

APPENDIX G

Flora and Fauna Studies

PREFACE

The technical working papers for the proposed ILC at Enfield were prepared during the first half of 2005. These were prepared in response to the requirements for the preparation of an Environmental Impact Statement (EIS) under Part 4 of the Environmental Planning & Assessment Act, 1979 (EP&A Act). Specific requirements for the EIS were issued on 1 March 2005 by the (then) Director- General of Infrastructure, Planning and Natural Resources.

The EP& A Act was amended on 1 August 2005 by the creation of Part 3A of the Act, and the Department of Infrastructure, Planning and Natural Resources was dissolved on 26 August 2005 and replaced by the Department of Planning and the Department of Natural Resources.

The proposed ILC at Enfield has since been declared a major project, pursuant to SEPP (Major Projects) 2005 and Sydney Ports has subsequently lodged an application under Part 3A of the Act.

Editorial changes to the technical working papers to reflect the changes in legislation or changes in Government departments have not been made.

The following should be considered when reading the technical papers:

- The Director-General's requirements issued under Part 4 are now deemed to have been issued under Part 3A, and any reference to the Director-General's requirements should be read as a reference to Director-General's requirements issued under Part 3A;
- Any reference to an EIS under Part 4 of the Act should be read as a reference to an Environmental Assessment under Part 3A of the Act;
- Any reference to the Department of Infrastructure, Planning and Natural Resources should be read as a reference to either the Department of Planning or the Department of Natural Resources, as appropriate.

Intermodal Logistics Centre at Enfield Environmental Impact Statement

Flora and Fauna Studies

Biosphere Environmental Consultants

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Executive Summary

The Intermodal Logistics Centre (ILC) site at Enfield occupies an area of approximately 60 ha. Parts of the site are in use as either engine maintenance areas, truck haulage or equipment storage compounds. The majority of the site is no longer in use and contains a number of derelict buildings, disused rail lines, paved areas and roads. As so much of the site has not been used for several years, many weeds and exotic plants have become established across the site. Sydney Ports Corporation is proposing to re-develop the ILC Site so that it can be used as an Intermodal Logistics Centre for the transfer of shipping containers from rail onto road transport vehicles. The re-development would entail a substantial change to the nature of the site with new buildings, roadways, container storage areas, warehousing and associated infrastructure constructed across most of the site. An ecological area is also proposed for the southern end of the site, covering an area (south of Coxs Creek) of approximately 4.8ha.

As part of the planning for the development of the site, a review of previous studies was undertaken and a comprehensive flora and fauna assessment of the site was carried out in early 2005. The survey targeted potential threatened or endangered species that have the potential to occur on the site. The flora survey recorded a large variety of plant types but no threatened or endangered plant species were found. One noxious species and many weed species were present across the site. Cooks River/Castlereagh Ironbark Forest that has historically occurred on the site is no longer present. A very small area of native heath still persists in the northern part of the site.

The fauna survey found that few native animals still occur on the site. Native birds comprise the majority of native species found while a few lizards and frogs were also located. No threatened or endangered animal species, or endangered ecological communities were found during the survey. The endangered Green and Golden Bell Frog had been recorded in the ILC Site (in 1995) but the surveys undertaken since failed to locate this species. The survey undertaken for this study noted that a limited area of potential habitat for Green and Golden Bell Frog is present on the site and that it is possible that frogs from neighbouring sites could cross onto the ILC Site during favourable weather conditions.

The development of the ILC Site will not place the local Enfield Green and Golden Bell Frog population at risk of extinction. Indeed, the proposed development of the ILC site provides an opportunity to create a dedicated Green and Golden Bell Frog habitat area to assist with the conservation of the species in the local area. The development of habitat in the Community and Ecological area and the linking of habitat areas to other Green and Golden Bell Frog sites nearby is consistent with the aims of the Green and Golden Bell Frog Draft Recovery Plan (DEC 2005).

An Eight Part test (Section 5A of the *Environmental Planning and Assessment Act, 1979*) was carried out to assess the potential impact of the development on the Green and Golden Bell Frog. It was found that the amelioration measures proposed more than compensated for any potential adverse impact and that the overall proposal could create an area of secure habitat where Green and Golden Bell Frogs could persist.

Landscaping measures proposed in the Landscape and Urban Design study (Appendix I of the EIS) for the site include native species that would help to restore some of the endemic vegetation in the southern part of the site.

1.0. Introduction

Sydney Ports Corporation (SPC) has purchased land known as the former Enfield Marshalling Yards at Enfield as a potential site for redevelopment as an Intermodal Logistics Centre (ILC). As part of the planning for the re-development of the site, flora and fauna assessments were required to be carried out.

In January 2005, Biosphere Environmental Consultants Pty Ltd was commissioned to undertake a comprehensive flora and fauna assessment of the Sydney Ports Site. The aims of the assessment were:

- to document the diversity of plants and animals on the site;
- identify any threatened or endangered species, populations and communities that may occur on the site, and if present, recommend measures for conservation;
- identify any habitat for threatened or endangered species, populations and communities;
- advise on habitat requirements and design considerations for habitat for the Green and Golden Bell Frog to meet the objectives of the Green and Golden Bell Frog Draft Recovery Plan (DEC, 2005);
- to address the Director-General's requirements regarding flora and fauna assessment and habitat creation and enhancement.

The following report describes the results of these assessments and makes recommendations for the conservation of significant species and plant communities on the site.

2.0 Description of the Proposal

Sydney Ports proposes to construct an Intermodal Logistics Centre (ILC) at the former Enfield Marshalling Yards. The ILC would be used for the transfer and storage of container freight to and from Port Botany, packing and unpacking of containers within the proposed warehouses at the site and storage of empty containers for later re-use or for return to the Port.

The site covers an area of about 60 hectares. It extends from the intersection of the Hume Highway and Roberts Road in the north, through to the intersection of Punchbowl Road and Cosgrove Road in the south. It is just over 2 km in length and 0.5 km wide.

The primary objectives of the ILC are to:

- contribute to the NSW Government's strategy of achieving 40 per cent rail mode share for container transport, through the delivery of additional intermodal capacity within close proximity to a significant freight catchment area within the Sydney Metropolitan area;
- create an integrated Logistics Centre that will accommodate related freight operations that complement each other; and
- contribute to an existing and future intermodal network that maximises the movement of freight by rail in an efficient and reliable manner.

The ILC is designed to handle 300,000 TEU/annum. It is anticipated that the site would have a first year throughput of 100,000 TEU and that it would reach its capacity within 10 years of operation, with a throughput of 150,000 TEU inbound from the Port and 150,000 TEUs outbound to the Port. The proposed ILC at Enfield would comprise the following:

- Intermodal Terminal for the loading and unloading of containers between road and rail and short term storage of containers;
- Warehousing for the packing and unpacking of containers and short-term storage of cargo;
- Empty Container Storage Facilities for the storage of empty containers for later packing or transfer by rail;
- Light Industrial / Commercial Area for light industrial / commercial use, preferably complementary to operations at the Intermodal Logistics Centre. The area would also act as an interface to adjacent uses along Cosgrove Road;
- Community and Ecological Area would provide the opportunity to incorporate ecological enhancement and community opportunities. The area would also serve as a buffer between operations on the site and residences to the south of the site; and
- Off site works including construction of a road bridge over the existing New Enfield Marshalling Yards and dedicated freight rail line, for access to Roberts Road via Wentworth Street.

3.0 Description of the ILC Site

The proposed ILC site occupies about 60 hectares of land between Wentworth Avenue and Cosgrove Road at Enfield (Figure 1). The site is a long but narrow land unit with its longest axis running north-south. The site is bounded to the west by the New Enfield Marshalling Yards (active train goods marshalling area) and by Cosgrove Road to the east; the northern tip of the site is truncated by the Hume Highway while the Punchbowl Road overpass demarcates the southern end of the site.

A large proportion of the site is not currently used but there are some active areas within the ILC site. Toll Australia has a working freight depot and compound in the centre of the site and nearby is a compound for ATF Pty Ltd. The DELEC locomotive maintenance facility and wheel lathe area occupies the north eastern portion of the site while Pacific National uses a rail line along Cosgrove Road (Figure 1). The site is mostly level but contains several large mounds of stockpiled soil and crushed cement and concrete. Disused railway lines cross the site and a number rail support buildings are still present across the area.

The site had been extensively cleared of original vegetation but is now covered by invasive plants that have colonised the areas of bare soil and fill. Weeds, such as Castor Oil, Pampas Grass, Crofton Weed, Lantana, Fennel, Fleabane and Cobblers Pegs are scattered across the whole site. The only native trees that are present are wattles (*Acacia*) and She-oaks (*Casuarina*) that have self-seeded.

There are no permanent ponds on site but there are several areas where rainwater accumulates to form ephemeral wetlands. The largest wetland area occurs in the north-eastern part of the site, next to Cosgrove Road. There are no watercourses except for Coxs Creek which passes from west to east under the site through buried culverts after entering the New Enfield Marshalling Yard area as an open water channel. Coxs Creek later emerges in an open concrete stormwater channel on the eastern side of the site before re-entering a culvert and passing beneath Cosgrove Road. Two other stormwater channels depart the site on the eastern side. These channels are in buried pipes under the site and only emerge just prior to crossing Cosgrove Road.

The site is accessed from Cosgrove Road and a series of unpaved tracks and roads cross the site.



4.0. Methods

4.1 Threatened and Endangered Species, Populations and Communities

A review of threatened and endangered species, populations and communities on the ILC site was carried out. This review noted the threatened plant and animal species and endangered ecological communities that had been recorded on or near the ILC Site. The review examined both the New South Wales *Threatened Species Conservation Act 1995* and the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999*. The search was extended to include a 5 kilometre radius around the SPC Site. The NSW National Parks and Wildlife Atlas and the Commonwealth Department of Environment and Heritage's data bases were searched for records of these animals or plants within this radius.

In addition, reports of previous studies undertaken during 2001 (as part of the previous EIS for the site development) and in 2004 (by Biosphere) were reviewed. Contact was made with Dr Allan Greer of the Australian Museum who had undertaken a frog survey of the site (comprising the land acquired by SPC) in 1995.

4.2. Sub-division of the Study Site

The study site extends across a number of land units. To accommodate the differences in the vegetation, access and topography the study site was divided into ten smaller flora and fauna survey areas (Figure 2). Each area was treated as an independent area and the flora and fauna of each area were recorded separately. The ten areas were (from south to north):

- Area 1: Flat area at extreme southern end of site
- Area 2: High mound area at southern end of site
- Area 3: Southern Zone between railway line and Cosgrove Road on eastern side of site.
- Area 4: Mound and flat area in south-eastern part of site.
- Area 5: Large flat area including the administration building and rail lines.
- Area 6: Central Flat Mound Area
- Area 7: Area between Flat Mound and the new Marshalling yards
- Area 8: Northern Zone between railway line and Cosgrove Road
- Area 9: Northern Working Zone including TFC Compound, Toll Transport Facility and locomotive workshop and tracks
- Area 10: North-western Zone



4.3. Flora Survey

Vegetation surveys were carried out from the 8th to the 16th of February 2005. The flora survey was undertaken in two phases: an initial general survey of each area was made to determine the dominant species and to determine the range of habitats present. Once the general nature of the vegetation had been ascertained, intensive ground surveys commenced. Each area was transected by foot along grid lines spaced 20 metres apart. This was possible for most sites, as many had been artificially levelled. In sites where a grid could not be employed, the site was traversed along high points and incursions into more difficult areas were made whenever the area could not be adequately observed from a viewing point. All plant species present were recorded. Plants that could not be immediately identified in the field were sampled and the samples were later compared with reference material in a herbarium. In general, plant identifications were based on Robinson (1991) and Harden (1990-2002). If threatened plants were suspected to be present, only minor samples were taken of the plant so that it was not damaged or unlikely to continue to survive; the collection of sample material conformed to the draft guidelines issued by the Department of the Environment and Conservation.

Particular attention was given to areas of remnant native vegetation and to threatened or rare species that have been recorded for the local area. This included the dawny Wattle (*Acacia pubescens*) which was referenced in the Director-General's requirements. Areas of remnant vegetation were surveyed to the level of individual plants, and all plants were identified.

In general, the vegetation surveys commenced at the southern end of the corridor and worked northwards (i.e. starting in Area 1 and finishing at Area 10). Each area was divided into manageable sub-units (quadrats) approximately 20 metres by 20 metres in area. Two survey staff members traversed each quadrat twice (once longitudinally and once laterally); in this manner each unit was intensively searched and the plant species found in each was recorded on field data sheets. Samples of plants that could not be immediately identified were placed in labeled bags for later identification.

4.4. Fauna Survey

The fauna survey commenced on the night of 5th of February and was completed by the 16th of February 2005. It consisted of two elements: a general fauna assessment and targeted searches for recorded threatened or endangered species known to occur in the general vicinity of the ILC Site. Only three threatened or endangered animal species are believed to potentially occur in the area; namely the Green and Golden Bell *Litoria aurea*, the Grey-headed Flying Fox *Pteropus poliocephalus* and the Common Bentwing Bat *Miniopterus schreibersei*. Intensive and targeted searches were carried out for these three species.

The general fauna survey methods comprised:

Terrestrial Mammals: Sixty baited hair tubes were set out across the site (refer to Figure 3 for the location of tubes) on the 7^{th} of February 2005; the tubes remained in place until the 15^{th} of February when they were collected and sample papers sent away for identification.

A search for evidence of terrestrial mammals was also carried out in each sub-area of the site. Each area was traversed on foot on two separate occasions. Samples of fur, animals' diggings or scratchings, burrows, trackways or droppings were searched for and recorded. Fur, bones and scats were collected for later analysis.

Nocturnal Mammals: Nocturnal mammals were looked for during the nights of the 7th, 9th and 11th of February 2005. Each area was surveyed twice (on different evenings). Each area was traversed on foot and bushes and trees were scanned with a 50-watt hand-held spotlight. Animals located in the spotlight were identified through the use of field binoculars.

Bats: Flying foxes were searched for at night using the spotlight. Bats flying overhead were held in the spotlight until they could be identified. Insectivorous bats were surveyed using an ultrasonic detector (ANABAT). The detector was carried during the transect for the first three hours after dark. Recordings of the calls of the bats were later analysed using ANABAT 5.0 software.

Birds: Birds were recorded during two early morning observation periods on the 8th and 9th of February 2005. Using field binoculars, birds were sighted and recorded during the first two hours after dawn. Some birds were identified by call, but where possible the identity of the bird was again confirmed through visual sighting.

Play-back recordings of the calls of Barn Owls, Southern Boobook Owls, Masked Owls and Powerful Owls were broadcast in the evening of the 8th, 10th and 11th of February 2005. The calls were broadcast from a portable amplifier and were directed away from residences. A two minute bracket of calls was broadcasted, then there followed a listening period of five minutes, before another two minute bracket of calls was played. This was followed by another 5 minutes listening period. A series of calls was broadcast from within each of the sub-areas on the site.

<u>Reptiles</u>: A hand search for reptiles was carried out in each area on sunny mornings on the 8th and 9th of February 2005. Rocks and other items of ground cover were up-ended and sheltering reptiles caught, identified, and released. Some reptiles were not caught but identified using field binoculars.

Frogs: Frogs were searched for during the evenings of the 5th of February 2005. These evenings were chosen as rain had fallen during the day. All calling frogs were initially identified. Following this a search using headlamps was carried out around the edges of the ponds and into the thick vegetation nearby. Frogs were only caught if they could not be readily identified visually. Captured frogs were transferred to a moistened plastic bag, identified, and released. All frog handling procedures follow the guidelines issued by the DEC (formerly National Parks and Wildlife Service) (NPWS 2000).



The mating call of the Green and Golden Bell frogs was played at each "wet" area identified in Section 5.0 using a small, hand-held amplifier. A two minute section of tape was played and then a five minute listening period followed, The tape was replayed twice more in this manner during the evening.

A tadpole survey was also carried out at each site. A small hand net was used to sweep the water and tadpoles were transferred to a plastic bag for identification. Once identified the tadpoles were returned to the water.

5.0. Results

5.1. Threatened or Endangered Species, Populations and Communities

Searches of the Commonwealth's Department of Environment and Heritage and the NSW's Department of Conservation and Environment (DEC) data bases found the following species that had been recorded within a 5 kilometre radius of the ILC Site:

Plants:	Wilsonia backhousei	TSC Act	
	Epacris pupurascens var purpurascens	TSC Act	
	Acacia bynoeana	TSC Act	EPBC Act
	Acacia pubescens	TSC Act	EPBC Act
	Melaleuca deani	TSC Act	EPBC Act
	Syzygium paniculatum	TSC Act	EPBC Act
	Bothrichloa biloba		EPBC Act
	Tetratheca juncea	TSC Act	EPBC Act
Endangered Ec	cological Communities:		
	Cooks River/ Castlereagh Ironbark Forest	TSC Act	
Animals:	Green and Golden Bell Frog	TSC Act	EPBC Act
	Bush Stone-curlew	TSC Act	
	Grass owl	TSC Act	
	Greater Sand Plover	TSC Act	
	Little Tern	TSC Act	
	Masked owl	TSC Act	
	Regent Honeyeater	TSC Act	EPBC Act
	Superb Fruit Dove	TSC Act	
	Common Bent-wing Bat	TSC Act	
	Grey-headed Flying Fox	TSC Act	EPBC Act

The only endangered species, population or community that has been recorded on the ILC Site is the Green and Golden Bell Frog *Litoria aurea*. The species was recorded by Greer (pers. comm) in 1995. Frog surveys conducted on the ILC Site in 2001 and 2004 identified habitat areas for Green and Golden Bell frogs but failed to locate Green and Golden Bell Frogs on the site (Biosphere 2004).

Green and Golden Bell Frogs are an endangered species and are listed on both the New South Wales *Threatened Species Conservation Act 1995* (TSC Act) and the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Green and Golden Bell Frogs were a widespread and commonly seen species around Sydney prior to the 1970s and so were well known to many residents before undergoing massive population declines between 1968 and 1990 (White and Pyke 1996). Green and Golden Bell Frogs are known from the Enfield area. Extant populations are known from the Juno Parade brickpit site, the New Enfield Marshalling Yards and Coxs Creek Reserve at Greenacre.

5.2 Flora and Fauna Results

5.2.1 Area 1: Flat Area at southern end of site.

Area 1 is a triangular area of land that has been filled and levelled and is now overgrown with invasive weeds and grasses. Scattered amongst the tall weeds are old rusting pieces of ironwork, corrugated iron, bricks and metal. There is an open drain parallel with the vehicle access track and this leads into an underground culvert. This was the only area that contained open water during the survey.

5.2.1.1 Fauna of Area 1

Terrestrial Mammals	*House Mouse *Brown Hare	Mus musculus Lepus capensis
Bats	Grey-headed Flying Fox	Pteropus poliocephalus
Birds	Masked Lapwing Magpie-lark Noisy Miner Australian Raven Australian Magpie Pied Currawong Welcome Swallow *Red-whiskered Bulbul *Starling *Feral Pigeon *Peaceful Dove White Ibis *Common Myna	Vanellus miles Grallina cyanoleuca Manorina melanocephala Corvus coronoides Gymnorhina tibicen Strepera graculina Hirundo neoxema Pyconotus jocosus Sturnus vulgaris Columba livia Geopelia placida Threskiornis alba Acridotheres tristis
Reptiles	Grass Skink Delicate Skink Eastern Water Skink	Lampropholis guichenoti Lampropholis delicata Eulamprus quoyii
Frogs	None	
* introduced species		

5.2.1.2 Flora of Area 1

Area 1 is a fairly flat area that is dominated by exotic grasses and introduced weeds. There are few native species in the area, most of the native ground cover plants occur in an open drain that runs parallel with the central access road. There are no noxious plants or significant plants species in Area 1. Appendix A (A1) contains the full plant species list for the area.

5.2.2 Area 2: Southern High Mound Area

Area 2 is dominated by a large stockpiled mound of soil and construction rubble that has become overgrown by invasive weeds. The mound is 12 metres high and 80 metres long. There is an informal track that circuits the base of the mound. Area 2 is bounded to the east by the railway track. There is a small sedge wetland area in the north-western corner of Area 2, near the junction of the central track and the circuit track. A second sedge area also exists on the eastern side of the site. Access to the top of the mound is best achieved by an overgrown track on the eastern side of the mound.

5.2.2.1 Fauna of Area 2

The results of the fauna study are listed on the following page.

Terrestrial Mammals	Brush-tail Possum	Trichosurus vulpecula
	*Black Rat	Rattus rattus
	*House Mouse	Mus musculus
	*Fox	Vulpes vulpes
	*Cat	Felis cattus
Bats	Grey-headed Flying Fox	Pteropus poliocephalus
Birds	Pacific Black Duck	Anas superciliosa
	White-faced heron	Ardea novaehollandiae
	Little Black Cormorant	Phalacocorax sulcirostris
	Black-faced Cuckoo Shrike	Coracina novaehollandia
	Masked Lapwing	Vanellus miles
	Magpie-lark	Grallina cyanoleuca
	Noisy Miner	Manorina melanocephala
	Australian Raven	Corvus coronoides
	Australian Magpie	Gymnorhina tibicen
	Pied Currawong	Strepera graculina
	Crested Pigeon	Geophaps lophotes
	Willie Wagtail	Rhipidura leucophrys
	Silver Gull	Larus novaehollandiae
	Red Wattlebird	Anthrochaera carunculata
	Superb Blue Wren	Malurus superba
	Welcome Swallow	Hirundo neoxema
	*Red-whiskered Bulbul	Pvconotus iocosus
	*Starling	Sturnus vulgaris
	*Feral Pigeon	Columba livia
	*Peaceful Dove	Geopelia placida
	White Ibis	Threskiornis alba
	*Common Myna	Acridotheres tristis
	Golden-headed Cisticola	Cisticola exilis
	Clamorous Reed Warbler	Acrocenhalus stentoreus
	Black-shouldered Kite	Flanus notatus
	Black-shouldered Kite	Lianus notatus
Reptiles	Grass Skink	Lampropholis guichenoti
	Delicate Skink	Lampropholis delicata
	Weasel Skink	Saproscincus mustelina
	Eastern Water Skink	Eulamprus quoyii
Frogs	Striped Marsh Frog	Limnodynastes peronii
-	Common Eastern froglet	Crinia signifera
* introduced species		

5.2.2.2 Flora of Area 2.

The vegetation of Area 2 comprise low ground cover plants that occur on the flat areas, and vigorous weedy shrubs, vines and herbs that have colonized the large mound. Wattles have become established around the lower parts of the mound but these have to compete with invasive vines and tall weeds that threatened to overgrow them.

A small area of native sedges occurs immediately north of the mound. There are no noxious plants or significant plants species in Area 1. Appendix A (A2) contains the full plant species list for the area.

5.2.3. Area 3: Southern Zone between Old Railway Line and Cosgrove Road

Area 3 is a long, thin strip of land that lies between the eastern boundary fence and the old, disused railway line. This area is at street level and lies below the level of the railway embankment for most of the area. Two large abandoned railway buildings stand in the southern end of the zone, along with several smaller outbuildings.

This area is quite different to the rest of the ILC Site in that there has been deliberate planting of ornamental and landscaping trees and shrubs to create a partial barrier between the industrial site and Cosgrove Road.

There are two wet areas in this zone; the first is on the southern side of the large disused railway buildings, the second is a large area of bulrushes and sedge that extends from the railway embankment through to the boundary fence with Cosgrove Road. A concrete stormwater channel also passes across this zone, collecting water from Coxs Creek at Greenacre as well as stormwater from the ILC Site.

5.2.3.1 Fauna of Area 3

The results of the fauna study are listed on the following page.

Terrestrial Mammals	*Black Rat *House Mouse	Rattus rattus Mus musculus
Bats	Grey-headed Flying Fox	Pteropus poliocephalus
Birds	Magpie-lark Noisy Miner Australian Raven Australian Magpie Welcome Swallow *Red-whiskered Bulbul *Starling *Feral Pigeon *Spotted Turtledove *Common Myna Superb Blue Wren	Grallina cyanoleuca Manorina melanocephala Corvus coronoides Gymnorhina tibicen Hirundo neoxema Pyconotus jocosus Sturnus vulgaris Columba livia Streptopelia chinensis Acridotheres tristis Malurus superba
Reptiles	Grass Skink Delicate Skink Eastern Water Skink	Lampropholis guichenoti Lampropholis delicata Eulamprus quoyii
Frogs * introduced species	Striped Marsh Frog Common Eastern Froglet	Limnodynastes peronii Crinia signifera

5.2.3.2 Flora of Area 3.

Area 3 contains a mixture of weeds, planted ornamental species, garden escape plants and native species. Many of the garden and ornamental plants occur around the buildings or along Cosgrove Street. The native plants are generally small sedges and grasses that are limited to wet areas associated with the railway embankments.

There are no noxious plants or significant plants species in Area 3. Appendix A (A3) contains the full plant species list for the area.

5.2.4. Area 4: South-eastern Mound Area

Area 4 is dominated by a 3 metre-high, vegetated mound of soil and rubble. The southern part of the site contains a high-pressure gas pipeline valve service compound. Two underground culverts converge in the southern part of the area and form as open concrete-lined stormwater drains.

Water in these drains is passed eastwards, beneath the old railway track and into culverts under Cosgrove Road.

The only wet areas in this zone are alongside the vehicular track at the southern end of the area. The area immediately south of the mound is heavily overgrown with weeds and can only be entered with difficulty.

5.2.4.1 Fauna of Area 4

The results of the fauna study are listed below.

Terrestrial Mammals	*House Mouse	Mus musculus
Birds	Brown Quail	Coturnix australis
	Australian Raven	Corvus coronoides
	Australian Magpie	Gymnorhina tibicen
	Willie Wagtail	Rhipidura leucophrys
	Welcome Swallow	Hirundo neoxema
	*Starling	Sturnus vulgaris
	*Sparrow	Passer domesticus
	*Common Myna	Acridotheres tristis
	*Spotted Turtledove	Streptopelia chinensis
Reptiles	Grass Skink	Lampropholis guichenoti
•	Eastern Water Skink	Eulamprus quoyii
Frogs	Common Eastern Froglet	Crinia signifera
* introduced species		

5.2.4.2 Flora of Area 4

Area 4 has few native plants and is one of the most heavily weed-infested areas on the ILC Site. The mound is overgrown by invasive weedy shrubs and vines while the flat area to the south of the mound is choked with blackberry, lantana and other highly invasive weeds. A very small area of native grasses exists near the concrete culvert that emerges in Area 4.

There are no noxious plants or significant plants species in Area 4. Appendix A (A4) contains the full plant species list for the area.

5.2.5. Area 5: Central Flat Area (including Administration Building and rail lines)

Area 5 is a long, flat area that encompasses the Administration Building, overhead walkway and railway structures nearby. The majority of the site is lightly vegetated and only the railway mounds have dense vegetation on them.

5.2.5.1 Fauna of Area 5

*House Mouse *FoxMus musculus Vulpes vulpesBatsGrey-headed Flying FoxPteropus poliocephalusBirdsWhite Ibis Masked Lapwing Magpie-lark Noisy MinerThreskiornis alba Masked Lapwing Magpie-lark Australian Raven Australian Raven Corvus coronoides Australian Magpie Gymnorhina tibicen Richards Pipit Kille Wagtail Silver Gull *Feral Pigeon *Coumon Myna *Columba livia *Feral Pigeon *Columba livia *Peaceful Dove Geopelia placida *Common Myna Red-browed Firetail Finch Neochima temporalis *Sparrow *Startling Golden-headed Cisticola Black-shouldered Kite Nankeen KestrelLampropholis guichenoti Lampropholis delicata Eulampropholis delicata* introduced species* None	Terrestrial Mammals	*Black Rat	Rattus rattus
*FoxVulpes vulpesBatsGrey-headed Flying FoxPteropus poliocephalusBirdsWhite Ibis Masked Lapwing Magpie-lark Noisy MinerThreskiornis alba Manorina melanocephala Australian Raven Richards Pipit Crested PigeonGrallina cyanoleuca Geophaps lophotes Willie Wagtail *Feral Pigeon *Feral Pigeon *Common Myna *Feral Pigeon *Sparrow *Sparrow *Sparrow *Sparrow *Starling Golden-headed Cisticola Black-shouldered Kite Nankeen KestrelAustralian Finch Rel-brived Cisticola Black-shouldered Kite Nankeen KestrelReptilesGrass Skink Delicate Skink Eastern Water SkinkLampropholis guichenoti Lampropholis delicata Eulampropholis delicata Eulampropholis delicata* frogsNone		*House Mouse	Mus musculus
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ReptilesGrass Skink Delicate Skink Eastern Water SkinkLampropholis guichenoti Lampropholis delicata Eulamprus quoyiiFrogsNone* introduced species		Nankeen Kestrel	Falco cenchroides
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Eastern Water Skink Eulamprus quoyii Frogs None * introduced species	•	Delicate Skink	Lampropholis delicata
Frogs None * introduced species *		Eastern Water Skink	Eulamprus quoyii
* introduced species	Frogs	None	
	* introduced species		

5.2.5.2. Flora of Area 5

Area 5 consists of a large flat area that is sparingly vegetated by native and exotic ground cover plants. The railway embankments have taller shrubs and weeds on them.

There are no noxious plants or significant plants species in Area 5. Appendix A (A5) contains the full plant species list for the area.

5.2.6. Area 6: Central Flat Mound Area

Area 6 is based around a large, flattened mound of crushed construction materials. The mound is between 2 to 3 metres above the general level of the land and is relatively barren on the top. The batters, however, are thickly vegetated with shrubs and weeds. This area extends to the east to include the surrounds of the Toll facility. There is a disused rail line in this area but it is hard to see as it is heavily overgrown by vegetation. Some sections along this rail line are quite boggy underfoot and are the only wet areas in the zone.

5.2.6.1 Fauna of Area 6

Terrestrial Mammals	*House Mouse	Mus musculus
	*European Fox	Vulpes vulpes
	*Brown hare	Lepus capensis
Bats	Grey-headed Flying Fox	Pteropus poliocephalus
Birds	*Sparrow	Passer domesticus
	Magpie-lark	Grallina cyanoleuca
	Superb Blue Fairy-wren	Malurus cyaneus
	Australian Raven	Corvus coronoides
	Australian Magpie	Gymnorhina tibicen
	Willie Wagtail	Rhipidura leucophrys
	Welcome Swallow	Hirundo neoxema
	*Red-whiskered Bulbul	Pyconotus jocosus
	*Starling	Sturnus vulgaris
	*Feral Pigeon	Columba livia
	Golden-headed Cisticola	Cisticola exilis
	*Spotted Turtledove	Streptopelia chinensis
	*Common Myna	Acridotheres tristis
Reptiles	Grass Skink	Lampropholis guichenoti
Frogs	Common Eastern Froglet	Crinia signifera
* introduced species		

5.2.6.2 Flora of Area 6

The flattened mound is poorly vegetated and contains a variety of exotic grasses and ground cover plants. The slopes of the mound contain taller shrubs, including some native shrubs. The western base of the mound has wet areas where native sedges occur.

There are no noxious plants or significant plants species in Area 6. Appendix A (A6) contains the full plant species list for the area.

5.2.7. Area 7: Central Zone between Flat Mound and New Marshalling Yards

Area 7 lies to the west of centre of the SPC Site; it is bounded on the east by a levelled mound of crushed construction materials and to the west by the New Marshalling Yards. The area is overgrown by a mixture of tall grasses and shrubs. A disused railway line passes through the centre of this area. A small area of sedges exists at the base of the central area but no open water exists in this area.

5.2.7.1 Fauna of Area 7

Terrestrial Mammals	*Brown Hare	Lepus capensis
Bats	None	
Birds	Magpie-lark Noisy Miner Australian Raven Australian Magpie Crested Pigeon Willie Wagtail Silver Gull *Starling *Feral Pigeon *Peaceful Dove White Ibis *Common Myna	Grallina cyanoleuca Manorina melanocephala Corvus coronoides Gymnorhina tibicen Geophaps lophotes Rhipidura leucophrys Larus novaehollandiae Sturnus vulgaris Columba livia Geopelia placida Threskiornis alba Acridotheres tristis
Reptiles	Grass Skink Delicate Skink	Lampropholis guichenoti Lampropholis delicata
Frogs * introduced species	None	

5.2.7.2 Flora of Area 7

Area 7 is dominated by exotic grasses and tall weeds. Some native sedges occur in wet areas along the base of the mound.

There are no noxious plants or significant plants species in Area 7. Appendix A (A7) contains the full plant species list for the area.

5.2.8. Area 8: Northern Zone between Old Railway Line and Cosgrove Road

This is a long, narrow strip of land that is an extension of Area 3. It occupies that space between the old railway track and the boundary fence at Cosgrove Road. It lies below the railway track and has been planted with ornamental and garden trees and shrubs.

The area is impinged by a suite of industrial units (81-89 Cosgrove Road) and by the entrance to the DELEC facility.

There is a large wet area opposite the entrance to Cleveland Street where a stormwater culvert emerges from beneath the old railway tracks. The stormwater canal is blocked by vegetation in places and water has overflowed onto the surrounding flat land creating and ephemeral wet area.

5.2.8.1. Fauna of Area 8

The results of the fauna study are listed on the following page.

Terrestrial Mammals	*House Mouse	Mus musculus
Bats	None	
Birds	*Sparrow Magpie-lark Australian Raven Australian Magpie *Red-whiskered Bulbul	Passer domesticus Grallina cyanoleuca Corvus coronoides Gymnorhina tibicen Pyconotus jocosus
	*Starling *Spotted Turtledove *Feral Pigeon *Common Myna	Sturnus vulgaris Streptopelia chinensis Columba livia Acridotheres tristis
Reptiles	Grass Skink Delicate Skink Eastern Water Skink	Lampropholis guichenoti Lampropholis delicata Eulamprus quoyii
Frogs * introduced species	Striped Marsh Frog Common Eastern froglet	Limnodynastes peronii Crinia signifera

5.2.8.2. Flora of Area 8

Area 8 is dominate by ornamental trees and shrubs that have been planted along Cosgrove Road. The land behind these plantings is generally dominated by a mixture of native and exotic grasses and weeds.

There are no noxious plants or significant plants species in Area 8. Appendix A (A8) contains the full plant species list for the area.

5.2.9. Area 9: North-eastern Area

The north-eastern area is an area that contains ongoing activities including railway locomotive maintenance, a truck haulage centre (Toll) and a fence construction company (ATF) storage compound and office. A large proportion of the area is under paved surfaces and includes sealed roadways and ballasted railways tracks.

The western boundary of the site is demarcated by an internal vehicular track that terminates in the extreme northern tip of the ILC Site. The western part of Area 9 is elevated and has been filled and levelled; there is a steep embankment leading down to the locomotive yards and railway area. The eastern boundary of this area is demarcated by the disused perimeter railway track. There is a small area of remnant Cooks River/Castlereagh Ironbark Forest on the eastern

side of the locomotive tracks (not on the ILC Site), and a very small area of native heath of the western side of the locomotive tracks.

The only wet area in this part of the site is a temporary drain and catchment area at the southwestern end of the Toll facility.

5.2.9.1. Fauna of Area 9

The results of the fauna study are listed below.

Terrestrial Mammals	*House Mouse	Mus musculus
Bats	None	
Birds	Peregrine Falcon Richards Pipit Red-browed Firetail Finch Double-bar Finch Magpie-lark Australian Raven Australian Magpie Grey Butcherbird New Holland Honeyeater Silver Gull Welcome Swallow *Red-whiskered Bulbul *Spotted Turtle Dove *Starling *Feral Pigeon *Common Myna	Falco peregrinus Acanthus novaeseelandiae Emblema temporalis Taeniopygia bichenovii Grallina cyanoleuca Corvus coronoides Gymnorhina tibicen Cracticus torquatus Phylidomyris novaehollandiae Larus novaehollandiae Hirundo neoxema Pyconotus jocosus Streptopelia chinesis Sturnus vulgaris Columba livia Acridotheres tristis
Reptiles	Grass Skink Delicate Skink	Lampropholis guichenoti Lampropholis delicata
Frogs * introduced species	None	1 1

5.2.9.2. Flora of Area 9

Area 9 contains the most diverse vegetation on the whole SPC Site. Unfortunately, exotic weeds dominate most of the land area but in areas where Ashfield Shale outcrops, such as on railway cuttings and embankments, native vegetation occurs. Of particular note, is a small area of native heath that exists above a railway cutting.

There are no significant plant species in Area 9 but one noxious species (Pellitory) occurs on the site. Appendix A (A9) contains the full plant species list for the area.

5.2.10. Area 10: North-western Flat

This site includes all of the north-western portion of the site. It commences at its southern end at the embankment leading up to Area 6 and continues north until it tapers to the very end of the site. The site has been completely levelled and is underlain by blue metal and aggregate fill across the whole site. The area is bounded by an ill-formed vehicular track on the western side and by a well-formed vehicular track on the eastern side.

There are a few disused buildings at the southern end of the area; these include a long locomotive shed and support buildings, a water tower and smaller out buildings. There is a rail line crossing the site but this is very overgrown and not readily visible. At various places in Area 10 there are mounds of construction rubble, bricks or timber.

The area is mostly covered by tall grasses and fennel. There are a few trees along the western boundary and around the locomotive sheds.

There is only one wet area and this is an ephemeral shallow site near the DELEC facility. It location is apparent from the various sedges in this area.

5.2.10.1 Fauna Of Area 10

The results of the fauna study are listed on the following page.

Terrestrial Mammals	*House Mouse	Mus musculus
Bats	Grey-headed Flying Fox	A Pteropus poliocephalus
Birds	Golden-headed Cisticola	a Cisticola exilis
	Magpie-lark	Grallina cyanoleuca
	Australian Raven	Corvus coronoides
	Australian Magpie	Gymnorhina tibicen
	Welcome Swallow	Hirundo neoxema
	Superb Blue Fairy-wren	Malurus superba
	Red-whiskered Bulbul	Pyconotus jocosus
	*Starling	Sturnus vulgaris
	*Feral Pigeon	Columba livia
	*Peaceful Dove	Geopelia placida
	*Common Myna	Acridotheres tristis
	Black-shouldered Kite	Elanus notatus
	Silvereye	Zosterops lateralis
	Richards Pipit	Anthus novaeseelandiae
Reptiles	Grass Skink	Lampropholis guichenoti
	Delicate Skink	Lampropholis delicata
	Eastern Water Skink	Eulamprus quoyii
Frogs * introduced species	Common Eastern Frogle	et Crinia signifera

5.2.10.2 Flora of Area 10

Area 10 is a large land area but does not contain a high variety of plant species. Exotic grasses and ground cover plants dominate the entire area.

There are no significant plant species in Area 10 but one noxious species (Pellitory) occurs on the site. Appendix A (A10) contains the full plant species list for the area.

6.0. Discussion

6.1. Effect of Disturbance History on the Native Biota

The proposed ILC site is a highly disturbed area. Very little original topography or ground cover remains. Land contours have been greatly altered through land reclamation or through stockpiling of soil and building rubble. The levelling of the site and the development of the rail infrastructure has further limited the scope for remnant flora and fauna to re-establish. In addition, many parts of the site are covered by roadways, paved surfaces, storage bays or rail lines.

The high level of site disturbance and the past site usage has not only greatly reduced the native biota but has facilitated the establishment of a wide variety of exotic plants and animals. Exotic plants and animals dominate the site; many of these plants and animals are regarded as local or regional pests. The presence of these exotic species further decreases the survival prospects of native species.

6.2. Flora and Fauna Biodiversity

One of the consequences of the changes in land use of the study site has been to produce major changes in the types of animals and plants that can exist on the modified land surfaces. Both the native animal and plant biodiversity has greatly decreased as a result of the land use history, but some groups have fared worse than others. Amongst the plants, species that do not tolerate root or soil disturbance have completely disappeared from the site. For this reason many of the original plants that previously occurred on the Cooks River Flood Plain are now absent from the site. One small area of Cooks River/Castlereagh Ironbark Forest occurs offsite to the east of Area 9 while a small area of native heath still survives in Area 9 at the northern end of the site. Plants, such as *Banksia*, that typically only grow in low-nutrient soils have also perished. However, species that prefer open, unshaded, well-drained soils, have been able to expand their range across the site. This includes a number of species of grass and small herbs. The site is devoid of original trees because of their physical removal during previous site occupation.

The previous levelling of the site and the installation of a series of internal drains and channels means that rainwater has little opportunity to collect on the site. Wetland areas are generally very small, often confined to a strip beside an earthen mound or near a stormwater channel. The largest wetland area occurs in Area 8 and is an overflow area associated with an emerging stormwater drain. The overflow area is dominated by bull rushes and sedges but open water is generally absent from the site.

The ILC Site is also missing significant components of the original fauna, in particular, the native ground-dwelling mammals are completely absent. The only native mammals that still occur on the study site are flying foxes, and these animals do not roost here. No other bats were detected

and this probably reflects the scarcity of flowering trees on the site and the general lack of open water areas. Amongst the birds, most ground-dwelling species have disappeared (the exception being Brown Quail) and most tree-nesting species have gone. In general, it is only the medium-sized, territorial predators or scavengers (such as ravens, magpies, currawongs, ibis and butcherbirds) that have thrived as a result of the changes in land use. Some of the smaller raptors (such as the Black-shouldered Kite and Nankeen Kestrel) are able to exploit the large cleared spaces in search of exotic rodents as prey. A Peregrine Falcon was observed hunting Feral Pigeons in Area 9.

All large and medium sized reptiles have been eliminated from the study site while most frog species have also been displaced. Small, ant-eating lizards have survived in the unused parts of the site while frogs are virtually confined to small wet areas associated with drains or along the edges of railway batters.

6.3. Threatened and Endangered Species

Despite targeted searches, no threatened plants or animals were found in the study site. The vegetation surveys failed to locate any endangered ecological communities. Habitat for threatened animal species is either totally absent from the site or is present in a degraded form.

Grey-headed Flying Foxes were observed flying over various areas within the site but did not roost or feed within the site, due to their food trees no longer occurring within the boundaries of the site. Despite its being recorded flying over the site, the complete absent of any habitat on the ILC for this species indicated no 8 part test of significance (Section 5A of the EP&A Act) was required.

Green and Golden Bell Frogs were recorded on the ILC Site in 1995 (Greer pers. comm.). In 1996, a Green and Golden Bell Frog pond was created in the New Enfield Marshalling Yards and frogs have been sighted at this pond. Green and Golden Bell Frogs are also present in the nearby Juno Parade brickpit site and a long-term management program is underway for the frogs on that site. Although the current surveys (2005) and previous surveys (2001, 2004) failed to locate Green and Golden Bell frogs on the ILC site, this does not mean that they do not utilise the site. Green and Golden Bell frogs are known to be a highly dispersive species and have the capacity to travel across the site under suitable weather conditions. Suitable habitat for foraging is located in Areas 1 and 3, and the loss of and prevention of access to these areas during construction and operation represents an impact on the species through a reduction in its potential foraging habitat.

This reduction in potential foraging habitat, the previous recording of the species in 1995 and the presence of the species in adjoining areas lead to the conclusion that an 8 part test of significance (Section 5A of the EP&A Act) should be carried out (Appendix B) to assess the potential impacts of the redevelopment of the site on Green and Golden Bell Frogs. The test included the proposed mitigation works (described in Section 6.5) and concluded that:

• The only potential adverse effect of the development is to prevent unlimited movement across the site during construction and operation. This is a short-duration impact during construction and will be more than offset during operation by the creation of habitat in the Frog Habitat Area. Ultimately, Green and Golden Bell Frogs will have secure long-term habitat on the ILC Site.

A Draft Recovery Plan for Green and Golden Bell Frogs is currently available (DEC 2005). This report identifies the Greenacre/Enfield population of Green and Golden Bell Frog as a key population. The proposed mitigation works (assessed in the 8 part test and described in Section 6.5) are consistent with the intentions of the Draft Recovery Plan.

6.4. Other Remnant Habitats

The extensive disturbance to the Sydney Ports Site has resulted in very little original habitat surviving. Only in Area 9 is there a small area of remnant heath, growing on a railway embankment near the DELEC facility. None of the heath plants is regarded as threatened or endangered but they are the only remainder of the original vegetation on the site. The heath area is close to the convergence point of railway tracks departing the ILC site and the New Enfield Marshalling Yards and is unlikely to be impacted upon by the construction and operation of the ILC.

It is possible, however, that the relocation of the existing access line to the DELEC area may affect the heath. This will only be known when detailed design is undertaken. If detailed design shows the area will need to be removed, species from that area should be incorporated into the landscaped areas of the site.

No riparian flora species were recorded along Coxs Creek, and no aquatic biota survey component was undertaken for the study. Although Coxs Creek is within the study area, it is a concrete-lined channel and does not represent any habitat for aquatic species.

6.5 Amelioration Measures for Threatened Species

Green and Golden Bell Frogs are the only threatened species that have the potential to be adversely affected by the development of the ILC site. Grey-headed Flying Foxes pass over the site but do not use it as habitat.

Green and Golden Bell Frogs do not appear to use the site for breeding but they may venture across the site on wet nights in search of food and prospective habitat areas. The construction of the ILC could result in injury or death to dispersing frogs and the empty container storage and rail structures could prevent dispersal across the site. In view of the potential for some adverse impact on Green and Golden Bell frog habitat area it is important that measures to ameliorate the impacts be developed.
Construction Management Measures

- During site works areas of potential frog habitat will be checked and any frogs found removed prior to works commencing;
- Frog exclusion fences will be provided in areas where frog activity is likely. These fences will be removed when works are completed.

Operational Management Measures

In the long term, it would be preferable if Green and Golden Bell Frogs were still able to frequent the ILC site, but under more secure conditions and in areas that are not heavily used by mobile equipment. Green and Golden Bell Frogs can be concentrated in particular parts of the site by the addition of a Green and Golden Bell Frog Habitat Area, comprising ponds and foraging areas. The frog ponds would be located in the Community and Ecological Area, away from the high activity areas of the site and would have a planted area around it that contains suitable foraging habitat (see Pyke and White 1996, 2000). The pond would be designed to promote its use by Green and Golden Bell frogs (Pyke and White 2000) and this may include features that make them less suitable for other frogs or aquatic organisms.

The frog ponds would be linked to off-site habitat areas by means of designated frog corridors. These are shown indicatively in Figure 4 and consist of planted and landscaped swales that allow frogs to travel safely to the frog pond area and away to other safe areas of the site.

Frog corridors have been constructed at several sites around New South Wales with some success (e.g Arncliffe, White 1998; Woonona, White 2003). The corridor (Figure 4) will allow Green and Golden Bell frogs to reach the western end of the ILC Site but the frogs will still need to cross rail lines in order to reach the frog habitat area on the New Enfield Marshalling yards or the Juno Parade Frog Habitat Area. This crossing is not perilous as most frog movements are at night when train movements are reduced. The frog corridors should be areas that are unlit or have reduced night lighting. In addition, areas of foraging and shelter habitat should be created near the frog ponds. A Management Plan for Green and Golden Bell Frogs will be prepared for the site that considers the needs for secure sites, foraging and shelter habitat area to ensure it retains its function.

As noted above, Appendix B contains an Eight Part test to assess the likely impact of the works if the amelioration measures are put in place.

6.6 Ecological Landscaping

As the different parts of the ILC Site are developed, opportunities are made available to restore other areas of the site for environmental purposes. As indicated in Section 6.5, an area at the southern end of the site will be dedicated to the creation of secure habitat for the Green and Golden Bell Frog.

The mound in the Community and Ecological area is to remain and it will need to be rehabilitated. The rehabilitation will require the removal of existing weeds, the suppression of weed regrowth and the establishment of native vegetation indicative of the original vegetation. This is discussed in detail in a separate Landscape and Urban Design Working paper (refer to Appendix I of the EIS).

The area north of the mound area (adjacent to Coxs Creek) will be developed as additional Green and Golden Bell frog foraging habitat and this habitat could grade into native woodland established on the slopes of the mound.



7.0 Conclusion

The ILC Site is a highly modified and disturbed area of land. Only one endangered species, the Green and Golden Bell Frog, has been recorded on the site, and the last record was in 1995 (Greer pers. comm.). Recent surveys failed to locate this species on the site but noted that limited habitat for the frog still occurs.

Other targetted species were assessed. The Dawny Wattle (*Acacia pubescens*) was not recorded on the site. The Grey-headed Flying Fox was recorded flying over the site, but no suitable habitat on the site was noted.

The development of the ILC site will result in the loss of a small area of potential foraging habitat (in Areas 1 and 3) for the Green and Golden Bell Frog.

Frog-exclusion fences will be erected to prevent Green and Golden Bell frogs from entering construction work areas. These fences would be used only in areas where frog movement is likely, and will be removed once construction works are complete.

A Frog Habitat Area containing ponds and foraging and shelter habitat will be created near Coxs Creek to contribute to the preservation of the species in the Enfield Greenacre area.

The only potential adverse effect of the development is to prevent unlimited movement across the site. This is a short-duration impact while construction is underway, and and will be more than offset by the subsequent creation of habitat in the FHA. Ultimately, Green and Golden Bell Frogs will have secure long-term habitat on the ILC site. Monitoring of the FHA will take place to ensure it is maintained as a site for the benefit of the frogs.

8.0 References

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Appendix A

Vegetation Species Lists

<u>A1. Area 1</u>

Local Native Plants

Family	Species	Common Name
Angiosperms		
Aizoaceae	Tetragonia tetragonoides	New Zealand Spinach
Casuarinaceae	Casuarina glauca	Swamp She-oak
Commelinaceae	Commelina cyanea	Scurvy Weed
Cyperaceae	Cyperus congesta Cyperus polystachyos	Sedge Sedge
Meliaceae	Melia azedarach	White Cedar
Myrtaceae	Eucalyptus saligna	Sydney Blue Gum
Poaceae	Cynodon dactylon	Couch Grass
Non-Local Native Species		

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None

Family	Species	Common Name
Angiosperms		
Apiaceae	Foeniculum vulare	Fennel
Asclepiadaceae	Araujia hortorum Ascleipias curassavica	Moth Vine Red-headed Cotton Bush
Asteraceae	Ageratina adenophora Bidens pilosa Calotis cuneifolia Chrysanthemoides monilifera Cirsium vulgare	Crofton Weed Cobblers Peg Bindi-eye/Purple Burr Boneseed Spear Thistle

Family	Species	Common Name
	Conyza floribunda Gnathophalium coarctatum Hypochaeris sp. Senecio madagascarensis Sonchus oleraceus Taraxacum officinale	Tall Fleabane Cudweed Cats ear Fire Weed Common Sowthistle Dandelion
Convolvulaceae	Convolvulus arvensis Ipomoea indica	Lesser Bindweed Purple Morning Glory
Cruciferaceae	Brassica tornefortia	Wild Turnip
Cyperaceae	Cyperus eragrostis	Umbrella Sedge
Euphorbiaceae	Gomphocarpus fruticosus Ricinus communis	Cotton Bush Caster Oil Plant
Faboideae	Genista monspessulana Trifolium repens	Mediterranean Broom White Clover
Fagaceae	Quercus robur	Pinafor Oak
Gentianaceae	Centaurium sp.	Common Century
Lauraceae	Cinnamonum camphorae	Camphor Laurel
Malvaceae	Modiola caroliniana Sida rhombifolia	Red-flower Mallow Paddys Lucerne
Oleaceae	Ligustrum lucidium Olea africana	Broad-leaved Privet African Olive
Onageraceae	Epilobium billardieriana	Willow herb
Portulaceae	Portulaca oleracea	Pigweed
Plantaginaceae	Plantago lanceolata	Plantain
Primulaceae	Anagallis arvensis	Pimpernel
Poaceae	Avena fatua Chloris virgata Eragrostis curvula Melinis repens Cortaderia selloana Digitaria sanguinalis Paspalum dilatatum Pennisetum clandestinium Setaria verticellaria	Wild Oat Rhodes Grass African Love Grass Red Natal Grass Pampas Grass Summer Grass Paspalum Kikuyu Grass Pigeon Grass

	Stenataphrum secundatum	Buffalo Grass
Polygonaceae	Rumex crispus Rumex (Acetosa) sagittata	Curled Dock Turkey Rhubarb
Rosaceae	Rubus fructicosus	Blackberry
Salicaceae	Salix nigra	Black Willow
Schrophulariceae	Verbascum virgatum	Twiggy Mullein
Solanaceae	Cestrum parqui Solanum nigrescens	Green Cestrum Black Nightshade
Verbenaceae	Lantana camara Verbena bonariensis	Lantana Purpletop

A2. Flora of Area 2

Local Native Plants

 Family	Species	Common Name
Casuarinaceae	Casuarina glauca	Swamp She-oak
Convolvulaceae	Convolvulus erubescens Calystegia marginata	Australian Bindweed Bindweed
Commelinaceae	Commelina cyanea	Scurvy Weed
Cyperaceae	Cyperus eragrostris	Dirty Dora
Euphorbiaceae	Omalanthus populifolius	Bleeding Heart
Junaceae	Juncus usitatus	Soft juncus
Meliaceae	Melia azedarach	White Cedar
Myrtaceae	Eucalyptus saligna Melaleuca armillarus Brace	Sydney Blue Gum et Honeymyrtle
Mimosaceae	Acacia longifolia longifolia Acacia decurrens Acacia saligna Acacia longifolia sopharae	Sydney GoldenWattle Sydney Green Wattle Wreath Wattle Broad-leaved Wattle
Onageraceae	Epilobium billiardieranum	Willow Herb
Pittosporaceae	Pittosporum undulatum	Sweet Pittosporum

	Poaceae	Agrostris avenacea Avena sterilis	Blown Grass Wild Oat
	Typhaceae	Typha orientalis	Bull-rush
Non-lo	ocal Native Plants		
	Mimosaceae	Acacia saligna	Wreath Wattle
Introd	luced Plants and Native	Weeds	
	Family	Species	Common Name
Angio	osperms		
	Alderaceae	Populus nigra	Lombardy Poplar
	Amygdalaceae	Prunus persica	Peach
	Apiaceae	Foeniculum vulgare	Fennel
	Apocynaceae	Nerium oleander	Oleander
	Asclepiadaceae	Araujia hortorum	Moth Vine
		Gomphocarpus fructicosus	Narrow-leaved Cotton Bush
	Family	Gomphocarpus fructicosus Species	Narrow-leaved Cotton Bush Common Name
	Family Asteraceae	Gomphocarpus fructicosus Species Ageratina adenophora Ambrosia artemisiifolia Aster sublatus Bidens pilosa Cichorium intybus Chrysanthemoides moniliferum Conyza floribunda Coreopsis lanceolata Hypochoeris radicata Senecio madagascarensis Sonchus oleraceus Tagates minuta Taraxacum officinale	Narrow-leaved Cotton Bush Common Name Crofton Weed Annual Ragwort Bushy Starwort Cobblers Peg Chicory Bitou Bush Tall Fleabane Coreopsis Cats ear Fire Weed Common Sowthistle Stinking Roger Dandelion
	Family Asteraceae Basellaceae	Gomphocarpus fructicosus Species Ageratina adenophora Ambrosia artemisiifolia Aster sublatus Bidens pilosa Cichorium intybus Chrysanthemoides moniliferum Conyza floribunda Coreopsis lanceolata Hypochoeris radicata Senecio madagascarensis Sonchus oleraceus Tagates minuta Taraxacum officinale Anredera cordifolia	Narrow-leaved Cotton Bush Common Name Crofton Weed Annual Ragwort Bushy Starwort Cobblers Peg Chicory Bitou Bush Tall Fleabane Coreopsis Cats ear Fire Weed Common Sowthistle Stinking Roger Dandelion Madera Vine
	Family Asteraceae Basellaceae Bignoniaceae	Gomphocarpus fructicosus Species Ageratina adenophora Ambrosia artemisiifolia Aster sublatus Bidens pilosa Cichorium intybus Chrysanthemoides moniliferum Conyza floribunda Coreopsis lanceolata Hypochoeris radicata Senecio madagascarensis Sonchus oleraceus Tagates minuta Taraxacum officinale Anredera cordifolia Carpsis radians	Narrow-leaved Cotton Bush Common Name Crofton Weed Annual Ragwort Bushy Starwort Cobblers Peg Chicory Bitou Bush Tall Fleabane Coreopsis Cats ear Fire Weed Common Sowthistle Stinking Roger Dandelion Madera Vine Scarlet Creeper

Caesalpiniodeae	Senna coluteoides	Cassia, Senna
Cannaceae	Canna indica	Canna Lily
Caprifoliaceae	Lonicera japonica	Honeysuckle
Chenopodiaceae	Chenopodium album	Fat hen
Compositae	Onopordum acanthium	Scotch Thistle
Convolvulaceae	Convolvulus arvensis Ipomoea indica	Bindweed Morning Glory
Cyperaceae	Cyperus congestus Cyperus eragrostris	Sedge Sedge
Euphorbiaceae	Euphorbia peplus Ricinus communis	Petty Spurge Caster Oil Plant
Gentianaceae	Centaurium erythraea	Common Century
Faboideae	Dipogon sp Genista linifolia Sarothamnus scoparius Vicia sativa	Flaxleaf Broom Common Broom Common Vetch

Family	Species	Common Name
Lauraceae	Cinnamonum camphora Eryobotrica japonica	Camphor Laurel Loquat
Lythaceae	Lagerstroemia indica	Crepe Myrtle
Malvaceae	Sida rhombifolia Modiola caroliniana	Paddys Lucerne Red-flower Mallow
Mimosaceae	Acacia saligna Albizzia capensis	Sickle Leaf Wattle Cape Green Wattle
Moraceae	Ficus elastica Morus nigra	Rubber Tree Black Mulberry
Ochnaceae	Ochna serrulata	Ochna
Oleaceae	Ligustrus sinense Ligustrus lucidium Olea africanus	Small-leaf Privet Large-leaved Privet African Olive
Oxalidaceae	Oxalis articulata	Wood Sorrel

Plantaginaceae	Plantago lanceolata	Plantain
Poaceae	Arundo donax Andropogon virginicus Chloris gayana Cortadeira selloana Digitaria cillaris Eragrostris curvula Paspalum dilatatum Paspalum urvillei Pennisetum clandestinium Melinis repens Sorghum halpense Sporobolis africanus Parramatta Stenoptaphrum secindatum	Giant Reed Wild Oats Rhodes Grass Pampas Grass Summer Grass African Lovegrass Paspalum Vasey Grass Kikuyu Red Natal Grass Johnson Grass Grass Buffalo Grass
Polygonaceae	Acetosa sagittata Rumex crispus	Turkey Rhubarb Curled Dock
Portulaceae	Portulaca oleracea	Pigweed
Primulaceae	Anagallis arvensis	Scarlet Pimpernel
Rosaceae	Cotoneaster glaucophyllus Rubus ulmifolius	Cotoneaster Blackberry
Schrophulariceae	Verbascum virgatum	Twiggy Mullein
Solanaceae	Cestrum parqui Solanum nigrum	Green Cestrum Blackberry Nightshade
Urticaceae	Parietaria judaica	Pellitory
Verbenaceae	Lantana camara Verbena bonariensis Verbena officinalis	Lantana Purple Top Common Verbena

A3 Flora of Area 3

Local Native Plants

Family	Species	Common Name
Angiosperms		
Arecaceae	Livistona australis	Cabbage Palm
Commelinaceae	Commelina cyanea	Scurvy Weed

Convulvulaceae	Dichondra repens Convolulus erubescens	Kidney Weed Australian Bindweed
Euphorbiaceae	Omalanthus populifolius	Bleeding heart
Faboidaceae	Hardenbergia violacea	False Sarsparilla
Juncaceae	Juncus ursitatus	Soft Juncus
Mimosaceae	Acacia longifolia longifolia	Sydney Golden Wattle
	Acacia falcata	Wreath Wattle
Myrtaceae	Eucalyptus botyroides Corymbia maculata Melaleuca decora Melaleuca armillaris Melaleuca quinquenervia	Bangalay Spotted Gum White-feather Honeymyrtle Bracelet Honeymyrtle Broad-leaved Paperbark
Ongaeraceae	Epilobium billiardianumn	Willow Herb
Pittosporaceae	Pittosporum undulatum	Sweet Pittosporum
Poaceae	Cynodon dactylon Bothrachloa decipiens Deyeuxia quadriseta Digitaria parvifolia Dichelachne rapa Poa sp.	Couch Grass Redleg Grass Reed bent Grass Finegrass Slender Plume Grass Grass
Typhaceae	Typha orientalis	Bulrush

Non-Local Native Plants

Mimosaceae	Acacia falcata	Wreath Wattle
Myrtaceae	Callistemon X viminalis Eucalyptus nicholls	Bottle Brush cultivar Narrow-leaved Peppermint
	Eucalyptus sp	Smooth-barked
	Lophostemon confertus	Brush Box
Proteaceae	Grevillea robusta	Silky Oak

Family	Species	Common Name
Angiosperms		
Apiaceae	Ammi majus Foeniculum vulgare Conium maculatum	Bishops Weed Fennel Hemlock
Apocynaceae	Oleander nerium	Oleander
Asclepiadaceae	Araujia hortorum	Moth Vine
Asteraceae	Ageratina adenophora Bidens pilosa Chrysanthemoides monilifer Conyza floribunda Coreopsis lanceolata Senecio madagascarensis Sonchus oleraceus Taraxacum officinale	Crofton Weed Cobblers Peg Boneseed Tall Fleabane Coreopsis Fire Weed Common Sowthistle Dandelion
Basellaceae	Anredera cordifolia	Madera Vine
Bignoniaceae	Campsis radicans	Red-flowering
Brassicaceae	Brassica tornefortia	Wild Turnip
Cannaceae	Canna indica	Canna Lily
Caprifoliaceae	Lonicera japonica	Japanese Honeysuckle
Convulvulaceae	Convolvulus arvensi Ipomoea indica	Small Convolvulus Blue Morning Glory
Cyperaceae	Cyperus eragrostris	Umbrella Sedge
Euphorbiaceae	Omalanthus populaifolius Ricinus communis	Bleeding Heart Caster Oil Plant
Faboidaceae	Erythrina X sykesii Genista monspessulana Psosalea pinnata	Coral Tree Mediterranean Broom Psosalea
Fagaceae	Quercus robur	Pinafor Oak
Gentianaceae	Centaurium sp.	Common Century
Liliaceae	Monstera deliciosa	Fruit salad Plant

	Protoasparagus densiflorus	Asparagus Fern
Moraceae	Morus nigra	Black Mulberry
Oleaceae	Olea africana Fraxinus sp. Ligustrum lucidium	African Olive European Ash Broad-leaved Privet
Onageraceae	Epilobium billardieriana	Willow herb
Plantaginaceae	Plantago lanceolata	Plantain
Poaceae	Avena fatua Agrostis parviflora Eleusine indica Eragrostis curvula Melinis repens Digitaria cillaris Eragrostris curvula Paspalum dilatatum Cortaderia selloana Pennisetum clandestinium Setaria verticellaria	Wild Oat Bent Grass Crowsfoot Grass African Love Grass Red Natal Grass Summer Grass African Lovegrass Paspalum Pampas Grass Kikuyu Grass Pigeon Grass
Portulaceae	Portulaca oleracea	Pigweed
Rosaceae	Cotoneaster glaucophyllus Rubus ulmifolius	Cotoneaster Blackberry
Schrophulariceae	Verbascum virgatum	Twiggy Mullein
Solanaceae	Cestrum parqui	Green Cestrum
Verbenaceae	Lantana camara Verbena bonariensis Verbena rigida	Lantana Purpletop Verbena

A4 Flora of Area 4

Local Native Plants

Family	Species	Common Name
Angiosperms		
Dennstaediaceae	Pteridium esculentum	Bracken
Meliaceae	Melia azudach	White cedar
Mimosaceae	Acacia decurrens	Sydney Green Wattle

Pittosporaceae	Pittosporum undulatum	Pittosporum
Poaceae	Cynodon dactylon Austrodanthonia sp. Eriochloa pseudoacrotricha Poa affinis	Couch Grass Wallaby Grass Early Spring Grass Native Grass
Typhaceae	Typha orientalis	Bulrush
Non-Local Native Plants		
Mimosaceae	Acacia saligna	Wreath Wattle
Myrtaceae	Callistemon X viminalis	Bottlebrush

Family	Species	Common Name
Angiosperms		
Alderaceae	Populus nigra	Lombardy Poplar
Apiaceae	Foeniculum vulgare Conium maculatum	Fennel Hemlock
Asclepiadaceae	Araujia hortorum	Moth Vine
Asteraceae	Ageratina adenophora Aster subulatus Bidens pilosa Conyza floribunda Coreopsis lanceolata Senecio madagascarensis Sonchus oleraceus Taraxacum officinale	Crofton Weed Bushy Starwort Cobblers Peg Tall Fleabane Coreopsis Fire Weed Common Sowthistle Dandelion
Basellaceae	Anredera cordifolia	Madera Vine
Brassiceae	Brassica arvena	Wild Turnip
Euphorbiaceae	Ricinus communis	Caster Oil Plant
Gentianaceae	Centaurium sp.	Common Century
Leguminosae	Melilotus indica	Melilot
Plantaginaceae	Plantago lanceolata	Plantain
Poaceae	Chloris gayana Eragrostis curvula	Rhodes Grass African Love Grass

	Melinis repens Cortaderia selloana Pennisetum clandestinium Digitaria cillaris Eragrostris curvula Paspalum dilatatum Setaria gracilis Sorghum halpense Sporobolus africanus	Red Natal Grass Pampas Grass Kikuyu Grass Summer Grass African Lovegrass Paspalum Slender Pigeon Grass Johnson Grass Giant Parramatta Grass
Polygonaceae	Rumex (Acetosa) sagittata	Turkey Rhubarb
Portulaceae	Portulaca oleracea	Pigweed
Rosaceae	Cotoneaster glaucophyllus Rubus ulmifolius	Cotoneaster Blackberry
Salicidceae	Salix babylonica	Weeping Willow
Solanaceae	Cestrum parqui	Green Cestrum
Verbenaceae	Lantana camara Verbena bonariensis	Lantana Purpletop

A5 Flora of Area 5

LocaL Native Plants

Family	Species	Common Name
Angiosperms		
Native Plants		
Areacaea	Livistona australis	Cabbage Palm
Casuarinaceae	Casuarina glauca	Swamp She-oak
Mimosaceae	Acacia decurrens Acacia longifolia longifolia	Sydney Green Wattle Sydney GoldenWattle
Non-Local Native Plants		
Mimosaceae	Acacia sp Acacia saligna	Blue-grey Wattle Wreath Wattle

	Family	Species	Common Name		
Angio	Angiosperms				
	Apocynaceae	Oleander nerium	Oleander		
	Apiaceae	Foeniculum vulgare	Fennel		
Family	/ Specie	es Comn	oon Name		
	Areaceae	Phoenix canariensis	Canary Island Date Palm		
	Asclepiadaceae	Araujia hortorum	Moth Vine		
	Asteraceae	Ageratina adenophora Bidens pilosa Cirsium vulgare Conyza floribunda Coreopsis lanceolatum Senecio madagascarensis Sonchus oleraceus Taraxacum officinale	Crofton Weed Cobblers Peg Spear Thistle Tall Fleabane Coreopsis Fire Weed Common Sowthistle Dandelion		
	Bignoniaceae Carpsi	is radicans	Scarlet Creeper		
	Clusiaceae	Hypericum performatum	St Johns Wort		
	Cruciferaceae	Sisymbrium officinale	Hedge Mustard		
	Euphorbiaceae	Ricinus communis Gomphocarpus fruticosus	Caster Oil Plant Cotton Bush		
	Fabaceae	Genista monspessulana Dipogon sp.	Mediterranean Broom		
	Malvaceae	Sida rhombifolia Modiola caroliana	Paddys Lucerne Red Mallow		
	Mimosaceae	Albizia capensis	Cape Green Wattle		
	Musaceae	Musa X paradisica	Banana		
	Oleaceae	Olea africanus	African Olive		

	Onageraceae	Epilobium billardieriana	Willow herb
	Phytolaccaceae	Phytolacca octandra	Inkweed
	Plantaginaceae	Plantago lanceolata	Plantain
	Poaceae	Avena fatua Melinis repens	Wild Oat Red Natal Grass
Family	y Specie	es Common Nai	ne
		Eragrostis arvula Digitaria sanguinalis Cortaderia selloana Paspalum dilatatum Pennisetum clandestinium Agrostis parvifolia Sorghum halpense	African Love Grass Summer Grass Pampas Grass Paspalum Kikuyu Grass Johnson Grass
	Primulaceae	Anagallis arvensis	Pimpernel
	Rosaceae	Rubus fructicosus	Blackberry
	Solanaceae	Cestrum parqui Solanum nigrescens	Green Cestrum Black Nightshade
	Verbenaceae	Lantana camara Verbena bonariensis Verbena officianalis	Lantana Purpletop Common Verbena

A6 Flora of Area 6

Local Native Plants

Family	Species	Common Name
Native Plants		
Asteraceae	Cassinia arcuata Cassinia quinquefaria	Chinese Shrub Cassinia
Casuarinaceae	Casuarina glauca	Swamp She-oak
Cyperaceae	Cyperus diffornis	Sedge
Euphorbiaceae	Omalanthus populifolius	Bleeding heart

Juncaceae	Juncus ursitatus	Soft Juncus
Mimosaceae	Acacia decurrens Acacia longifolia longifolia	Sydney Green Wattle Sydney Golden Wattle
	Acacia parramattensis	Parramatta Green Wattle
Family	Species	Common Name
Myrtaceae	Eucalyptus saligna Melaleuca linarifolia	Sydney Blue Gum Snow in Summer
Pittosporaceae	Pittosporum undulatum	Sweet Pittosporum
Poaceae	Cynodon dactylon Dicanthium sericeum Digitaria parvifolia	Couch Grass Qld Bluegrass Small-flower Finger Grass
Non-Local Native Plants		
Mimosiaceae	Acacia podalyriifolia Acacia saligna	Qld Silver Wattle Wreath Wattle
Myrtaceae	Eucalyptus citriodora Lophostemon confertus	Lemon-scented Gum Brush Box

Family	Species	Common Name
Angiosperms		
Apiaceae	Foeniculum vulgare	Fennel
Asclepiadaceae	Araujia hortorum Ascleipias curassavica	Moth Vine Red-headed Cotton Bush
Asteraceae	Ageratina adenophora Bidens pilosa Chrysanthemoides monilifera Cirsium vulgare Helianthus annuus Senecio madagascarensis Sonchus oleraceus Taraxacum officinale	Crofton Weed Cobblers Peg Boneseed Tall Fleabane Sunflower Fire Weed Common Sowthistle Dandelion
Brassicaceae	Brassica tornefortia	Wild Turnip

Clusiaceae	Hypericum perforatum	St Johns Wort
Convulvulaceae	Convolvulus arvensi Ipomoea indica	Small Convolvulus Blue Morning Glory
Cyperaceae	Cyperus eragrostris	Umbrella Sedge

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Fa	amily	Species	Commor	Name
E	uphorbiacea	e Ri Ge	cinus communis omphocarpus fruticosus	Caster Oil Plant Cotton Bush
F	aboidea	Di Ge M	pogon lignosus enista monspessulana elilotus albus sosalea pinnata	Vine Mediterranean Broom Bokhara Clover Psosalea
La	auraceae	Ci	nnamomum camphora	Camphor Laurel
Μ	lalvaceae	Si M	da rhombifolia odiola caroliana	Paddys Lucerne Red Mallow
Μ	limosaceae	Al	bizia capensis	Cape Green Wattle
0	leaceae	O	lea africanus	African Olive
0	nageraceae	Eμ	pilobium billardieriana	Willow herb
Р	lantaginacea	e Pl	antago lanceolata	Plantain
Ρ	oaceae	Br Cl Cl Er Di Ca Pa St St	iza maxima hloris gayana hloris sp elinis repens ragrostis curvula gitaria sanguinalis ortaderia selloana aspalum dilatatum ennisetum clandestinium enatophrum secundatum orghum halepense	Quaking Grass Rhodes Grass Windmill Grass Red Natal Grass African Love Grass Summer Grass Pampas Grass Paspalum Kikuyu Grass Buffalo Grass Johnson Grass
Р	olygonaceae	Rı	umex (Acetosa) sagittata	Turkey Rhubarb
Р	rimulaceae	Ar	nagallis arvensis	Pimpernel
R	osaceae	Rı	ubus fructicosus	Blackberry

	Cotoneaster glaucophyllus	Cotoneaster
Scrophularinaceae	Verbascum virgatum	Twiggy Mullein
Family	Species	Common Name
Simaroubaceae	Ailanthus altissima	Tree of Heaven
Solanaceae	Cestrum parqui Solanum nigrescens	Green Cestrum Black Nightshade
Verbenaceae	Lantana camara Verbena bonariensis	Lantana Purpletop

A7 Flora of Area 7

Local Native Plants

Fa	mily	Species	Common Name
Native Pla	nts		
Му	/rtaceae	Corymbia maculata	Spotted Gum
Mi	mosaceae	Acacia decurrens Acacia longifolia longifolia	Sydney Green Wattle Sydney Golden Wattle
		Acacia saligna	Wreath Wattle
Pit	tosporaceae	Pittosporum undulatum	Sweet Pittosporum
Pc	aceae	Cynodon dactylon	Couch Grass
Non- Loca	l Native Plants		
Mi	mosaceae	Acacia longifolia longifolia	Sydney Golden Wattle
		Acacia saligna	Wreath Wattle

Family	Species	Common Name	
Angiosperms			
Apiaceae	Foeniculum vulgare	Fennel	

Asclepiadaceae	Araujia hortorum	Moth Vine
Asteraceae	Ageratina adenophora Bidens pilosa Cirsium vulgare Conyza floribunda Senecio madagascarensis Sonchus oleraceus Taraxacum officinale	Crofton Weed Cobblers Peg Spear Thistle Tall Fleabane Fire Weed Common Sowthistle Dandelion
Family	Species	Common Name
Cyperaceae	Cyperus eragrostris	Umbrella Sedge
Euphorbiaceae	Ricinus communis Gomphocarpus fruticosus	Caster Oil Plant Cotton Bush
Faboidaceae	Genista monspessulana Psosalea pinnata	Mediterranean Broom Psosalea
Malvaceae	Sida rhombifolia Modiola caroliana	Paddys Lucerne Red Mallow
Oleaceae	Olea africana Ligustrum lucidium	African Olive Broad-leaved Privet
Plantaginaceae	Plantago lanceolata	Plantain
Poaceae	Melinis repens Eragrostis curvula Digitaria sanguinalis Cortaderia selloana Paspalum dilatatum Pennisetum clandestinium	Red Natal Grass African Love Grass Summer Grass Pampas Grass Paspalum Kikuyu Grass
Rosaceae	Rubus fructicosus Cotoneaster glaucophyllus	Blackberry Cotoneaster
Solanaceae	Cestrum parqui Solanum nigrum	Green Cestrum Black Nightshade
Verbenaceae	Lantana camara Verbena bonariensis	Lantana Purpletop

A8 Flora of Area 8

Local Native Plants

Family	Species	Common Name
Angiosperms		
Aizoaceae	Tetragonia tetragoniodes	New Zealand Spinach
Casuarinaceae	Casuarina glauca	Swamp She-oak
Mimosaceae	Acacia decurrens Acacia longifolia ongifolia	Sydney Green Wattle Sydney Golden Wattle
	Acacia falcata Acacia longifolia sopharae	Sickle-leaved Wattle Broad-leaved Wattle
Myrtaceae	Angophora costata Melaleuca decora	Smooth-Barked Apple White-feather Honeymyrtle
	Melaleuca armillaris	Bracelet Honeymyrtle
Poaceae	Cynodon dactylon	Couch Grass
Typhaceae	Typha orientalis	Bulrush
Non-Local Native Plants Myrtaceae	Callistemon X viminalis Lophostemon confertus	Bottle Brush cultivar Brush Box

Family	Species	Common Name
Angiosperms		
Apiaceae	Foeniculum vulgare	Fennel
Apocynaceae	Oleander nerium	Oleander
Asclepiadaceae	Araujia hortorum	Moth Vine
Asteraceae	Ageratina adenophora Bidens pilosa Conyza floribunda Senecio madagascarensis Sonchus oleraceus Taraxacum officinale	Crofton Weed Cobblers Peg Tall Fleabane Fire Weed Common Sowthistle Dandelion

Caprifoliaceae	Lonicera japonica	Japanese Honeysuckle
Convulvulaceae	Ipomoea indica	Blue Morning Glory
Cruciferaceae	Sisymbrium officinale	Hedge Mustard
Cyperaceae	Cyperus eragrostris	Umbrella Sedge
Family	Species	Common Name

Euphorbiaceae	Omalanthus populaifolius Ricinus communis	Bleeding Heart Caster Oil Plant
Faboidaceae	Genista monspessulana Psosalea pinnata	Mediterranean Broom Psosalea
Gentianaceae	Centaurium sp.	Common Century
Moraceae	Morus nigra	Black Mulberry
Oleaceae	Olea africana Ligustrum lucidium	African Olive Broad-leaved Privet
Plantaginaceae	Plantago lanceolata	Plantain
Poaceae	Avena fatua Eragrostis curvula Melinis repens Digitaria cillaris Paspalum dilatatum Cortaderia selloana Pennisetum clandestinium	Wild Oat African Love Grass Red Natal Grass Summer Grass Paspalum Pampas Grass Kikuyu Grass
Rosaceae	Cotoneaster glaucophyllus Rubus ulmifolius	Cotoneaster Blackberry
Solanaceae	Cestrum parqui	Green Cestrum
Verbenaceae	Lantana camara Verbena bonariensis	Lantana Purpletop

A9 Flora of Area 9

Local Native Plants Family Sp	becies Comm	non Name
Asteraceae	Cassinia arcuata	Mountain Itch
Coquerinaceae		Swamp She ook
Casuannaceae	Casuarina giauca	Swamp Sne-oak
Commelinaceae	Commelina cyanea	Scurvy Weed
Cyperaceae	Cyperus polystacyos Lepidosperma flexosum	Sedge Rapier Sedge
Dilleniaceae	Hibbertia aspersa	Rough Guinea Flower
Epacridaceae	Leucopogon juniperus Lissanthe strigosa	Beaded Heath Native Cranberry
Faboidaceae	Daviesia genistifolia	Native Pea
Mimosaceae	Acacia decurrens Acacia longifolia longifolia	Sydney Green Wattle Sydney Golden Wattle
	Acacia linifolia	Flax-leaved Wattle
Myrtaceae		
·	Eucalyptus saligna Syncarpia glomulifera	Sydney Blue Gum Turpentine
Oleaceae	Notolea longifolia	Mock Olive
Pittosporaceae	Bursaria spinosa Pittosporum undulatum	Blackthorn Sweet Pittosporum
Poaceae	Austrodanthonia sp. Cynodon dactylon Anistida vagans	Wallaby Grass Couch Grass Three-awn Spear Grass
Non-Local Native Plants	l hemeda australis	Kangaoo Grass
Mimosaceae	<i>Acacia saligna Acacia</i> prominens-like	Wreath Wattle
Myrtaceae	Corymbia citriodora Lophostemon confertus	Lemon-scented Gum Brush Box

Proteaceae

Grevillea robusta

Silky Oak

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Family S	Species Common	Name
Rutaceae	Zieria smithii	Sandfly Zieria
Sapinidaceae	Dodonea triquetra	Common Hop Bush
Thymeleaceae	Pimelia linifolia	Rice Flower
ntroduced Plants and N	Native Weeds	
Family S	Species Common	Name
ngiosperms		
Alderaceae	Populus nigra	Lombardy Poplar
Apiaceae	Conium maculatum Foeniculum vulgare	Hemlock Fennel
Apocynaceae	Nerium oleander	Oleander
Aralaceae	Hedera helix	lvy
Areaceae	Phoenix canariensis	Canary Island Date Palm
Asclepiadaceae	e Araujia hortorum	Moth Vine
Asteraceae	Ageratina adenophora Arctotheca nivium Bidens pilosa Chrysanthemoides monilifera Cirsium vulgare Conyza floribunda Coreopsis lanceolata Senecio madagascarensis Seneccio quadridentatus Sonchus oleraceus Taraxacum officinale	Crofton Weed Flat Cape Weed Cobblers Peg Boneseed Spear Thistle Tall Fleabane Coreopsis Fire Weed Cotton Fire Weed Common Sowthistle Dandelion

BasellaceaeAnredera cordifoliumMadeira VineBrassicaceaeCapsella bursa-pastoris
Sisymbrium officinaleShepherd's Purse
Hedge MustardCactaceaeOpuntia strictaPrickly Pear

Family Spe	cies Common	Name
Caprifoliaceae	Lonicera japonica	Japanese Honeysuckle
Clusiaceae	Hypericum perforatum	St Johns Wort
Convulvulaceae	Convolvulus arvensi Ipomoea indica	Small Convolvulus Blue Morning Glory
Crassulaceae	Bryophyllum delagoense	Mother of Millions
Cyperaceae	Cyperus eragrostris	Umbrella Sedge
Euphorbiaceae	Ricinus communis Gomphocarpus fruticosus	Caster Oil Plant Cotton Bush
Faboidaceae	Genista monspessulana Psosalea pinnata	Mediterranean Broom Psosalea
Ficaceae	Ficus elastioca	Rubber tree
Gentianaceae	Centaurium sp.	Common Century
Juncaceae	Juncus effusus	Soft Juncus
Lauraceae	Cinnamonum camphora	Camphor Laurel
Leguminosae	Melilotus indica Trifolium repens Trifolium subterraneum Medicago arabica	Hexham Scent White Clover Subterranean Clover Spotted Medic
Malvaceae	Sida rhombifolia Modiola caroliana	Paddys Lucerne Red Mallow
Mimosaceae	Albizia capensis	Cape Green Wattle
Oleaceae	Olea africana Ligustrum lucidium	African Olive Broad-leaved Privet
Onageraceae	Epilobium billardieriana	Willow herb
Papaveraceae	Argemone ochroleuca	Mexican Poppy
Plantaginaceae	Plantago lanceolata	Plantain

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Family	Species	Common	Name
Poaceae	Andropogo Briza maxi Eragrostis Phalaris au Digitaria su Cortaderia Paspalum Pennisetu Setaria ve Stenatoph	on virginicus ma currvula quatia anguinalis selloana dilatatum m clandestinium rticellaria rum secundatum	Whisky Grass Quaking Grass African Love Grass Canary Grass Summer Grass Pampas Grass Paspalum Kikuyu Grass Pigeon Grass Buffalo Grass
Polygonaceae	Rumex (A	cetosa) sagittata	Turkey Rhubarb
Primulaceae	Anagallis a	arvensis	Pimpernel
Rosaceae	Rubus fruc Cotoneast Pyracanth	xticosus er glaucophyllus a augustifolia	Blackberry Cotoneaster Orange Firethorn
Scrophularina	ceae Verbascur	n virgatum	Twiggy Mullein
Simaroubacea	ae Ailanthus a	altissima	Tree of Heaven
Solanaceae	Cestrum p Solanum r	arqui nigrum	Green Cestrum Black Nightshade
Urticaceae	Parietaria	judaica	Pellitory
Verbenaceae	Lantana ca Verbena b Verbena o	amara onariensis fficianalis	Lantana Purpletop Common Verbena

A10 Flora of Area 10

Local Native Plants

Family	Species	Common Name	
Angiosperms			
Casuarinaceae	Casuarina glauca	Swamp She-oak	

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Mimosaceae	Acacia decurrens Acacia longifolia longifolia Acacia linifolia	Sydney Green Wattle Sydney Golden Wattle Flax-leaved Wattle
Pittosporaceae	Pittosporum undulatum	Sweet Pittosporum
Poaceae	Cynodon dactylon	Couch Grass

Non-Local Native Plants

Mimosaceae	<i>Acacia falcata Acacia</i> prominens-like	Wreath Wattle
Myrtaceae	Corymbia citriodora Eucalyptus mannifera	Lemon-scented Gum Brittle Gum
Proteaceae	Lophostemon confertus Grevillea robusta	Brush Box Silky Oak

Introduced Plants and Native Weeds

Family	Species	Common Name
Angiosperms		
Alderaceae	Populus nigra	Lombardy Poplar
Apiaceae	Foeniculum vulgare	Fennel
Asclepiadaceae	Araujia hortorum	Moth Vine
Asteraceae	Ageratina adenophora Bidens pilosa Cirsium vulgare Conyza floribunda Senecio madagascarensis Sonchus oleraceus Taraxacum officinale	Crofton Weed Cobblers Peg Spear Thistle Tall Fleabane Fire Weed Common Sowthistle Dandelion
Family Spe	ecies Com	mon Name
Brassicaceae	Capsella bursa-pastoris Sisymbrium officinale	Shepherd's Purse Hedge Mustard
Caprifoliaceae	Lonicera japonica	Japanese Honeysuckle
Convulvulaceae	Convolvulus arvensi	Small Convolvulus

Ipomoea indica

Blue Morning Glory

Cyperaceae	Cyperus eragrostris	Umbrella Sedge
Euphorbiaceae	Ricinus communis Gomphocarpus fruticosus	Caster Oil Plant Cotton Bush
Fabaceae Faboideae	Genista monspessulana Psosalea pinnata Melilotus indica Trifolium repens Medicago arabica	Mediterranean Broom Psosalea Hexham Scent White Clover Spotted Medic
Gentianaceae Centar	Common Century	
Juncaceae	Juncus acutus Juncus effusus	Spiny Juncus Soft Juncus
Lauraceae	Cinnamonum camphora	Camphor Laurel
Malvaceae	Sida rhombifolia	Paddys Lucerne
Mimosaceae Moraceae	Albizia capensis Ficus elastica	Cape Green Wattle Indian Rubber Tree
Oleaceae	Ligustrum lucidium Olea africana	Broad-leaved Privet African Olive
Plantaginaceae	Plantago lanceolata	Plantain

Family	Species	Common Name	
Po	aceae	Avena fatua Eragrostis curvula Menitis repens Digitaria sanguinalis Cortaderia selloana Paspalum dilatatum Pennisetum clandestinium Sorghum halepense	Wild Oat African Love Grass Red Natal Grass Summer Grass Pampas Grass Paspalum Kikuyu Grass Johnson Grass
Pla	intaginaceae	Plantago lanceolata	Plantain
Ph	ytolaccaceae	Phytolacca octandra	Inkweed
Pri	mulaceae	Anagallis arvensis	Pimpernel
Po	aceae	Andropogon virginicus Bromus catharticus	Whisky Grass Prarie Grass

	Cortaderia selloana Digitaria sanguinalis Paspalum dilatatum Pennisetum clandestinium Stenataphrum secundatum	Pampas Grass Summer Grass Paspalum Kikuyu Grass Buffalo Grass
Polygonaceae	Rumex (Acetosa) sagittata	Turkey Rhubarb
Rosaceae	Rubus fructicosus Cotoneaster glaucophyllus	Blackberry Cotoneaster
Schrophulariceae	Verbascum virgatum	Twiggy Mullein
Solanaceae	Cestrum parqui Solanum nigrum	Green Cestrum Black Nightshade
Urticaceae	Parietaria judaica	Pellitory
Verbenaceae	Lantana camara Verbena bonariensis Verbena officianalis	Lantana Purpletop Common Verbena

Appendix B

Eight Part Test Impact of the Proposed Intermodal Logistics Centre at Enfield on the Green and Golden Bell Frog.

1.0 Introduction

The following Eight Part test examines the likely impact of the proposed development of the ILC Site at Enfield on Green and Golden Bell frogs. The test was carried out despite the failure to locate Green and Golden Bell frogs on the site. It was possible that Green and Golden Bell frogs venture onto the site during suitable wet weather conditions. For this reason, a series of measures designed to protect Green and Golden Bell frogs during the works were formulated. In addition, viable long-term habitat for the frogs will be created that should contribute to the success of the Green and Golden Bell frog population in the local area.

2.0 Overview of Proposal

The development of the site entails the creation of an Intermodal Logistics Centre (ILC) and associated infrastructure to include an intermodal terminal, warehousing, container storage and an ecological area.

3.0 Overview of Amelioration Measures

Amelioration measures have been developed that will protect Green and Golden Bell frogs during the construction phase of the development as well as create secure long-term habitat for the frogs in the future. At present there are no breeding sites for Green and Golden Bell frogs on the ILC Site and their possible use of the area is restricted to foraging and dispersal activities only.

In brief, the amelioration measure proposed include:

- The erection of frog-exclusion fences around parts of the site during construction works. These fences are to be designed to keep Bell frogs out of dangerous areas and areas that would be subject to heavy vehicle movements and earth works.
- Frog clearances are to be carried out to remove frogs from potentially dangerous sites and sites destined for construction works.
- The construction of a permanent Bell Frog Habitat Area (FHA) that would be excluded from subsequent site development.
- The FHA is to contain two drainable ponds which would be suitable for breeding and to be located near a constructed storm water basin.

- Landscaping of the FHA to create "ideal" shelter, foraging and over-winter habitat.
- Regular monitoring of the FHA to ensure it retains its function.
- The creation of frog corridors that would permit frog migrations between the ILC site and the nearby new marshalling yards as well as Coxs Creek corridor.

In order to assess the effective ness of these measures, the following Eight Part test was carried out.

Eight Part Test

1. In the case of a threatened species, whether the life cycle of the species is likely to be disturbed such that a viable local population of the species is likely to be placed at risk of extinction.

The Green and Golden Bell frog is an endangered species listed on Schedule 1 Part 1 of the Threatened Species Conservation Act 1995. Although Bell frogs occur in three locations in the Enfield/Greenacre area the population appears to be reproductively constrained. Successful breeding events are uncommon. No surviving tadpoles or juvenile frogs have ever been located in the Coxs Creek Reserve. Tadpoles and juvenile frogs had been found in both the brick pit (White and Pyke 1996) and the frog pond on the New Enfield Marshalling yards site. Since the creation of a secure frog habitat area in the Juno Parade brickpit site breeding by Bell frogs has taken place each year but juvenile survivorship is still limited by recolonisation opportunities. There are no records of successful breeding on the ILC site.

The proposal to create a secure area associated with the detention basin and Coxs Creek makes it possible for Green and Golden Bell frogs to become established on the ILC site. A site which may be used for breeding in this location would be a valuable adjunct to the Juno Parade frog area as well as the frog pond in the New Enfield Marshalling Yards site.

The development proposal will not remove breeding opportunities for Green and Golden Bell frogs, but will in the long-term create potential breeding opportunities that do not currently exist on the site. The development will not place the local Green and Golden Bell Frog population at risk of extinction.

2. In the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the ability of the population is likely to be significantly compromised.

The Enfield / Greenacre Green and Golden Bell frogs have not been listed as an endangered population because of the legal status already afforded to them as an endangered species. Nonetheless, this population would meet the requirements for listing as an endangered population in view of its highly isolated nature and vulnerability to extinction. Vulnerability is imposed on the Green and Golden Bell frogs by the present scarcity of secure breeding sites.

The life cycle of the species will not be disrupted such that the ability of the population will be compromised significantly.

3. In relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or removed.

The creation of the frog ponds and the frog habitat area (FHA) will provide the only secure habitat on site which may be used for breeding, and the intervening areas will be replanted and modified to become high quality foraging and shelter habitat. The pond design that will be used is similar to that used for successful Bell frog ponds at Arncliffe (M5 East Motorway) and Woonona (Edgewood Estate).

Additional foraging habitat will be created around the detention basin will more than replace lost foraging space. This will be achieved by the planting of grassy areas around the ponds and the planting of shelter plants (such as *Lomandra longifolia*) in the grassed areas. The shelter plants will make it easier for frogs to remain in the foraging areas for longer without having to return to more distant shelter areas. Piles of shelter materials, mainly rocks, will be placed around the frog ponds.

A small area of existing potential foraging habitat will be lost during the development but the overall area of foraging habitat that will be created will be more extensive and more productive than the area that was lost. A significant area of habitat will not be lost and ultimately the Green and Golden Bell frogs will have habitat areas that can be colonised all year round.

4. Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community.

At present, there are no easy movement corridors for Green and Golden Bell frogs to enter or leave the SPC Site. As designated movement corridors are to be created that link the FHA with nearby frog areas, movement across the site will be facilitated rather than impeded.

5. Whether critical habitat will be affected.

No critical habitat has been proclaimed for this species.

6. Whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region.

Unfortunately, most of the remaining Green and Golden Bell frogs sites in New South Wales are on private lands, many of which are subject to development. Some Green and Golden Bell frog populations do occur in reserves (White 1995), such as part of a Kurnell Bell frog population that occurs in the Botany Bay National Park. Apart from the above-mentioned population, only the Bell frogs in the Coxs Creek Reserve are in conservation areas in Sydney. The Green and Golden Bell frogs at the Olympic Site have recently been included in the Millenium Park proposal and so the long-term security of this site seems to be set.

Overall, Green and Golden Bell frogs are not well represented in conservation areas.

7. Whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process.

Only two threatening processes have been listed for Green and Golden Bell frogs: namely, the introduced Plague Minnows *Gambusia holbrooki*, a predatory fish that is known to devour the eggs and tadpoles of the Green and Golden Bell Frog (White 1995), and the exotic disease chytridiomycosis (or chytrid). Gambusia are present in Coxs Creek and in water bodies alongside the new marshalling yards. Chytrid has not been detected in the Greenacre-Enfield Bell frog population to date. Chytrid spores are normally spread through the importation of water or damp materials such as compost or mulch.

Water from rain water tanks is to be used to fill the satellite frog ponds, and where this is not available town water is to be used. Mulch and compost imported onto the site will be treated to control the spread of spores.

The development of the SPC Site is not a threatening process.

8. Whether any threatened species, population or ecological community is at the limit of its known distribution.

Green and Golden Bell frogs were historically distributed along the New South Wales' coast from Byron Bay in the north, to the Victorian border in the south. Sydney lies almost in the centre of the past distribution of the species. However, in more recent times, the distribution has changed greatly with the species being greatly reduced north of Newcastle (White and Pyke 1996).

The Enfield Bell frogs are not at the limit of distribution of the species.

Conclusion

The development of the ILC site will result in the loss of a small area of potential foraging habitat (in Areas 1 and 3).

Frog-exclusion fences will be erected to prevent Green and Golden Bell frogs from entering construction work areas. These fences would be used only in areas where frog movement is likely, and will be removed once construction works are complete.

A Frog Habitat Area containing ponds which may encourage breeding, and foraging and shelter habitat will be created near Coxs Creek.

The only potential adverse effect of the development is to prevent unlimited movement across the site. This is a short-duration impact while construction is underway, and and will be more than offset by the subsequent creation of habitat in the FHA. Ultimately, Green and Golden Bell frogs will have secure, long-term habitat on the ILC Site. Monitoring of the FHA will take place to ensure it is maintained as a site for the benefit of the frogs.

In view of the apparent negligible impact as a result of the re-development of the SPC Site, the developer should not be required to seek a Section 120 licence.