers and employees. (link with Action 3.2). This could also be linked to existing Council Environmental Education Programs.	Actions 12.3.1, 14.3.2	DECC, Strathfield Council, consultants, residents, community groups, and neighbouring property owners/occupiers	\$8,000	Environmental Trust	2007-2008
3.2 Establish a GGBF website that details how to identify GGBF, who to contact, a protocol for making a sighting official, and guidelines for potential developers etc.	Action 14.3.1	Strathfield Council, CMA, DECC	Minimal	In-Kind	2007-2009
3.3 Community education via website or survey to dispel potential GGBF myths particularly regarding development of land that supports GGBF (link with Actions 3.1, 3.2)	Action 14.3.1	DECC, Strathfield and Bankstown Councils	Minimal	In-Kind	2007-2008
3.4 Develop guide for developing 'frog friendly gardens' with particular focus on delivering to residences between Cox's Creek Reserve and the former brick pit site (link with Action 3.1).	Actions 11.3.3, 14.3.1	DECC, Frog and Tadpole Study Group (FATS), Strathfield Council, consultants	\$5,000	Env Trust, CMA	2007-2008
3.5 Promote development of news items and reports of progress etc regarding the local GGBF population for local media and local business/industry/council newsletters.	Actions 14.3.1 and 14.3.2,	DECC, Community Groups, Councils, Local Industry, Local Media	Minimal	Mostly In-kind	2007-2009

**\*Note: Costs are indicative only and subject to available funding**

**IMPLEMENTATION PLAN (continued)****Strategy 4: Reduction of external threats to GGBFs**

<b>ACTION</b>	<b>RECOVERY PLAN LINKS</b>	<b>RESPONSIBILITY</b>	<b>COST*</b>	<b>FUNDING SOURCES</b>	<b>TIMEFRAME</b>
4.1 Implementation of the NPWS Frog Hygiene Protocol during any interaction with GGBF or its habitat to prevent the spread of chytrid fungus.	Action 11.3.5	All	Nil	In-Kind	2007-2009
4.2 Survey of what GGBF habitat <i>Gambusia holbrooki</i> occupies and, with reference to the <i>Gambusia</i> Threat Abatement Plan, prevent further spread to unoccupied GGBF habitat.	Action 11.3.2	DECC, Strathfield and Bankstown Councils	\$5,000	DECC, NHT, CMA	2007-2008
4.3 Control of feral predators (e.g. trapping, fox baiting) in the SPC/RailCorp site and on public and industrial lands to be coordinated with any other active baiting programs.	Actions 10.3.1, 11.3.2	SPC, RailCorp, Councils, DECC, industries	\$10,000	NHT, Env Trusts, sponsors	2008
4.4 Limit use of herbicides (particularly glyphosate products) in known frog habitat, via signage and briefings of responsible land managers, and monitor quality of water that enters GGBF habitat, especially Cox's Creek.	Actions 11.3.1, 12.3.2	SPC, RailCorp, Councils, DECC, Community Groups	undetermined	recurrent	2007-2009
4.5 Promote responsible cat ownership in relation to GGBFs through education (link with Action 3.2 and 3.4).	Actions 11.3.2, 14.3.2	Minimal	Covered in previous delivering action	Covered by previous action	2007-2008

**\*Note: Costs are indicative only and subject to available funding**



**IMPLEMENTATION PLAN (continued)****Strategy 5: Monitoring and research to better understand the extent and dynamics of the Greenacre GGBF population**

<b>ACTION</b>	<b>RECOVERY PLAN LINKS</b>	<b>RESPONSIBILITY</b>	<b>COST*</b>	<b>FUNDING SOURCES</b>	<b>TIMEFRAME</b>
5.1 Continued monitoring of critical population at former brick pit site and occasional population at old FreightCorp Pond (link with Action 1.1).	Action 12.3.1	Hannas Group, Strathfield Council	Undetermined	Project Cost	2007-2009
5.2 Identify and audit lands surrounding Greenacre Key Population so as to identify/map potential and known habitat and pinpoint potential unknown GGBF population elements (link with Action 3.1).	Action 12.3.1	Councils, Consultants, DECC	\$5,000	Councils	2007-2008
5.3 Conduct a systematic survey of the upper Cooks River, former Chullora Railways/wetlands sites, and Rookwood Cemetery for GGBFs and potential GGBF habitat (link with Action 5.2).	Actions 12.3.1, 14.3.2	Councils, Consultants, DECC	\$10,000	NHT, CMA	2007-2009
5.4 Conduct research into determining viable population size and the area of habitat necessary to support this population.	Action 12.3.2	DECC, Consultants, Researchers	10,000	NHT, ARC Research Grant	2008-2009
5.5 Investigate reasons behind the current absence of GGBF at Cox's Creek Reserve and link to any revision of the Reserve PoM.	Action 12.3.2	DECC, Council, Consultant	<\$5,000	CMA, DECC, Env Trust	2007
5.6 Investigate drainage patterns for the purpose of determining possible further habitat creation initiatives in Strathfield and Bankstown LGAs (link with Action 1.3).	Action 12.3.2	Councils	Nil	In-Kind	2007
5.7 Collect GGBF tadpoles for captive breeding for an eventual reintroduction trial and to supplement existing population. Under supervision of DECC.	Action 13.3.1	DECC, Taronga Zoo, Australian Reptile Park (ARP)	\$20,000	Project Sponsors, NHT, Env. Trust	2008

\*Note: Costs are indicative only and subject to available funding

**IMPLEMENTATION PLAN (continued)****Strategy 6: Coordination and communication between the various stakeholders, land managers and the community**

<b>ACTION</b>	<b>RECOVERY PLAN LINKS</b>	<b>RESPONSIBILITY</b>	<b>COST*</b>	<b>FUNDING SOURCES</b>	<b>TIMEFRAME</b>
6.1 DECC to initiate formalisation of the parties concerned into a 'GGBF interested parties group'. Composed of those parties that attended the GGBF stakeholder workshop and important others.	Action 10.3.1	DECC	Minimal	In-Kind	≤ 6 months
6.2 Formalised group to collectively pursue funding opportunities for actions arising, or otherwise, out of this plan (link with Action 6.1).	Action 10.3.1	Group Members	Nil	In-Kind	2007
6.3 Creation of a fund 'pool' that would allow landholders to financially offset GGBF conservation initiatives that are most beneficial, but that could also be on lands other than their own. Offsets to be guided by DECC/Council (link with Action 6.1).	Action 10.3.1?	Group Members	Nil	In-Kind	2007
6.4 Formulate a formalised financial structure for group, so as to define responsibilities and funding.	Action 10.3.1?	Group Members	Nil	In-Kind	2007
6.5 Formalised group to liaise with Cooks River Foreshores Working Group and others to discuss opportunities and initiatives for linking Greenacre GGBF Key Population habitat areas to habitat along Cooks River.	Action 10.3.1	GGBF Group Members, Cooks River Foreshores Working Group, Strathfield Council, Greenweb/SROC, SMCMA	Nil	In-Kind	2007

**\*Note: Costs are indicative only and subject to available funding**

## REVIEW

A meeting of stakeholders will be organised to occur following the activity period each season where results and trends will be discussed and recommendations for adding to and modifying management actions in the plan made.

A review of the plan is required after 2.5 years as a basis for its next iteration after three years.

Informal review of the plan is also encouraged both within organisations and through networks and partnerships. All recommendations to improve the plan should be directed to the DECC contact below.

## THE FROG HYGIENE PROTOCOL

Individuals studying or surveying frogs often travel and collect samples of frogs from multiple sites. Green and Golden Bell Frogs can be particularly sensitive to the introduction of infectious pathogens, such as the frog chytrid fungus. Therefore, it is important that frog workers recognise the boundaries between sites and undertake measures which reduce the likelihood of spreading infection. The detailed procedures and measures are provided in the "Hygiene protocol for the control of disease in frogs", which can be obtained from the Department of Environment and Climate Change, or downloaded from:

<http://www.nationalparks.nsw.gov.au/pdfs/hyprfrog.pdf>

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*Garry Blaschke Botany Bay and Catchment Alliance*

*Lesleigh White Toll Networks Group Site Manager Roberts Road site*

*Pierre Jean Lauwers Toll Group Environment and Energy Manager*

*Ross Wellington; Neil Dufty and Mark Hamilton Molino Stewart*



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Appendix 1. Photos of some of the locations referred to in this Management Plan

	<p>Cox's Creek, Cox's Creek Reserve, Greenacre 1995 (photo A. White)</p>
	<p>Juno Parade brick pit prior to infilling and proposed subdivision (photo A. White)</p>



Strathfield Council constructed 'Deep Pond' GGBF habitat at Cox's Creek Reserve, showing appropriate vegetation and spars (photo Strathfield Council)

More expansive view of the Strathfield Council constructed 'Deep Pond' GGBF habitat at Cox's Creek Reserve, showing appropriate vegetation rock piles (photo Strathfield Council)





	<p>View looking east showing both GGBF ponds on the Hannas former brick pit site (photo R. Wellington)</p>
	<p>Hannas site looking north over the constructed GGBF ponds with rock piles adjacent (photo R. Wellington)</p>
	<p>Frog exclusion fencing bordering the Hannas constructed GGBF ponds (photo R. Wellington)</p>





GGBF pond on Pacific National (formerly FreightCorp) land, Greenacre (photo R. Wellington)



Sound barrier separating the Pacific National ponds and Hannas GGBF ponds (R. Wellington)



GGBF habitat on Sydney Ports Corporation land adjacent to Cosgrove Road, Strathfield (R. Wellington)