Management Plan for Australian White Ibis (*Threskiornis molucca*)

Lake Annan, Mount Annan NSW

January 2013

Executive Summary

Camden Council has developed this Management Plan for Australian White Ibis at Lake Annan, Mount Annan to assist with meeting legislative requirements for managing a native species in an urban area and simultaneously demonstrating responsible and ethical environmental management which is conducted strategically and sustainably.

Australian White Ibis (AWI) is a common native Australian species protected in New South Wales (NSW) under the NSW *National Parks and Wildlife Act 1974*. The eastern seaboard of Australia is considered an important refuge for ibis populations displaced from traditional inland breeding sites through years of drought and ecologically damaging water management practices. Where local government authorities, private organisations or landholders determine the need to manage breeding AWI colonies, a Section 121 Occupier's Licence to Harm Fauna in NSW must be obtained from NSW National Parks & Wildlife Service (NPWS).

Since 2004, AWI have expanded their roosting and nesting sites in the Sydney Region. By late 2007, Lake Gillawarna at Georges Hall and Lake Annan were the number 1 and 2 AWI sites respectively in Sydney for breeding and roosting. The large number of AWI in urban areas has affected public amenity, aircraft safety, water quality and biodiversity, prompting complaints and the need for management of AWI in the Sydney Region.

During 2009/10 Camden Council participated in the AWI Regional Task Force together with the NSW NPWS and Bankstown City Council for the development of the Sydney Regional Ibis Management Plan. This document is now complete and is considered a working draft plan awaiting adoption or endorsement from the NSW Office of Environment and Heritage (OEH)

The Working Draft Sydney Regional Ibis Management Plan identifies colonies of 3 sizes and applies different management strategies and licensing requirements for each. A NPWS licence is required before any intervention can be undertaken. In order to obtain a licence for colonies over 50 birds, the landowner must submit a detailed site management plan with the application.

This plan identifies the site management objectives and makes recommendations for active management of the AWI population at Lake Annan.

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1 Introduction

Prior to July 2006, Australian White Ibis (AWI) roosted on Lake Annan Island in numbers smaller than 20 birds. It was at this time following a population explosion, that a number of local residents expressed concern at the increasing number of AWI and active management strategies of the Ibis commenced.

At the time of population increase, developers of Mount Annan, Landcom, contracted consultants Ecosure to undertake population counts at both Lake Annan and Jacks Gully Waste Facility from June 2006 to June 2009. Ecosure estimated there was population high of 1338 AWI in December 2007. Jacks Gully became a covered Waste Facility in late 2008, and the landfill was closed to putrescibles waste in 2009.

Eastern Creek is another waste facility that Ibis are frequently observed foraging at. This facility will cease accepting untreated putrescible waste by the end of June 2017. It is expected that this would also result in fewer Ibis being present.

The AWI population at Jacks Gully dropped from a high of 400 to averages of 20 to 60 birds following the closure of the landfill. The AWI population at Lake Annan has also correspondingly dropped during this period, but stabilised over the last two years to approximately 700 birds. AWI generally breed from July to February, however in 2012 they were observed breeding in May. Depending on the availability of food and nesting resources this species has the potential to breed all year round (OEH per. comm. 2012).

In 2008 a National Ibis Conference was held in Sydney and it was resolved that NPWS would coordinate the development of a Sydney Regional Management Plan for AWI to guide the actions of landholders such as local councils.

In 2009, Camden Council participated in a Sydney Regional Forum for AWI and provided input into the development of the Sydney Regional Ibis Plan. This is now complete and is considered a “Working Draft Plan” awaiting adoption or endorsement from the NSW OEH.

The Working Draft Sydney Regional Ibis Management Plan identifies colonies of 3 sizes and applies different management strategies for each.

AWI Colony definition	Licence requirements for active management
Small colonies (less than 50 individuals)	An Australian White Ibis General (120) or Occupiers (121) Licence Application must be lodged
Medium to large colonies (greater than 50 individuals)	An Australian White Ibis General (120) or Occupiers (121) Licence Application must be lodged accompanied by a Site Management Plan
Refuge colonies (proposed Lake Annan, Lake Gillawarna, Bicentennial Park and Centennial Park)	An Australian White Ibis General (120) or Occupiers (121) Licence Application must be lodged accompanied by a Site Management Plan, which indicates that at least 50% of active nests will be left undisturbed.

The Working Draft identifies that a Sydney wide population of at least 6,500 individuals be maintained. If the population falls below this number the enforced level of protection may be increased (i.e. 75% of nests at refuge colonies to be left undisturbed).

2 Lake Annan

2.1 Site Description

Lake Annan in Mount Annan was constructed in the early 1990s as a combined sedimentation and macrophyte water quality control pond in-line within Narellan Creek. The lake is 2.7 hectares in size and the island 3000m^2 in area.

The lake is surrounded by residences and is located in the northern part of the suburb Mount Annan, approximately 500 metres to the south of Narellan Rd, 1 kilometre to the west of the Australian Botanic Gardens (Mount Annan), and 52 kilometres to the south west of Sydney CBD.

The area covered in this plan includes Lake Annan Island and the Birriwa Reserve at the perimeter of the island. A map identifying the area covered by this Management Plan is provided below.

Figure 1: Area of Land Covered by the Management Plan

In June 2011 there were 16 AWI nest complexes varying from 0.3 to 1.5 m^2 in area and three nest complexes in the lower branches of trees that would contain approximately 50 eggs at one time. The majority of ground nests are in use, however since egg oiling commenced in September 2012, approximately half of the nests where egg oiling was undertaken have since been abandoned. Ground nests that are still active generally contain fresh vegetative material in addition to other items that the AWI consider will make the nest more comfortable to lay their in eggs in such as bits of plastic and netting. The issue with netting is that chicks and juveniles have a tendency to get their legs caught in this material and perish. There were 6 woody weed piles (all 1.5 m^2 in area), two of which have been utilised for nests. The northern part of the island is quite bare due to past vegetation removal for nest building and soil compaction.

Over subsequent egg oiling visits it has become evident that the AWI have sensed that there has been interference with their nests occurring. AWI do have a keen sense of smell and their eyesight is also relatively good (pers. comm NPWS September 2012). This does provide an explanation as to why a number of coloured oiled eggs were ejected out of the AWI shortly after oiling had taken place. The assumption is that the AWI have concluded the oiled eggs were not viable, as they looked and smelt different. The issue with the ejection of the oiled eggs is that the AWI are then inclined to produce another clutch to compensate for the non–viable eggs.

2.2 Site Significance

2.2.1 Biological

Lake Annan Island offers protection from predators to a range of birds during breeding season and for roosting, hence its attraction to AWI. It had been noted in 2001 (Lake Annan Plan of Management) the island was also an important roosting site for Cattle Egret (*Bubulcis ibis*) which is the only migratory bird in Camden Local Government Area listed under the international bird treaty (Jamba/Camba). Additionally Black Swans (*Cygnus atratus*), Purple Swamp Hens (*Porphyrio porphyrio melanotus),* Masked Lapwing Plovers *(Vanellus miles*) and Little Black Cormorants *(Phalacrocorax sulcirostris)* nest on the island. Black Swan, Masked Lapwing Plover and Purple Swamp Hen have all successfully raised offspring in 2012.

While food resources remain sufficient ibis will continue to breed therefore, the key to ibis management is to restrict their food supply particularly at putrescible waste landfills. With continued breeding, ongoing resources will be required to manage colonies that may splinter due to saturation and move into surrounding urban areas causing increased public nuisance and health concerns.

The island is also close to Jacks Gully Waste and Recycling Centre which prior to it becoming a covered waste management facility in the latter half of 2008, offered a substantial food source in the form of putrescibles waste. Since 2008 the White Ibis population at Lake Annan has decreased due to more limited food sources. Eastern Creek Waste Management Centre which at present is a substantial source of putrescible waste is approximately 30 kilometres to the north. This waste facility will no longer accept putrescible waste from 30 June 2017 (pers. comm Waste Assets Management Corporation October 2012).

2.2.2 Landscape

At the time the lake was constructed, the island contained core remnant vegetation of Cumberland Plain Woodland, mainly *Eucalyptus terreticornis* and *Eucalyptus molucanna*, *Bursaria spinosa* and Bursaria *Atriplex* species*. S*ome *Casuarina glauca* were planted along with other species to enhance the landscape in the early 1990s. There was also a large number of the noxious weed African Boxthorn on the island, although most of these and the native shrubs have been utilised for nesting material. The northern part of the island is now quite denuded and compacted and subject to erosion. The perimeter park surrounding the lake has some large remnant *Eucalyptus terreticornis*, but has mostly been planted with *Corymbia maculata*.

2.2.3 Aboriginal

There are no known Aboriginal sites in the locality and no assessment has been undertaken. As explained in the Landscape and Historical comments, this area has been heavily developed with residential development and associated landscaping. It is not intended as part of this Australian White Ibis Site Management Plan to disturb the soil. If in the future soil disturbance is required consultation and guidance will be sort from the NSW Office of Environment and Heritage.

2.2.4 Historical

Lake Annan was constructed in the early 1990s as a combined sedimentation and macrophyte water quality control pond in-line within Narellan Creek. It was a pilot scheme for reducing pollution loads from stormwater run-off. The island was placed centrally in line with the inflow to disperse the flow and reduce short circuiting. The island was also to provide a refuge for fauna and additional lake edge for macrophyte plants. However the lake is considered undersized in regards to its catchment and during community consultation in August 2001 some resident concerns were expressed in relation to odours and aesthetics, and ongoing impacts to water quality due to development in the catchment.

Since the 1990s there has been particularly during the warmer months of the year, algal growth (including filamentous green algae and blue green algae), which is an indication of excess nutrient level. AWI have exacerbated this situation. Council is currently considering the redesign of Lake Annan as it is considered that the current effectiveness of Lake Annan as a water control pond is quite limited.

2.2.5 Recreational

There is no recreation activity on the island, as the purpose of the island is to provide a wildlife refuge for native birds. Recreational use of the perimeter of the island is limited to passive activities including walking, sitting, playing and bird watching. Over the years these recreational activities have been severely impacted by the sight of algal blooms and foul smells. The AWI have exacerbated this situation by adding to the nutrient load of the lake.

2.3 Site Issues

Australian White Ibis (AWI) roosted on Lake Annan Island in numbers smaller than 20 birds which significantly increased in 2006 to become the second largest breeding colony in the Sydney region.

The following issues have been identifies as associated with AWI at Lake Annan.

Issue relevant to site (✓)	Possible issues associated with AWI on-site	Additional Comments
✓	Smell	With the current count of AWI on the island close to 700 birds and the resultant droppings, and at times large numbers of dead birds, the smell can be overwhelming, particularly on warm to hot days.
✓	Noise	Mostly noisy in early mornings and at sunset. However at times this includes a large flock of Corellas roosting on the island during the night.
✓	Affect on water quality	There has been no water monitoring, however algae has been observed and blue-green algae warnings provided during the warmer months. Anecdotal evidence suggests that the water quality has been affected since the population explosion of AWI on the island.
Unknown	Fauna displacement	No records of frequency of previous Cattle Egret roosting on the island. They are still observed on the island. Other avifauna such as Little Black Cormorant, Black Swans and Purple Swamp Hens and Masked Lapwing Plovers still co-exist and breed on the island. Previous numbers unknown.
✓	Damage to vegetation	This has been quite extensive, particularly to some of the new landscaping. Vegetation on the island has been intensively used by AWI to make nests. Also the northern part of the island is bare where the nest complexes are extensive and the resultant phosphorous rich soils have impacted on the native vegetation. Some residents have reported that Ibis in the past have collected large quantities of twigs from domestic shrubs to aid nest building.
✓	Public nuisance at eating and recreational areas	The biggest nuisance is the occasional dead birds along the outer perimeter of the lake. There have been reports at times of birds eating out of bins at a few local shopping centres. Also at time of closure of landfill to putrescibles waste and the covering of the Jack's Gully Waste facility there were reports of birds entering cafes in Campbelltown, possibly in search of new food sources.
Unknown	Risk of aircraft strike	There have been no known complaints from Camden Airport which is approximately 5 kilometres away.
✓	Risk to public health	Some potential as water quality (and resulting blue-green algae) is exacerbated by AWI, including dead birds.
✓	Risk to sensitive site	Damaging vegetation on island which is Cumberland Plain Woodland remnant, a Critically Endangered Ecological Community. Also large numbers of birds have at times roosted at Australian Botanic Gardens, Mount Annan. It is assumed they are part of the breeding population from Lake Annan Island.
✓	Deteriorating image of Lake Annan	The presence of AWI (and associated problems) is one of number of contributing factors to the overall declining image of Lake Annan and its public amenity.

Table 1: Site issues associated with AWI at Lake Annan

3 Site Population Survey

3.1 Roost Counts

Ibis roost counts are designed to establish the number of ibis roosting overnight at a given site. Camden Council commenced roost counts in September 2009 utilising the following methodology:

Step 1: At one and a half hours prior to sunset, estimate the total number of chicks (a) and adults (b) on-site.

Step 2: From an hour and a half before sunset until the last ibis has returned, record the number of ibis flying in (c) and the number of ibis flying out (d).

Step 3: Add the total number of adults on-site (b) to the number of ibis flying in (c) and subtract the number of ibis flying out (d) to identify the total adult population (e).

Step 4: Calculate the overall population estimate by adding the total adult population (e) to the total number of chicks on-site (a)

Table 2 shows the roost count data from September 2009 till October 2012.

nr = not recorded / not observable			**a**	**b**	**c**	**d**	**b + c – d = e**	**a + e**
Date	**Time started**	**Time finished**	**Total chicks on-site**	**Total adults on-site**	**No# of ibis flying in**	**No# of ibis flying out**	**Total adults**	**Total ibis (chicks & adults)**
22/09/09	8.45am	12 noon	225	620	nr	nr	620	845
22/12/09	3.30pm	8.00 pm	51	205	244	0	449	500
15/09/10	3.00pm	4.00 pm	195	487	nr	nr	487	682
01/11/10	4.30pm	6.45 pm	68	297	38	0	335	403
15/10/12	5.20pm	7.00pm	60	410	254	50	614	674

Table 2: Ibis roost count data from September 2009 till October 2012

3.2 Population Data

Since August 2009, Camden Council has undertaken AWI population counts for Lake Annan. Table 3 shows population numbers from August 2009 to December 2012.

Table 3: Population Counts of AWI at Lake Annan 2009-2012

	Live Birds								Dead Birds Removed				
Site Time Date	**Adults**	**Juveniles**	**Chicks**	**Total**	**New Eggs**	**Old Eggs**	**Total Eggs**	**Eggs Oiled (max 50%)**	**Adults**	**Juveniles**	**Chicks**	**Total**	**Weight (kg)**
Lake Annan Island and outside perimeter 9.30 to 11.00am 25/08/2009	421	241	447	**1109**			**644**		7	13	37	**57**	36
Jack's Gully 3.00pm 25/08/09	**69**												
Lake Annan outside perimeter 18/09/09									9				8
Lake Annan Island and outside perimeter 8.45 am to 12 noon 22/09/2009	430	190	225	**845**			**555**		26	50	138	**214**	88.5
Jacks Gully 12.30 pm 22/09/2009	**40**												
Lake Annan and outside perimeter 22/09/2009									14				11
Lake Annan island and outside perimeter 7/10/2009 9am to 1.00 pm	600	110	147	**857**			**428**		22	54	98	**174**	110
Lake Annan island and outside perimeter 28/10/09 9am to 12.30 pm	350	80	163	**593**			**569**		16	37	59	**112**	58.5
Lake Anna Island and outside perimeter 11/11/09 9am to 11.30am	419	77	166	**662**			**376**		3	18	17	**38**	25.5
Jacks Gully 12.00 pm 11/11/2009	**20**												
Lake Annan outside perimeter 20/11/09									2				

Table 3: Population Counts of AWI at Lake Annan 2009-2012 – Cont'd

	Live Birds								Dead Birds Removed				
Site Time Date	**Adults**	**Juveniles**	**Chicks**	**Total**	**New Eggs**	**Old Eggs**	**Total Eggs**	**Eggs Oiled (max 50%)**	**Adults**	**Juveniles**	**Chicks**	**Total**	**Weight (kg)**
Lake Annan Island and outside perimeter 25/11/09 8.45 to 10.30 a,	258	96	223	**577**			**216**		13	34	40	**87**	58.9
Jack's Gully 25/11/09 11.30 am	**60**												
Lake Annan Island and outside perimeter 8/12/09 8.30 to 10.00am	299	102	89	**490**			**106**		6	29	38	**73**	39
Jack's Gully 8/12/09 10.30am	**50**												
Lake Annan island and outside perimeter 22/12/09 3.30 to 5.50 pm	102	103	51	**256**			**26**		21	30	25	**76**	51
In-flight of birds Lake Annan 6.00 pm to 8.00 pm 22/12/09, 217 from south & 27 from north	244			**244**									
Lake Annan Island 15/11/09 *		38	9	**47**			**0**			33	6	**39**	10
Lake Annan Island & outside perimeter (count from outside perimeter) 21/01/2010				**162**									
Lake Annan Island & outside perimeter (count from outside perimeter) 1/2/2010				**138**									
Lake Annan Island & outside perimeter (11/2/2010 8.30 am to 10.00am)	104	4	0	**108**			**0**			15	2	**17**	11
Lake Annan Island & outside perimeter (count from outside perimeter) 11/2/2010 @ 3.30pm)	110			**110**									
Jacks Gully 11/2/2010 @ 3.15pm	**92**												

Table 3: Population Counts of AWI at Lake Annan 2009-2012 – Cont'd

	Live Birds								Dead Birds Removed				
Site Time Date	**Adults**	**Juveniles**	**Chicks**	**Total**	**New Eggs**	**Old Eggs**	**Total Eggs**	**Eggs Oiled (max 50%)**	**Adults**	**Juveniles**	**Chicks**	**Total**	**Weight (kg)**
Lake Annan island and outside perimeter March 2010 (only dead birds weighed)													5
Lake Annan Island & outside perimeter (count from outside perimeter) 19/3/2010 @ 1.00pm)	35			**35**									
Lake Annan island and outside perimeter 1 September 2010 (only dead birds counted)									17	5	8	**30**	17.5
Lake Annan Island & outside perimeter (18/10/2010 8.30 am to 9.30am)	410	98	93	**601**			**266**		10	15	11	**36**	20.5
Lake Annan Island & outside perimeter 1/11/2010 4.30 pm to 5.00 pm)	242	55	68	**365**			**126**		3	12	11	**26**	12
In-flight of birds Lake Annan 5.00 pm to 6.45 pm 1/11/2010	38												
Lake Annan outside perimeter9 November 2010 (only dead birds counted)									13				11
Lake Annan Island & outside perimeter 24/11/2010 9.00 am to 9.30 am)	229	30	23	**282**			**160**		5	16	5	**26**	7
Jack's Gully 24/11/2010 10.15am	**25**												
Lake Annan Island & outside perimeter 21/12/2010 8.30 am to 9.15am)	182	12	98	**292**			**80**		5	1	9	**15**	5.5
Jack's Gully 21/12/2010 10.00am	**10**												
Lake Annan Island & outside perimeter 2/2/2011 9.00 t 9.30 am)	95	24	4	**123**			**18**		3	7	6	**16**	4.5

Table 3: Population Counts of AWI at Lake Annan 2009-2012 – Cont'd

	Live Birds								Dead Birds Removed				
Site Time Date	**Adults**	**Juveniles**	**Chicks**	**Total**	**New Eggs**	**Old Eggs**	**Total Eggs**	**Eggs Oiled (max 50%)**	**Adults**	**Juveniles**	**Chicks**	**Total**	**Weight (kg)**
Jack's Gully 2/2/2011 10.00am	**30**												
Lake Annan Island & outside perimeter 16/3/2011 8.45 am t 9.15 am)	43	7	0	**50**			**0**			4	1	**5**	4
Jack's Gully 16/3/2011 9.45am	**28**												
Lake Annan Island & outside perimeter24/3/2011 1.00 pm), counted from edge of lake	**24**												
Lake Annan Island & outside perimeter 7/4/2011 3.30 pm) , counted from edge of lake	**14**												
Lake Annan Island & outside perimeter 12/07/2011 9.30 am to 10.15 am)	244	16	229	**489**			**380**			12		**12**	
Jacks Gully 12/7/2011 11.00am	76												
Lake Annan Island 11/08/2011 2.00 to 3.00pm										2	26	**28**	10.5
Lake Annan Island & outside perimeter 31/08/2011 2.10 to 2.50 pm)	408	109	223	**740**			**531**		2	4	9	**15**	8
Jacks Gully 31/08/2011 2.00 pm	50												
Lake Annan Island & outside perimeter 27/09/2011 8.55 to 9.25am)	475	135	173	**783**			**357**		3	10	33	**46**	23
Jacks Gully 27/09/2011 10.25 am	80												
Lake Annan Island & outside perimeter 18/10/2011 9.30 to 10.10am)	467	164	179	**810**			**381**		8	12	14	**34**	23

Table 3: Population Counts of AWI at Lake Annan 2009-2012 – Cont'd

	Live Birds								Dead Birds Removed				
Site Time Date	**Adults**	**Juveniles**	**Chicks**	**Total**	**New Eggs**	**Old Eggs**	**Total Eggs**	**Eggs Oiled (max 50%)**	**Adults**	**Juveniles**	**Chicks**	**Total**	**Weight (kg)**
Lake Annan Island & outside perimeter 3/11/2011 9.30 to 10.20am)	610	109	145	**864**			**374**		3	24	17	**44**	28.5
Lake Annan Island & outside perimeter 19/12/2011 8.30 to 9.15am)	263	39	52	**354**			**150**		4	9	16	**29**	8
Lake Annan Island & outside perimeter 20/01/2012 8.45 to 9.30 am)	125	49	84	**258**			**36**		1	24	16	**41**	11
Lake Anna Island and outside perimeter 28/02/2012 9.15 am to 10.00 am	84	14	1	**99**			**17**		1	13	2	**16**	6.5
Jacks Gully 28/02/2012 10.15 am	60												
Lake Annan Island and outside perimeter17/05/2012 9.15 am to 10.15 am	150	55	55	**260**			**329**			1	1	**2**	
Jacks Gully 17/05/2012 10.45 am	60												
Lake Annan Island and outside perimeter 14/062012 9:15am to 10:30am	200	60	70	**330**			**390**						19kg
Jacks Gully 14/06/2012 11am	60												
Lake Annan Island and outside perimeter 2/07/2012 9:15am	350	160	255	**765**			**500**		6	2	7	**15**	16kg
Jacks Gully 2/07/2012 11am	55												
Lake Annan Island and outside perimeter 19/07/2012 9:15am to 10:30am	360	170	140	**670**			**361**						22kg
Jacks Gully 19/07/2012 11am	50												
Lake Annan Island and outside perimeter 6/08/2012 9am	300	200	160	**660**			**380**		2	2	6	**10**	10.5kg

Table 3: Population Counts of AWI at Lake Annan 2009-2012 – Cont'd

	Live Birds								Dead Birds Removed				
Site Time Date	**Adults**	**Juveniles**	**Chicks**	**Total**	**New Eggs**	**Old Eggs**	**Total Eggs**	**Eggs Oiled (max 50%)**	**Adults**	**Juveniles**	**Chicks**	**Total**	**Weight (kg)**
Jacks Gully													
Lake Annan Island and outside perimeter 22/08/2012 9:15am to 11.30am	200	100	162	**462**			**431**		7	7	40	**54**	36kg
Jacks Gully 22/08/2012 12pm	50												
Lake Annan Island and outside perimeter 5/09/2012 9:15am to 11.30am	240	200	172	**612**			**344**		4	25	40	**70**	53kg
Jacks Gully 5/09/2012 12pm	48												
Lake Annan Island and outside perimeter 24/09/2012 9:00am till 12:45pm (egg oiling commenced	200	350	50	**600**			**430**	215	19	58	29	**106**	119kg
Jacks Gully 24/09/2012 1.15pm	55												
Lake Annan Island and outside perimeter 15/10/2012 9:00am till 12:00pm (egg oiling)	150	200	60	**410**			**472**	236	2	26	20	**48**	28kg
Jacks Gully 15/10/2012 12.30pm	60												
1/11/2012 10am till 1.30pm Lake Annan Island and outside perimeter (egg oiling)													41kg
Jacks Gully 1/11/2012 2pm	55												
19/11/2012 10am till 12.15pm Lake Annan Island and outside perimeter (egg oiling)	200	150	36	**386**	**27**	**309**	**336**	13	5	22	4	**31**	22kg
Jacks Gully 19/11/2012 12;45pm	60												
* Birds not counted on outside perimeter of Lake Annan													

4 Site Management & Actions

Camden Council recognises that the AWI colony at Lake Annan is not a geographically isolated issue but part of a region-wide AWI population. The 2010 Draft Sydney Regional Management Plan for AWI recognises Lake Annan as a refuge breeding colony.

This plan aims to enable Camden Council to effectively mitigate site specific negative impacts associated with AWI by providing a comprehensive and clear guideline for on-site management.

4.1 Past Management Actions

In response to residents' complaints Council undertook a monthly removal of dead AWI from the island and Lake Annan perimeter from October 2008 to late August 2009, and then a fortnightly removal of dead birds from late August 2009 during the breeding season which lasts usually from July to December each year. The dead birds are taken to the Sydney University Veterinary complex at Cobbitty for weighing and burning.

In July 2012 a Section 121 Occupier's Licence to Harm Native Fauna under the *National Parks and Wildlife Act 1974* was approved by the NSW National Parks and Wildlife Service (NPWS) Licensing Division of the Office of Environment and Heritage (OEH). In September 2012 egg oiling of 50% of eggs within 50% of nests located on the Island commenced. This is anticipated to continue until the current breeding cycle is completed.

4.2 Site Management Objectives and Actions

Due to the environmental damage caused by, and public health and nuisance issues arising from, the refuge colony of AWI at Lake Annan, the 'do nothing' approach is not adequate as unpredictable outcomes could arise.

Council has identified specific vision for Lake Annan that is:

> *to create a sustainable, ecologically diverse aquatic and riparian environment that successfully integrates with the adjoining park areas and surrounding environment.*

To achieve this, Table 4 shows the objectives and management strategies to reduce the impact and restrict breeding of AWI on Lake Annan.

Table 4: AWI Management Objectives and Actions for Lake Annan

	Objective	Management Strategy	Management Action	Timeframe	Responsibility	Comment
1.0	Reduce AWI breeding on-site in vegetation	Restrict breeding success	Remove eggs from nests being targeted for egg oiling (smash onsite).	Included during fortnightly AWI count and carcass removal	Contractor	
2.1	Reduce AWI breeding on-site on the ground	Restrict breeding success	Undertake egg oiling.	Fortnightly throughout breeding season [July - Dec]. NB Potentially ongoing if Ibis breed all year round.	Contractor	• A Section 121 Licence has been obtained from NPWS (valid until 18/07/2014). Due to Council having a current Section 121 Licence (Occupier's Licence and Council owns the land), on the advice of OEH (November 2013).a separate Section 120 licence to undertake egg oiling was not required • Council conducted egg oiling during the 2013 breeding season. In the future if Council decides to engage a contractor to undertake egg oiling on behalf of Council, they will need to be licenced (a s120 licence required under NP& W Act 1974). • Ensure that chicks are not present or in adjacent nests.
2.2			Undertake nest removal (ecological burn) over two years - 2013 & 2014.	50% of the remainder of currently existing nests – 2014. 50% of existing nests were burnt in 2013 NB to be conducted outside breeding season (April - June) and outside of bushfire danger period.	Natural Resource Officer/ NSW Fire and Rescue	• Consultation with EPA with regards to Pile Burns A Section 132C Licence has been obtained under NP&WS Act 1974 and is valid until 30 June 2014. • Ensure that chicks are not present or located adjacent nests. • 50% of existing nests were burnt on 27 May 2013 with assistance from NSW Fire and Rescue

Table 4: AWI Management Objectives and Actions for Lake Annan (con'td)

	Objective	Management Strategy	Management Action	Timeframe	Responsibility	Comment
3.0	Reduce ibis roosting on-site	Restrict Roosting Opportunities	Roost dispersal	Twice per week outside breeding season (Jan to June)	Natural Resource Officer/ Contractor	
4.1	Improve water quality	Restrict breeding success	Undertake egg oiling	Fortnightly throughout breeding season [July - Dec]. NB Potentially ongoing if Ibis breed all year round.	Contractor	• Refer to 2.1
4.2		Restrict roosting opportunities	Undertake nest removal (ecological burn) over two years - 2013 & 2014.	50% of nests – of the remainder of currently existing - 2014 50% of existing nests were burnt in 2013 NB to be conducted outside breeding season (April -June) and outside bushfire danger period.	Natural Resource Officer/ NSW Fire and Rescue	• Refer to 2.2
4.3		Ground Maintenance on Lake Annan Island, Birriwa Reserve and waterways.	Carcass removal	Fortnightly during peak breeding season or as required.	Contractor	

Table 4: AWI Management Objectives and Actions for Lake Annan (con'td)

	Objective	Management Strategy	Management Action	Timeframe	Responsibility	Comment
5.1	Improve/protect vegetation	Restrict breeding success	Undertake egg oiling	Fortnightly throughout breeding season [July-Feb]. NB Potentially ongoing if Ibis breed all year round.	Contractor	Refer to 2.1
5.2		Restrict roosting opportunities	Undertake nest removal (ecological burn) over two years - 2013 & 2014.	50% of nests – 2014. 50% of nests were burnt in May 2013. NB to be conducted outside breeding season (April-June), and outside of bushfire danger period.	Natural Resource Officer/ NSW Fire and Rescue	Refer to 2.2
5.3		Island restabilisation project	Revegetation and stabilisation of banks	2013/2014	Natural Resource Officer	
6.0	Improve community understanding of AWI	Community Education	Develop and implement AWI Education Strategy	Ongoing	Natural Resource Officer/ Environmental Education Officer	

Table 4: AWI Management Objectives and Actions for Lake Annan (con'td)

7.1	Improve odour and public health	Restrict breeding success	Undertake egg oiling	Fortnightly throughout breeding season [July-Feb]. NB Potentially ongoing if Ibis breed all year round.	Contractor	• Refer to 2.1
7.2		Ground Maintenance on Lake Annan Island, Birriwa Reserve and waterways.	Carcass removal	Fortnightly during peak breeding season or as required.	Contractor	
8.0	Contribute to sustaining a baseline AWI population throughout the Sydney Basin	Monitor Lake Annan refuge colony	Fortnightly population counts Quarterly roost counts.	Fortnightly counts ongoing. Quarterly counts to be undertaken January, April, July and October. Annual census to be undertaken in October each year.	Fortnightly counts 3 - 4 hours approximately. Roost count -1 1/2 hours before sunset.	• Fortnightly counts are undertaken during carcass removal during the daytime. • Quarterly counts (roost counts are undertaken 1/1/2hours before sunset.

5 Population Control Measures

5.1 List of Management Actions

Based on the objectives outlined in Section 4, the following activities need to be carried out. These should be performed by adequately trained personnel wearing the necessary personal protective equipment (PPE). Appendix A illustrates recommended PPE. Appendix B outlines a Standard Operating Protocol for working in situ with native birds.

If at any time, an ibis (of any age) is harmed while performing any of these management actions, they must be immediately taken to a wildlife carer or a registered Vet.

5.1.1 Egg and Nest Removal

Step 1: All nests need to be thoroughly inspected for the presence of chicks before they are removed. This can be done by using:

- inspection by the naked eye (if possible)
- inspection using a small mirror fitted to the end an extension pole
- inspection using a wireless CCTV camera fitted to the end an extension pole (see Appendix C for photo of camera)

Step 2: Nests adjacent to or containing chicks need to be left undisturbed in order to comply with the Licence issued by the NSW NPWS and to ensure animal welfare guidelines are adhered to at all times.

Step 3: Only nests not containing chicks can be removed. This can be done by using extension poles with pronged attachments fitted to the end.

Step 4: All nests and eggs (not containing chicks or adjacent to chicks) should be removed from the site, unless the site is a refuge colony where only 50% of the nests containing eggs should be removed.

Step 5: Return to the site every 14 days throughout the breeding season to remove any freshly laid eggs in newly built nests.

5.1.2 Egg Oiling

Egg oiling is considered to be a humane method of euthanasia and has been deemed an acceptable method by ecological authorities both nationally and internationally. Locally, egg oiling has been previously undertaken by both Bankstown and Fairfield Councils and they found that it was an effective management strategy.

Step 1: Select a spray bottle with an adjustable nozzle. Mix 7 parts cooking oil with 3 parts water and 1 part dish washing liquid in the spray bottle.

Step 2: Add brightly coloured food dye to the mix at a concentration that will help identify treated eggs from new untreated eggs (i.e. make sure the dye is highly visible once applied to the egg).

Step 3: Adjust the nozzle on the spray bottle so that the liquid is exiting in a fine mist that will ensure even coverage over the egg without excessive waste of the mixture.

Step 4: Do not handle the eggs or remove them from their nest. Hold the spray bottle 5 – 10 cm from the eggs, aim the nozzle and apply the mixture to each egg. Ensure that the egg is completely covered on all visible surfaces. There is no need to rotate the egg. Due to its shape and the viscosity of the oil, the mixture will run down the sides of the egg and coat the bottom as well, sealing the egg airtight.

Step 5: Return to the site every 14 days to apply a fresh mixture to any newly laid eggs (repeat steps 1 – 4). Any brightly coloured eggs that have received a previous treatment do not need the mixture re-applied.

5.1.3 Roost Dispersal

Step 1: Disturb ibis after sunset by shining spotlights and laser lights, noisily cracking stock whips and sounding ibis specific distress calls (refer to Appendix C for a photo of recommended tools to use).

Step 2: Ensure that the dispersal is conducted so that other bird species surrounding the ibis colony remain undisturbed.

Step 3: To discourage ibis from returning to the site, dispersal needs to occur at least twice per week on a continual basis for all periods that chicks are not present.

5.1.4 Nest Burning

As the AWI have colonised Lake Annan Island, it is possible to consider reducing the availability of nesting habitat by burning empty nests, there is minimal possibility of the fire escaping and spreading to neighbouring areas and an abundance of water surrounding the Island. Nest burning will also reduce the amount of odour that is generated from the Island, which will in the long term benefit local residents. The nests that are heavily contaminated with faecal material and abandoned will be targeted as the first nests to be burnt.

Due to the disturbance on the Island and loss of nesting materials (once an ecological burn has been implemented), the Ibis are likely to disperse and look for food and nesting materials in nearby locations. To assist residents in this regard, an education campaign should be implemented simultaneously to provide residents with simple ideas how they can discourage

Ibis from visiting their properties, cleaning up vegetation debris from their front yards and making them less attractive to the Ibis.

5.1.5 Carcass Removal

When ibis breeding colonies reach high densities, on-site mortality of individuals at any age levels is inevitable. The resulting carcass decomposition exacerbates the smell associated with ibis breeding colonies. Prompt removal of decaying carcasses may help to reduce these odours and can be performed while on-site for other activities such as breeding restriction. This is currently undertaken on a fortnightly basis.

5.1.6 Roost Count / Annual Census

Step 1: Estimate the number of adults and chicks on-site approximately one and a half hours prior to sunset. Use binoculars or a spotting scope to get an accurate result.

Step 2: Count both incoming and outgoing ibis from an hour and a half before sunset until the last ibis has returned.

Step 3: Add the on-site count to the number of incoming ibis and subtract the number of outgoing ibis. This provides an estimation of the complete roosting population.

5.2 Community Education

Public feeding of AWI in urban parks and residential gardens is a common and widespread occurrence in many urban areas within the Camden Local Government Area (LGA). Key urban foraging locations within the Camden LGA should be identified and a targeted community education campaign initiated in these areas.

Recommendations to increase public education at these sites, thereby decreasing the number of ibis foraging and the associated public nuisance caused includes:

- Develop a media release an annual basis prior to the breeding season to encourage residents to report ibis breeding sites and to increase awareness of the issues associated with urban ibis populations.
- Develop and distribute education material (such as brochures, stickers for bins, schools package and media articles) to ensure local residents and businesses are up to date with ibis management in their area.
- Educate people who are known to feed wildlife on a regular basis or allow birds to feed from industrial bins. It should be emphasised that they are contributing to the potential growth of the ibis population.

- Install rubbish bins that deny ibis and other wildlife direct access to food.
- Empty all bins regularly to prevent overflow of rubbish, particularly those that service shopping complexes and recreational facilities.

Creating community awareness of public feeding and general ibis issues can also be integral in communicating important and useful information about foraging, roosting and breeding sites within the area. It will also aid in community acceptance of this Management Plan.

5.2.1 Community Involvement

The following will help to further reduce reproductive success within the Camden Local Government Area:

- If nesting occurs on private property the landowners should be approached to encourage breeding restriction at these sites. Landowners will need to apply for a Section 121 Occupiers Licence under the *National Parks and Wildlife Act 1974* issued through the NSW Office of Environment and Heritage.
- Encourage local residents to report new breeding sites so that breeding restriction can be implemented promptly. This can be achieved through public education.

Glossary

Phrase/Word	Definition
Active Bird Management	The use of short-term management techniques such as distress calls, pyrotechnics, stock whips, sling shots, dogs, remote controlled aircraft, dirt bikes, trapping and culling to disperse or remove birds.
Anthropogenic Food Source	Food derived from humans or human activity including; landfills, intentional feeding by people and scavenging at parks, foreshores, schools, theme parks, resorts, malls, industrial areas and farms.
Dispersal	The moving of individuals away from each other or away from a particular site.
Foraging	The process of searching for and obtaining food.
Passive Bird Management	The modification of habitat to render it more or less attractive to birds.
Roosting	The process of birds congregating overnight at a specific place for rest and protection from predators.

References

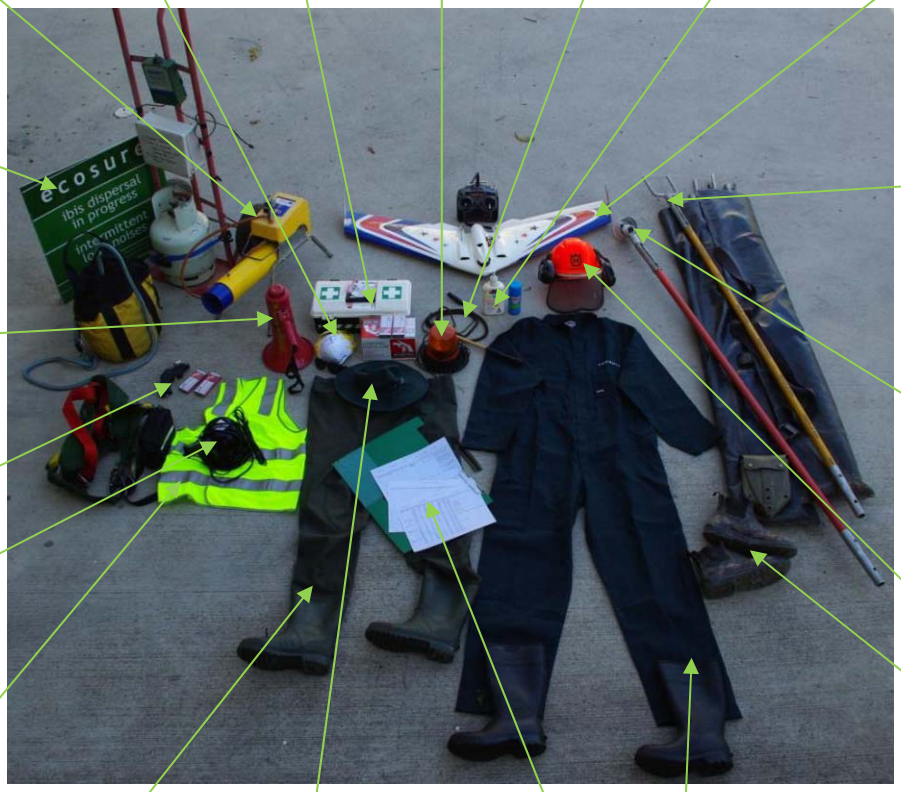
National Parks and Wildlife Act 1974

Eco Sure (2009). *Sydney Basin Australian White Ibis Regional Management Plan.* Prepared for NSW National Parks and Wildlife Service. Unknown

PSB (2009), Lake Annan Specific Area Plan of Management

Appendix A - PPE Equipment

Appendix A – Tools and Personal Protective Equipment (PPE) used for ibis management



Appendix B - Standard Operating Protocol

Precautions for working *in situ* with native birds.

- If individual birds appear sick, particularly if they show symptoms (such as excessively watery eyes, swelling of the head and eyelids, ruffled feathers, etc.), consult with a veterinarian before handling them or bringing them into any facility. If necessary use biohazard handling procedures with moribund or dead birds – secure them and get them to post mortem ASAP.

- Do not approach large “die-offs”. Seal off the area and consult either the State Department Primary Industries or the local veterinarian. If possible record the following: Time, coordinates, weather conditions, species and estimated numbers involved (observe remotely) and contact details of nearby local residents. Take note of predator/scavenger activity and record the observations of local residents if available. The higher risk wild species include ducks, geese, swans, gulls, terns, shore birds, waders, egrets, herons, spoonbills, ibis and migratory or semi-nomadic species within these groups – BUT “die offs” of any species should be treated with caution.

- In rescue and rehabilitation centres all incoming birds should be quarantined before mixing with resident birds. Avoid mixing species and birds from different regions, and unnecessary bird-to-bird contact.

- Protect yourself when handling birds. Wear heavy gloves when handling birds that can pierce skin with beak or claws; otherwise, wear dish gloves or disposable gloves. Wear protective overalls that can be easily and regularly cleaned. Or preferably use non-absorbable disposable barrier suits.

- When cleaning equipment, collecting samples, or handling faeces or faecal contaminated feed and water, wear disposable gloves, then discard and wash hands with warm soapy water/disinfectant immediately.

- Avoid conducting post mortems on birds in the field unless you have an adequate portable facility. Transport the birds to an appropriate regional post mortem facility. Use protective clothing including biohazard mask.

- When working with wild populations routinely collect blood, cloacae and choanal smears. Process and bank these samples – they may be useful for future disease tracking.

- If collecting blood, faecal, or tissue samples, wear gloves and protective clothing. Handle samples and sharps according to established bio-safety protocols.

- Do no eat, drink or smoke while handling birds or cleaning contaminated equipment.

- During any procedure regularly change gloves and wash your hands with warm soapy water or disinfectant followed by 70% alcohol rinse.

- Use appropriate disinfectants to wash equipment (e.g. sampling tools, bird restraint, holding, and transportation devices, banding tools or bird bags) or any potentially contaminated surface.

- Always work in a well-ventilated environment. If working outdoors, remain upwind of birds and avoid inhaling dust and feather aerosols. If you are working in an environment where splash or aerosols are generated (using high pressure hoses, or in ponds), consider wearing eye protection and a face mask to prevent contact with eyes, nose and mouth.

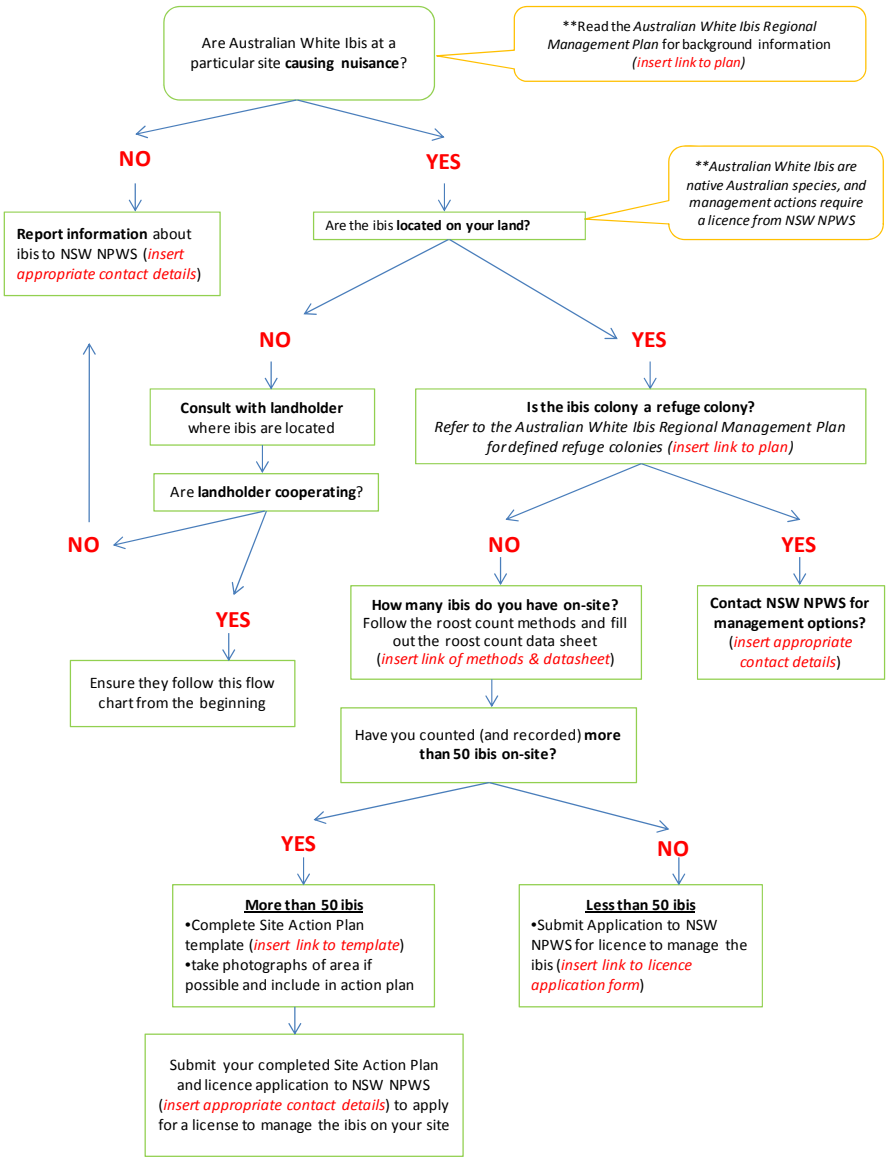
- Dispose of all potentially contaminated material immediately in an appropriate manner.

- If you are ill, particularly if you have viral respiratory tract disease, avoid working with wild avian species until fully recovered. If you become ill after handling birds consult your doctor and inform your doctor that you have been in contact with wild birds.

- Be diligent with insect protection (long sleeves, long trousers and repellent) especially when working in swampy water-bird habitat (arbovirus protection).

Appendix C Flow Chart

The following flow chart may be published on the NSW NPWS website as a quick reference guide.



Management Plan Addendum for Australian White Ibis (*Threskiornis molucca*)

Lake Annan, Mount Annan NSW

January 2019

Executive Summary

In 2013 Camden Council endorsed the Management Plan for Australian White Ibis (AWI) at Lake Annan, Mount Annan. The Management Plan was developed to assist with meeting legislative requirements for managing a native species in an urban area, whilst simultaneously demonstrating responsible and ethical environmental management that is conducted strategically and sustainably. This Addendum to the Management Plan for Australian White Ibis, has been developed to include the floating wetlands in the management area covered by wildlife licencing and the Management Plan for AWI. This will streamline the process for applying for a licence from the NSW National Parks and Wildlife Service (NPWS) to enable Council to carry out population control measures.

In December 2016, floating wetlands were installed surrounding the island within Lake Annan. The wetlands were designed to improve the water quality of the lake. AWI are now nesting on these floating wetlands and causing significant damage to these water treatment devices. This additional nesting habitat provided by the floating wetlands, has contributed to an increase in the local population, as control on these wetlands is not permitted under the current licence from NPWS.

This Addendum to the Management Plan for AWI, outlines that the floating wetlands are to be included within the planned control strategies listed in the 2013 Management Plan for AWI. This will allow Camden Council to continue responsible and ethical environmental management of the native species in an urban area.

Introduction

The Management Plan for AWI was endorsed by Camden Council in 2013, to assist with meeting legislative requirements for managing a native species in an urban area, whilst simultaneously demonstrating responsible and ethical environmental management that is conducted strategically and sustainably.

Management Actions have been conducted on Lake Annan island since 2013, which has resulted in a decrease in the local AWI population. Over the last five years, a maximum of 598 AWI were observed during a survey in December 2013, compared to 1338 AWI observed in December 2007 (prior to the implementation of any control measures). This indicates that the control techniques which have been employed by Camden Council are assisting in the sustainable management of the AWI population.

Since the management program commenced, there has also been a noticeable shift in nesting behaviour of AWI. A greater proportion of AWI are nesting higher in tree canopies on the island rather than within the ground layer of vegetation. This change in behaviour could be due to the increased human presence during surveys of the island causing the AWI to seek refuge in the tree canopy, and an attempt by the birds to avoid this interference by building the nests out of reach.

In December 2016, floating wetlands were installed surrounding the island within Lake Annan. The floating wetlands were installed as part of a larger project to install stormwater treatment devices in the waterway and aimed to improve the water quality of Lake Annan. This work was undertaken to address the following issues:

- Blue-green algae and rubbish floating in the lake;
- Odour from the open Gross Pollutant Trap (GPT) basin at the lake inlet; and
- Improve the visual amenity and ponding issues associated with the open GPT basin.

The floating wetlands are a tertiary treatment device as part of this project to capture nutrients in Lake Annan. Since their installation, there has been no resident complaints of blue-green algae and floating rubbish. While the water quality of Lake Annan has improved, these floating wetlands have created additional nesting opportunities for the AWI population.

Since June 2017, regular ibis monitoring of Lake Annan and its surrounds, has identified that the AWI are nesting on the floating wetlands in addition to the island. This problem has grown in the 12 months following the first observation and at November 2018 seven out of 14 of the floating wetlands were utilised by AWI as nesting habitat.

Licencing for harming native animals is covered by the *Biodiversity Conservation Act 2016* (BC Act). Camden Council's licence to harm protected animals is controlled and issued under the BC Act by the NPWS. Under section 2.14 of the BC Act it is an offence to contravene or fail to comply with a condition of this licence. A condition of the licence is to record the species and number of animals harmed under the licence and return the record sheet to the NPWS office that granted the licence. In this case, the Nattai Area Office is responsible for Council's wildlife licencing and Council's Natural Resource Project Officer maintains regular contact with a Senior NPWS Ranger.

This addendum to the Management Plan for AWI intends to include the floating wetlands in the current Management Plan, to enable sustainable management practices to be conducted to control the local AWI population.

Site Description

Lake Annan in Mount Annan was constructed in the early 1990s, as a combined sedimentation and macrophyte water quality control pond in-line within Narellan Creek. Lake Annan island is located within the man-made Lake Annan and is 3000m^2 in area. The island within Lake Annan is a significant breeding colony of AWI. 14 floating wetlands are strategically spaced surrounding the island and vary in length and width. The floating wetlands are anchored to the island.

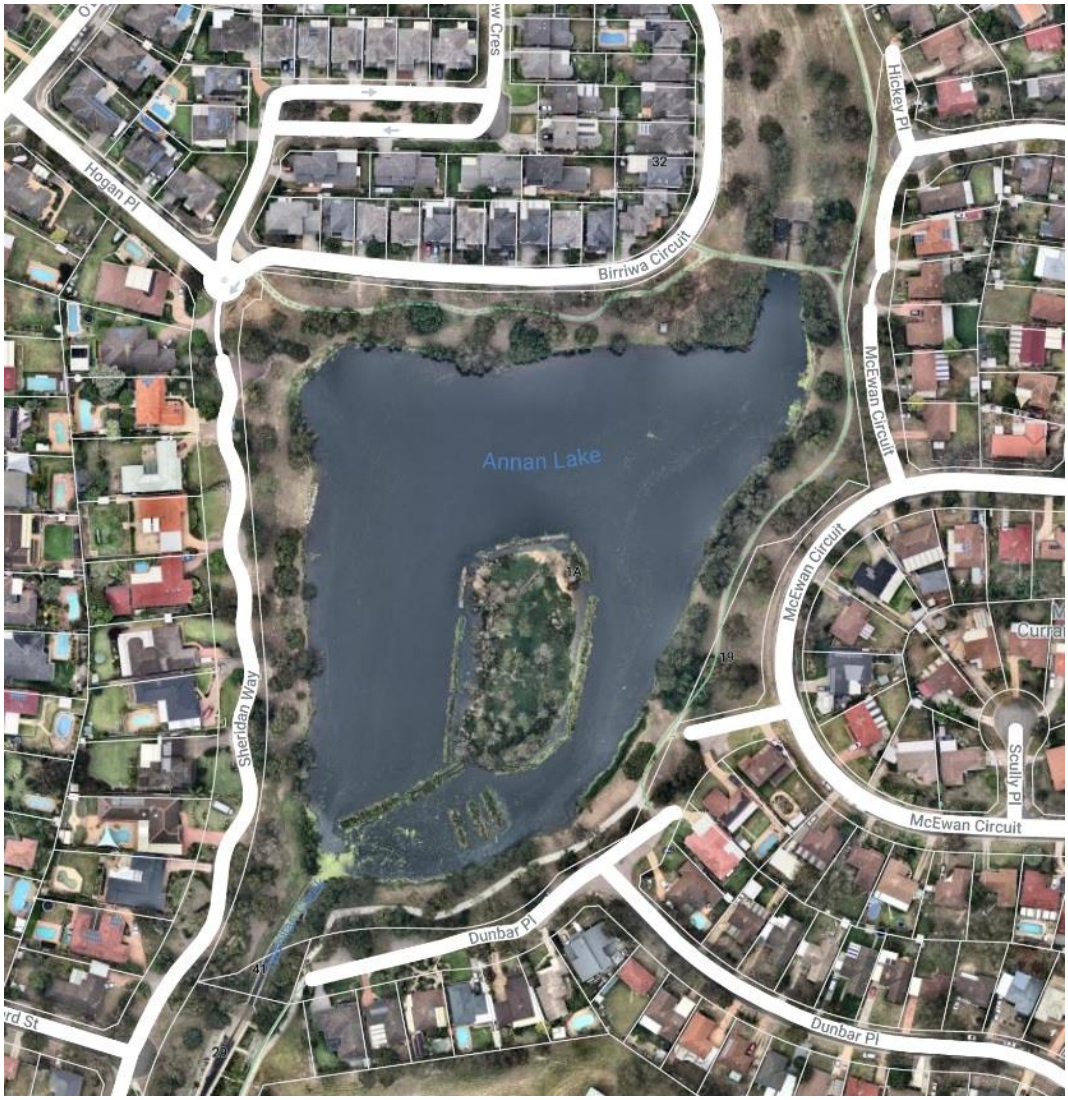


Figure 1: Aerial imagery of Lake Annan and floating wetlands within Lake Annan, Mount Annan NSW (Nearmap, 5/11/2018).

Site Issues

During a survey in June 2017, AWI were observed nesting on the floating wetland to the west of the island (**Figure 2**). As of 5 November 2018, AWI are now nesting on seven of the 14 floating wetlands (**Figure 3**), and have caused significant damage to these water quality improvement devices. Refer to **Figure 4** to **7** for evidence of AWI nesting on the floating wetlands taken during surveys.

In August, September and October 2018, resident complaints were received by Camden Council due to the increase in AWI numbers. One resident was concerned about the health risks associated with the large AWI population and was concerned about nesting AWI on the floating wetlands.

Modifications to the floating wetlands were trialled in December 2017 on the wetlands to the west of the island, to discourage the AWI from nesting (**Figure 8**). The modifications consisted of a rigid triangle secured to the top of the existing floating wetland cage. This initially prevented the AWI from nesting, however, the modifications were not successful in eliminating the native birds from nesting and the modifications have since been damaged.

In response to the damage to property and resident concerns, oiling of the AWI eggs found within nests on the floating wetlands, has been conducted by Council since late June 2017. Separate temporary licences have been obtained from NPWS to enable Council to carry out this control method, as the floating wetlands are not included in the Occupier's Licence to harm native fauna for Lake Annan island and are not covered in the 2013 Management Plan.

To ensure the population of AWI at Lake Annan is managed, the floating wetlands are to be included in the Management Plan for AWI. To streamline the application process for obtaining a licence to harm native fauna in an ethical and sustainable manner, the floating wetlands are to be included in the Management Plan for AWI. This will allow a single licence to be sought from the NPWS to ensure Council can continue to implement population control measures and ultimately, sustainably manage the large population found in an urban area.

Figure 2: Aerial imagery of Lake Annan, Mount Annan, indicating the location of the AWI nesting on western floating wetland in June 2017 (Nearmap, 2018).

Figure 3: Aerial imagery of Lake Annan, Mount Annan, indicating the location of AWI nesting on 7 of the 14 floating wetlands as of November 2018 (Nearmap, 2018).

Figure 4: Image of AWI nest on floating wetland (19 June 2017).

Figure 5: image of AWI chicks in nest on floating wetland (25 Sept 2017).

Figure 6: Image of numerous AWI nests on floating wetland (10 October 2018).

Figure 7: Image of juvenile AWI on floating wetlands (5 November 2018).

Figure 8: Image of modification applied to floating wetland in December 2017.

Site Management and Actions

Currently a temporary s121 licence is sought from NPWS when new AWI nests are observed on the floating wetlands during surveys. This is a reactive approach to management, and numbers of nests are being built faster than the licence can be processed. Therefore, the Management Plan for AWI is to be updated to include the floating wetlands, allowing a single Occupier's Licence to be obtained.

The floating wetlands installed in 2016 are to be included together for the purposes of obtaining an Occupier's Licence to harm fauna. This will streamline the application process with NPWS and allow Council to continue to implement population control measures, including egg and nest removal and egg oiling.

Conclusion

The Management Plan for AWI aims to enable Camden Council to effectively mitigate site specific negative impacts associated with AWI by providing a comprehensive and clear guideline for on-site management.

This Addendum to the Management Plan intends to update the original plan to include the floating wetlands installed in 2016. The inclusion of the floating wetlands in the Management Plan, will allow a single Occupier's Licence to harm native fauna be obtained, and also provide Council with authority to control the AWI nesting on the floating wetlands. In turn, this will ensure the population of AWI is sustainably managed by Camden Council.