

Catherine Fields (Part) Precinct: Australasian Bittern Habitat

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Executive Summary

The Australasian Bittern is an endangered species in NSW and across Australia. It is estimated that there are less than 1,600 adults left in NSW. It was observed in South Creek in 2011 during fauna surveys for the Catherine Fields Precinct. This report identifies the preferred habitat of the Australasian Bittern and gives design recommendations to protect, enhance and create ideal habitat in Catherine Fields. Objectives and development controls are provided to ensure future works consider the impacts on Australasian Bittern habitat within the precinct.

The Australasian Bittern is a large, partly nocturnal bird that forages and nests in shallow wetlands amongst dense reeds and sedges. It stalks its prey and is well camouflaged in the reeds. It prefers seclusion and requires dense surrounding vegetation for protection from predators.

In Catherine Fields, there is one wetland providing good habitat for the bittern and at least two moderate habitat locations that are suitable for enhancement. Three other locations are identified as potential sites for creation of new habitat. Design essentials for protecting, enhancing and creating new habitat are:

- Swampy ground with reeds/sedges;
- Gentle grade to water;
- Stepped benches to provide foraging habitat during high and low flows;
- Dense screening plants adjacent to habitat;
- No floodlighting, vehicle or pedestrian access;
- Pest control and protection from introduced predators (dogs, cats, foxes); and
- Public education through signage.



1 Introduction

As part of the planning for Catherine Fields (Part) Precinct, Eco Logical Australia (ELA) was engaged to conduct field surveys of the riparian/creek system and other terrestrial communities. During a night time survey on 3rd November 2011, two ecologists observed one *Botaurus poiciloptilus* (Australasian Bittern) in the riparian corridor. Australasian Bittern is a threatened species listed as **endangered** under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and **endangered** under the NSW *Threatened Species Conservation Act 1995*. The listing of endangered means that it is facing a very high risk of extinction in the wild in the near future. The number of mature individuals in NSW is estimated at 660 to 1,660. In the greater region surrounding Catherine Fields, there have been few reported sightings of this species (**Figure 1**).

The NSW Office of Environment and Heritage has requested further investigation into the occurrence of the Australasian Bittern at Catherine Fields, and has identified the need to protect and enhance its habitat and offset any habitat loss (letter to DPI, 17th January 2013). The purpose of the following report is to identify the habitat requirements for Australasian Bittern and provide simple design guidelines for the protection of existing habitat and creation of new habitat in the riparian corridor.

2 Objectives and Controls

To assist in preserving Australasian Bittern habitat at Catherine Fields in the long term, the following objectives and development controls are recommended for the riparian corridor within the precinct:

Objectives:

- To protect, enhance and create habitat for the Australasian Bittern within the riparian areas within the Catherine Fields Part Precinct.
- To ensure that construction within the riparian areas do not have a significant impact on the Australasian Bittern or its habitat.
- To design land uses adjacent to riparian areas sympathetically with the Australian Bittern habitat requirements.

Controls:

- A flora and fauna assessment addressing potential impacts on the Australasian Bittern via a 7-part test of significance and an assessment of significance under the EPBC Act must be prepared for works that may impact upon potential habitat. This assessment must include a survey meeting the requirements of the SEWPaC SPRAT Database (Species Profiles and Threats Database) and the Australasian Bittern Paper (this document), including survey being conducted during Summer/Spring.
- All proposed works within and adjacent to riparian areas are to be designed in accordance with the Australasian Bittern Paper for the Catherine Fields Part Precinct (ELA 2013).
- A vegetation management plan must be prepared by a suitably qualified ecological consultant for all works within the riparian areas and must have specific regard to assessment of Australasian Bittern Habitat.
- Minimal work is to be undertaken within existing water bodies and may only be for the purposes of public safety, flood mitigation, environmental protection and enhancement of Australasian Bittern Habitat.
- Opportunities for protection, enhancement and creation of habitat must be assessed and identified.
- Works in or adjacent to potential habitat is to be undertaken outside of bittern breeding season.
- Works with the potential to impact South Creek or its tributaries are to consider fish passage and be designed in accordance with the Australasian Bittern Paper for the Catherine Fields Part Precinct.

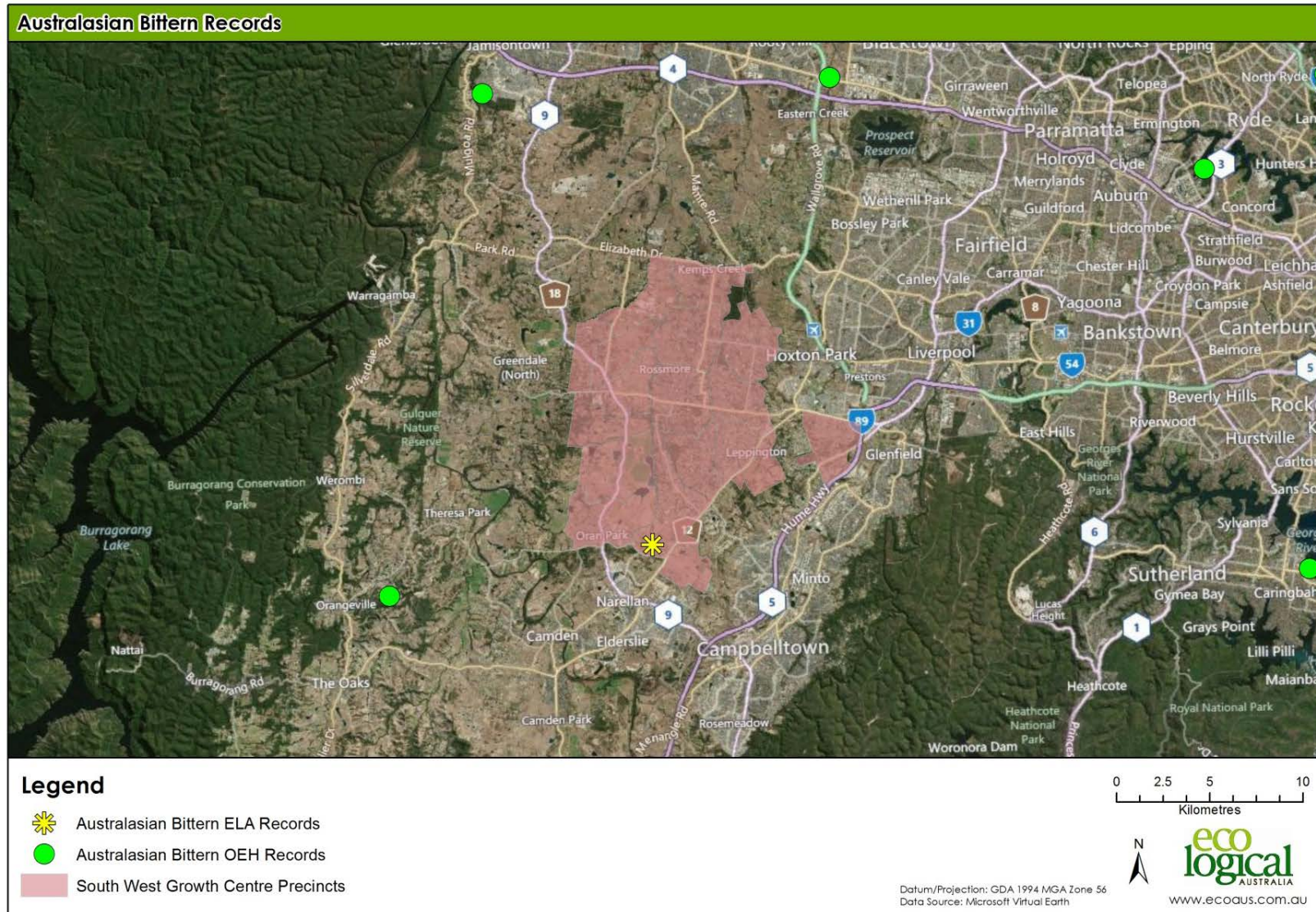


Figure 1: Reported sightings of Australasian Bittern near Catherine Fields.

3 Ecology and habitat of Australasian Bittern

The Australasian Bittern stands to a height up to 65-75 cm. It is a thick-set bird, mostly mottled brown, darker above with a creamy buff and brown streaked underside with a white throat and dark brown streaks along the side of the neck. In flight, it has a general brown appearance with a large wingspan of 105-118 cm. It inhabits temperate freshwater wetlands and occasionally estuarine reedbeds. It favours permanent shallow wetlands, or



edges of pools and waterways, with tall dense vegetation such as sedges, rushes and reeds (e.g. *Phragmites*, *Cyperus*, *Eleocharis*, *Juncus*, *Typha*, *Baumea*, *Bolboschoenus*) or cutting grass (*Gahnia*) growing over a muddy or peaty substrate (Marchant and Higgins 1990).

The Australasian Bittern is a shy and cryptic bird, and is considered to be partly nocturnal as it actively forages pre-dawn and dusk. During the day, it roosts on the ground amongst dense reeds, rather than in trees (Marchant & Higgins 1990). It can be observed during the day during the breeding season (October to February). However, given their large size, they are surprisingly difficult to see, as they are particularly well camouflaged among reeds. Added



to this, when alarmed, they stand still with neck stretched upwards and bill pointing skywards. Sometimes they even sway in the breeze in time with the surrounding reeds. This makes them blend remarkably well into the surrounding vegetation. At dusk, the bittern forages in shallow water up to 30 cm deep, primarily feeding on fish, eels, crayfish, frogs, insects, snakes, lizards and occasionally small birds, mammals, leaves and fruit (Barker & Vestjens 1989). Like herons, these birds use several techniques to capture prey, including standing and waiting, slow stalking, and active pursuit. Wing and leg movements are used to confuse or attract prey items.

The Australasian Bittern occurs solitarily or in pairs, or sometimes in small groups (up to 12) during the non-breeding season (Marchant & Higgins 1990). Although generally sedentary in permanent habitat, the species often moves in response to flooding and drought and is suspected to make short-range seasonal (post-breeding) movements (Smith et al. 1995;

Marchant & Higgins 1990). The nest is constructed of trampled reeds and rushes and is generally located amongst dense vegetation over shallow water. Clutch size is thought to be between 4 and 5 eggs and laid in spring-summer (Marchant & Higgins 1990). The generation length of the Australasian Bittern is estimated as five years (Garnett & Crowley 2000).



Breeding pairs of Australasian Bittern are solitary and territorial, occupying a relatively large home range of 40-50 ha and, therefore, occurring at low densities. The large home range suggests that food resources may be limited for this species. The number of individuals nationally has been estimated between 1,000-2,500 (Garnett & Crowley 2000; Wetlands International 2006; Birdlife International 2009). Around a half to two-thirds of the national population is estimated to occur in NSW on the basis of geographic range and the distribution of suitable wetland habitat. The number of mature individuals in NSW is estimated at 660 to 1,660.

Further reading is available online:

- NSW Scientific Committee (2009)
<http://www.environment.nsw.gov.au/resources/nature/schedules/AusBittern.pdf>
- Minister Approved Conservation Advice (2011)
<http://www.environment.gov.au/biodiversity/threatened/species/pubs/1001-conservation-advice.pdf>
- DSEWPAC Species Profile
http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1001#description

4 Habitat protection and creation at Catherine Fields

4.1 EXISTING CONDITIONS

The Australasian Bittern at Catherine Fields was observed amongst reeds fringing an instream dam on South Creek (**Figure 2**). When startled, it flew over the water to shelter on the opposite bank. This section of creek has a large open water body within the channel and is surrounded by dense trees and some gentle grade banks. The gentle banks allow water to inundate and saturate the fringing reeds, sedges and grasses during high flow or overland runoff. The dense trees/shrubs provide protection from predators. This pool is valuable to the area because the majority of South Creek and its tributaries have a narrow channel with steep banks which do not support swampy habitat and foraging areas. Other instream dams, or those offline from the creek, may provide some foraging habitat at night, but generally do not have gentle banks that allow shallow swampy conditions with reed beds (e.g. **Figure 3**). These dams are also mostly exposed (i.e. no dense screening plants) and are, therefore, poor nesting sites. To help ensure the survival of this threatened species, it is recommended that existing habitat be protected and enhanced, and additional habitat be created.



Figure 2: The “Southern Wetland” where the Australasian Bittern was observed. This dam currently has gentle banks, reeds and screening trees/shrubs.



Figure 3: The “Northern Wetland” suitable for creation of habitat. This dam currently has steep banks, limited aquatic vegetation and little screening vegetation.

4.2 ENHANCING AND CREATING HABITAT

Southern Wetland

Protection and **enhancement** of existing habitat at Catherine Fields is possible at one existing instream dam. Works required to protect and enhance this dam (the “Southern Wetland”, **Figure 4**) are:

1. Maintain dam wall to hold water for wetland vegetation, whilst providing existing fish passage;
2. Re-grade some banks to create stepped wetlands, although works should occur within the existing water body rather than outwards in existing native vegetation (ENV);
3. Maintain and improve dense plantings of shrubs and trees to provide a visual screen; and
4. Minimise roads, pedestrian paths and excessive lighting, noting the ‘pinch point’ in the south-west corner of the wetland and the heritage driveway/path. This area requires filling in the dam to create a reed bed and area for riparian vegetation and dense planting either side of the driveway/path and on the road batter.

It is acknowledged that the above requirements may not be practical in all areas due to flooding risk and public safety, but should be used as guidance where suitable.

Northern Wetland

Creation of new habitat at Catherine Fields is possible at one existing instream dam. Works required to create habitat at this dam (the “Northern Wetland” **Figure 4**) are:

1. Re-grade banks to allow inundation at various flow heights, especially during drought;
2. Planting of reeds and sedges on gentle tiered banks to create foraging and nesting structure;
3. Planting dense shrubs and trees adjacent to reed/sedge habitat to screen urban land use and provide protection from predators; and
4. Minimise roads, pedestrian paths and excessive lighting.

4.3 DESIGN ESSENTIALS FOR AUSTRALASIAN BITTERN

A combination of habitat elements will provide the best habitat for the Australasian Bittern. These are listed below and conceptualised in **Figure 5**.

- Swampy ground with reeds/sedges for foraging;
- Gentle grade to water for ease of fauna access and emergent vegetation;
- Stepped benches to provide foraging habitat during high and low flows;
- Wide dense reed zone for nesting habitat;
- Dense screening plants adjacent to habitat;
- No floodlighting, vehicle or pedestrian access;
- Pest control and protection from introduced predators (dogs, cats, foxes); and
- Public education through signage.

4.4 RECOMMENDED SPECIES FOR PLANTING

Two planting zones are required for the Bittern’s habitat:

- 1) Dense riparian trees and shrubs to screen urban activity. See **Table 1** for recommended flora species; and
- 2) Aquatic vegetation to provide foraging and nesting habitat. See **Table 2** for recommended aquatic species.

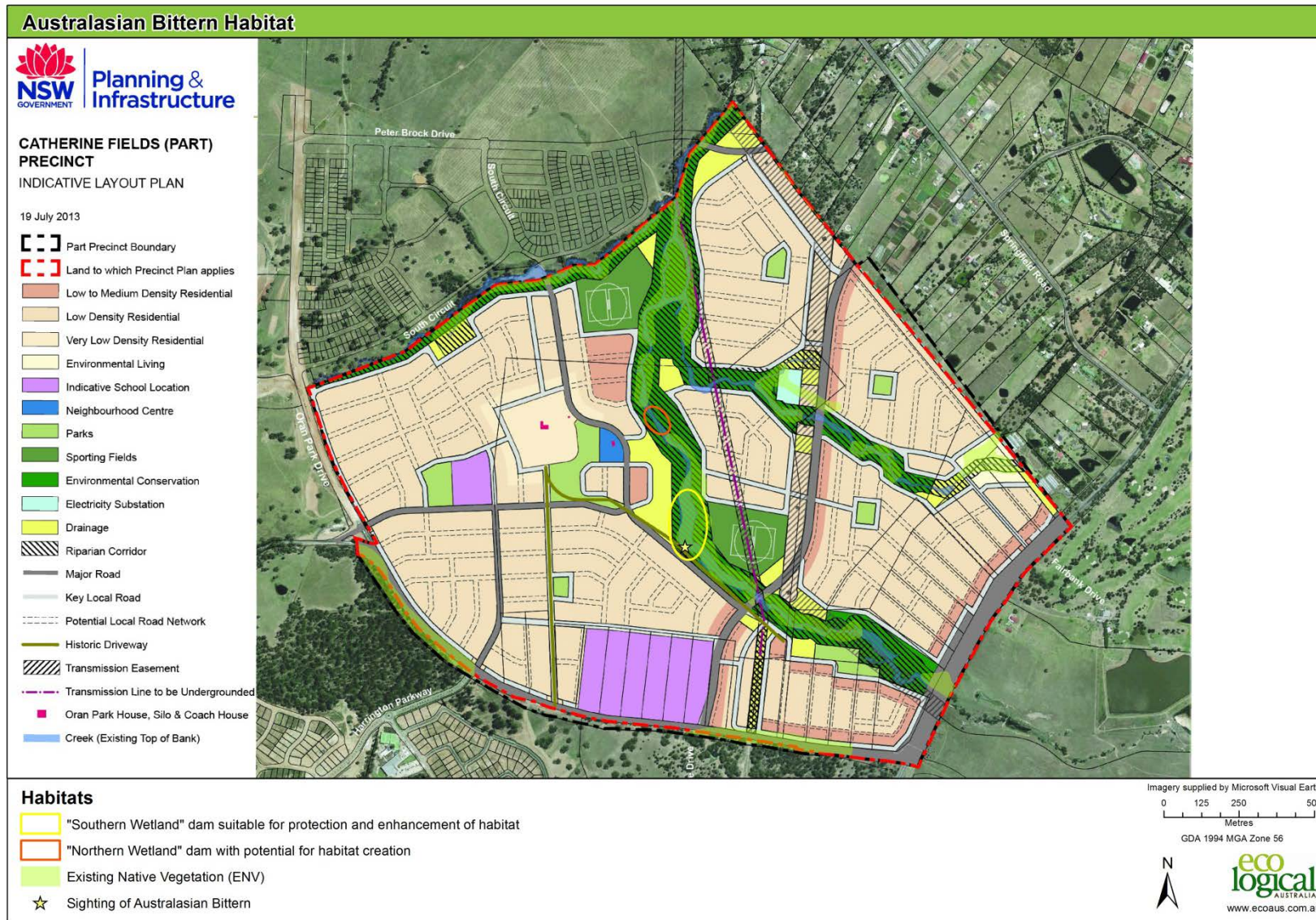


Figure 4: Existing and potential habitat for the Australasian Bittern at Catherine Fields (Part) Precinct. Indicative Layout Plan 19/07/12.

Not to scale

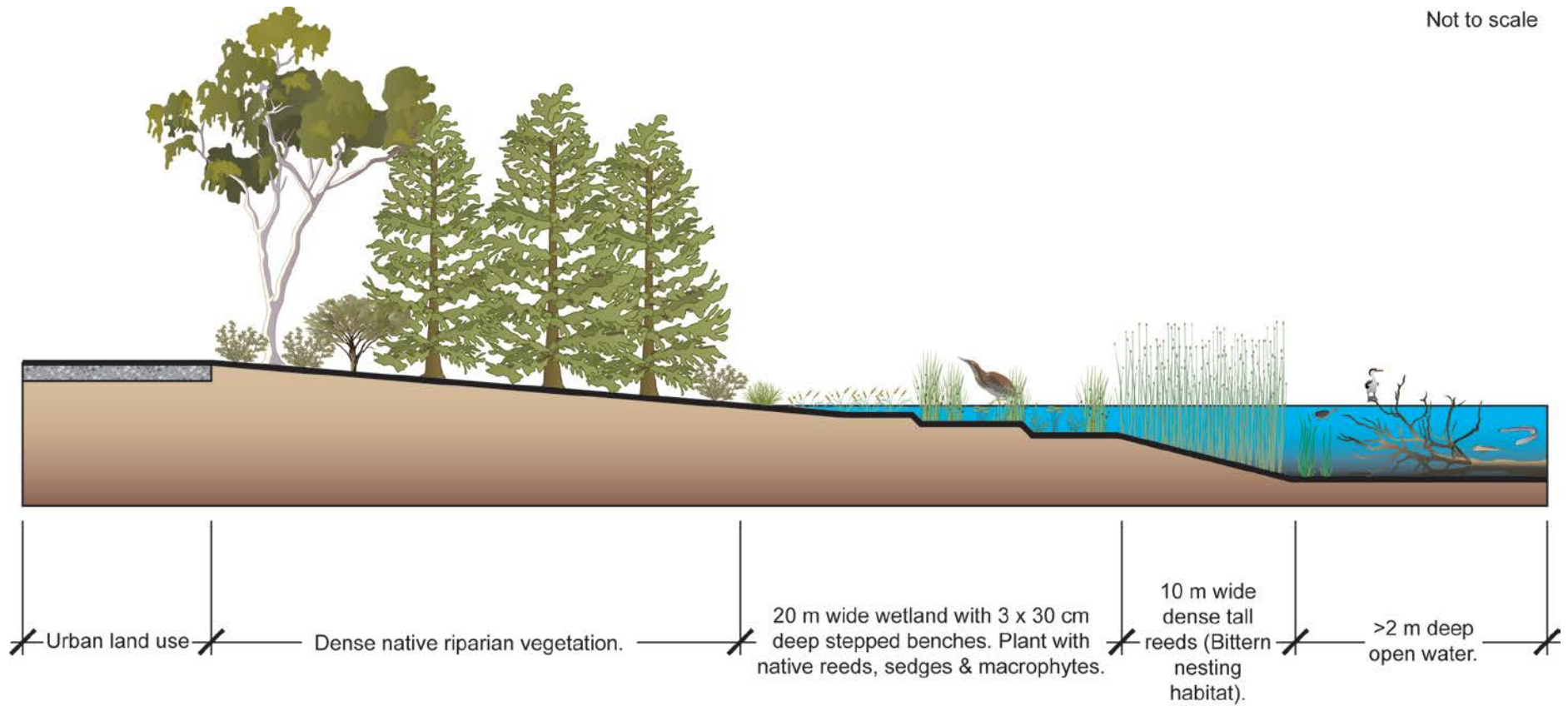


Figure 5: Cross section of wetland habitat designed for the Australasian Bittern at Catherine Fields. See Section 4.4 for recommended flora species.

Table 1: Recommended riparian flora species for screening Bittern habitat (see cross section in Figure 5). A minimum of 2 rows of overstorey species will be planted with a maximum gap between plants and rows of 3 metres. Mid-storey plants will be planted at a density of 6 plants per square metre. Additional dense shrubs may be required where roads and paths are in close proximity to maximise visual screening. Species denoted with + are characteristic of the River-Flat Eucalypt Forest on Coastal Floodplains Endangered Ecological Community (EEC) which is remnant to the creek.

Species	% of mix
Overstorey	
<i>Casuarina glauca</i> +	30
<i>Angophora bakeri</i>	10
<i>Angophora subvelutina</i> +	10
<i>Eucalyptus amplifolia</i> +	30
<i>Eucalyptus molucanna</i> +	5
<i>Eucalyptus tereticornis</i> +	15
Shrubs	
<i>Bursaria spinosa</i> +	25
<i>Dillwynia juniperina</i>	25
<i>Dononaea viscosa</i>	25
<i>Indigofera australis</i>	25
Grasses	
<i>Aristida ramosa</i>	5
<i>Aristida vagans</i>	5
<i>Baumea articulata</i>	15
<i>Chloris truncata</i>	10
<i>Chloris ventricosa</i>	10
<i>Lachnagrostis filiformis</i>	10
<i>Microlaena stipoides</i> var. <i>stipoides</i>	15
<i>Poa labillardiera</i>	15
<i>Themeda australis</i>	15

Table 2: Recommended aquatic flora species for creating Bittern habitat (see cross section in Figure 5). Species are to be planted at a density of 6 plants per square metre.

Species	% of mix
<i>Baumea articulata</i>	10
<i>Bolboschoenus caldwellii</i>	5
<i>Bolboschoenus fluviatilis</i>	5
<i>Carex appressa</i>	15
<i>Cyperus exaltatus</i>	15
<i>Eleocharis sphacelata</i>	10
<i>Juncus usitatus</i>	20
<i>Potamogeton tricarinatus</i>	5
<i>Schoenoplectus mucronatus</i>	5
<i>Schoenoplectus validus</i>	5
<i>Triglochin procerum</i>	5

4.5 FISH PASSAGE

Where instream (online) dams or wetlands are retained or created for the Australasian Bittern habitat, free fish passage needs to be considered. Of the 55 species of native freshwater fish living in New South Wales, 32 are known to be migratory and to require free passage to sustain populations. However, it is now recognised that all freshwater fish need to move freely between the various areas of their habitat, although the scales of their movements are different (Thorncraft and Harris 2000). Fish passage is the term describing the directed movement of fish past a point in a stream. It particularly relates to the engineering and biological aspects of restoring free passage at instream barriers. Fishways are structures that allow fish to pass barriers. The seven broad categories of fishways that have been used or considered in New South Wales are the pool type (including vertical-slot), Denil, lock, trap-and-transport, rock-ramp, bypass, and eel fishways.

At Catherine Fields, the most suitable fish passage design for online dams and wetlands is a bypass channel. Bypass fishways are low-gradient earthen or rocky channels that mimic the structure of natural streams and are often described as 'nature-like' fishways. They may provide a cheaper alternative to the more technical fishway designs. The design will vary depending on surface grade and available space, but should include essential elements including meanders and natural stream materials (e.g. sand, gravel, pebble, rock and aquatic plants). The bypass channel should resemble the conceptual design in **Figure 6**.

Also, to ensure connectivity throughout the greater creek system, any structures that cross waterways in Catherine Fields (e.g. roads and pipes) should follow design guidelines for bridges and culverts in "*Fish passage requirements for waterways crossings*" (Fairfull and Witheridge 2003).

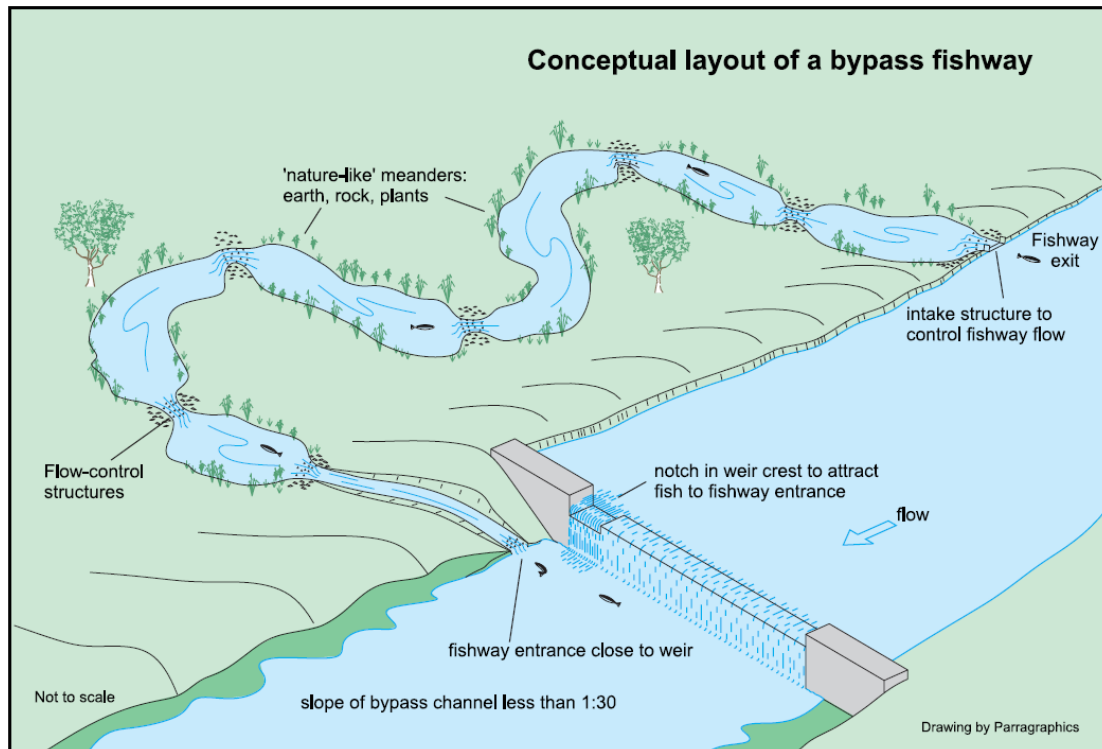


Figure 6: Conceptual design of a bypass fish passage suitable at Catherine Fields. Diagram from Thorncraft and Harris (2000).

5 Survey requirements for Australasian Bittern

The Commonwealth Species Profile and Threats Database (SPRAT) provide the following survey guidelines for the Australasian Bittern (SEWPaC 2013).

The Australasian Bittern is difficult to detect visually. In most habitats, the recommended method for surveying the Bittern is by nocturnal survey with detection by call. Surveys should be conducted during the spring-summer breeding season when calls are most often heard. Surveys would be most effective during calm weather. Advertising calls may be detected up to 800-1000 m away. At close range, the Bittern can be heard emitting several short gasps followed immediately by several deep resonant 'booms'. This series of calls is delivered over a period 10-15 seconds. It is recommended that each site be surveyed for a minimum of 1 hour listening time. This method allows many wetlands to be surveyed in a short period of time. It is unlikely that all birds present at a site will call and therefore this method is likely to underestimate population size.

In temporary wetlands it may be possible to count aggregations of birds when the waters become shallow prior to drying out. In such habitats, area searches are recommended (population densities may be too low for transect surveys). Observers should systematically cover as much habitat as possible whilst wading through the wetland to flush concealed birds. Wading should be focused in vegetation that allows observers to observe Bitterns that may flush several metres ahead.

6 Recommendations

To best protect the Australasian Bittern habitat in Catherine Fields (part) Precinct, the following steps are recommended:

1. Map existing features along all riparian corridors that would likely form key habitat for the Bittern, and that have the potential for improvement (e.g. new wetlands outside of ENV areas). Also identify habitat that would be retained or lost due to the precinct development, such as offline dams. This will help evaluate the spatial extent of existing and potential habitat.
2. Conduct field surveys using call playback and active searches for the Australasian Bittern. This should be conducted in the spring-summer breeding season during calm and warm weather. Active searches include diurnal searches of potential nesting locations and dusk/nocturnal spotlighting of key foraging areas. Call playback is to be a minimum of 1 hour in the early evening per existing habitat;
3. Document the survey results above and develop a management plan for the conservation of the Australasian Bittern at Catherine Fields. The plan may include:
 - a. Site-specific design guidelines for enhancing/protecting habitat, such as bank modifications, wetland size and planting guides;
 - b. Monitoring requirements of constructed/protected habitats to ensure long term effectiveness, such as planting success, weed monitoring and future bird surveys; and
 - c. Recommended text and locations of public awareness signage.

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