

Bird Life Monitoring Program

Baiada Poultry Processing Facility, Tamworth

Baiada Pty Ltd

19 May 2021

Final



Report No. 21081RP1

The preparation of this report has been in accordance with the brief provided by the Client and has relied upon the data and results collected at or under the times and conditions specified in the report. All findings, conclusions or commendations contained within the report are based only on the aforementioned circumstances. The report has been prepared for use by the Client and no responsibility for its use by other parties is accepted by Cumberland Ecology.

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Glossary

Term / Abbreviation	Definition
Baiada	Baiada Poultry Pty Limited
BC Act	NSW Biodiversity Conservation Act 2016
BDAR	Biodiversity Development Assessment Report
DA	Development Application
DAWE	Commonwealth Department of Agriculture, Water and the Environment
DPIE	NSW Department of Planning, Industry and Environment
EES	NSW Environment, Energy and Science Group (formerly OEH)
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
EP&A Act	NSW Environmental Planning and Assessment Act 1979
GIS	Geographic Information System
GPS	Global Positioning System
ha	Hectares
km	kilometres
LGA	Local Government Area
NSW	New South Wales
Project	Baiada Poultry Processing Plant Development
SSD	State Significant Development
subject land	The area subject to the proposed action (Figure 1)

1. Introduction

Cumberland Ecology was commissioned by Baiada Poultry Pty Ltd (the 'client') to prepare a Birdlife Monitoring Program relating to an approved Development Application (DA) for an extension of the Baiada Poultry Processing Facility, Tamworth. The Baiada Poultry Processing Facility is located on a property known as 'Oakburn' situated at 1154 Gunnedah Rd, Westdale NSW (hereafter referred to as the 'subject land'). It is approximately 7.5 km north-west of the Tamworth Central Business District and lies within the Tamworth Regional Local Government Area (LGA). The subject land is located directly adjacent to the Tamworth Regional Airport on Lots 100, 101 and 102 in DP 1097471, and covers an area of approximately 57.6 hectares (ha). The extension of the Baiada Poultry Processing Facility involves construction of a new poultry processing plant plus ancillary developments, a new access road, and installation of waste-water treatment facility (henceforth referred to as the 'project').

1.1. Background

A DA was submitted for State Significant Development (SSD) Consent under Part 4 of the New South Wales (NSW) *Environmental Planning and Assessment Act 1979* (EP&A Act) and Cumberland Ecology prepared the Biodiversity Development Assessment Report (BDAR) to support the DA in February 2019 (amended June 2020) (our reference – 18055RP3). Development Consent was granted on 18 December 2020 (SSD-9394) subject to Conditions of Consent. Of relevance to this report, Condition B63 states the following:

"Within six months of the date of determination of this development consent, the Applicant must establish a site wide bird life monitoring program, in consultation with Civil Aviation Safety Authority (CASA). The monitoring program is to include:

- (a) details of bird life that may trigger the need for mitigation measures to manage potential interactions with Tamworth Regional Airport. These triggers and measures should be established in consultation with CASA and the Tamworth Regional Airport;*
- (b) be prepared by a suitably qualified consultant;*
- (c) identify areas of potential bird attraction;*
- (d) details of mitigation measures such as bird netting and other deterrents; and*
- (e) procedures for the implementation of any mitigation measures.*

A copy of the monitoring program is to be provided to the Planning Secretary."

The reason for the inclusion of this consent condition is the location of the project adjacent to Tamworth Regional Airport and the potential for the project to attract birds, with the corresponding potential for increased bird strikes to aircraft. Wildlife strikes and / or avoidance can cause major damage to aircraft and / or reduction of safety. According to Guideline C: *Managing the Risk of Wildlife Strikes in the Vicinity of Airports* (National Airports Safeguarding Advisory Group 2011), the way in which existing land use is managed in the vicinity of airports can significantly influence the risk of wildlife hazards. Many airports are surrounded by areas which are attractive to wildlife, especially birds. For example, land uses such as agriculture, wildlife sanctuaries, wetlands and land fill sites can attract a high number of birds which increase the risk of interference with aviation activity.

The project will result in the creation of water detention basins which may attract increased numbers of birds. Wildlife attracted to land uses around airports can migrate onto the airport or across flight paths, increasing the risk of strikes (National Airports Safeguarding Advisory Group 2011).

The International Civil Aviation Organisation (ICAO) has identified land uses with the potential to become high risk wildlife attractants and developed specific advice for managing them (National Airports Safeguarding Advisory Group 2011). Land uses with a high risk included "abattoirs and freezing works" and this definition is considered to include the project. The Western Sydney Aerotropolis Wildlife Management Assessment refined this list of high risk wildlife attractant land uses and identified additional land uses. According to this framework, the project would be defined as "Agricultural produce industry, or livestock processing industry", which has also been identified as having a high wildlife attraction risk (Avisure 2020b). Actions identified to manage wildlife in high risk areas includes monitoring, the preparation of wildlife hazard assessments and implementation of wildlife management plans. Monitoring underpins all wildlife hazard mitigation and airport safeguarding (Avisure 2020b). Robust standardised monitoring programs that regularly collect meaningful data will inform decisions relating to wildlife management programs, identify emerging risks, and determine wildlife activity trends over time. Accordingly, the development of this Birdlife Monitoring Program for the subject land is considered to be an appropriate, pro-active mitigation measure to manage the risk of wildlife to the Tamworth Regional Airport.

1.2. Purpose

The purpose of this report is to present a Birdlife Monitoring Program in accordance with the Conditions of Consent for approval by the Planning Secretary. The aim of the monitoring program is to present a monitoring program that identifies the potential for the project to attract birds, identifies bird usage patterns of the subject land and outlines appropriate monitoring methods to determine if bird numbers are increasing as a result of the project. The monitoring program also presents appropriate mitigation measures and triggers for their implementation should it be found that birds are attracted to the subject land and that bird numbers are increasing as a result of the project. The overall objective is to monitor and minimise bird usage of the subject land in order to prevent impacts occurring to Tamworth Regional Airport as a result of bird strikes to aircraft.

This Birdlife Monitoring Program includes the following:

- Project background and project layout;
- Identification of areas of significant bird attraction;
- Bird species previously recorded from the subject land including threatened species with potential to occur;
- Monitoring survey methodology and frequency;
- Details of mitigation measures and triggers for their implementation; and
- Reporting requirements.

2. Methodology

2.1. Desktop Assessment

The preparation of this Birdlife Monitoring Program was based on a desktop review of existing information and data as outlined below, and no specific field surveys were conducted.

Cumberland Ecology previously conducted detailed terrestrial flora and fauna surveys of the subject land for the preparation of the BDAR (Cumberland Ecology 2020), and the results of these surveys were reviewed during the preparation of this report. These surveys included vegetation mapping, flora quadrats, fauna habitat assessment, bird surveys, bat surveys, amphibian surveys and both diurnal and nocturnal assessments. Accordingly, it is considered that the fauna habitat characteristics of the subject land are well known and understood and the current potential for bird species to occur can be accurately assessed using existing data.

In addition, the BDAR included a review of existing data for the wider locality (5 km radius of the subject land) as contained in the NSW Environment, Energy and Science Group (EES) Bionet Atlas and Threatened Biodiversity Data Collection to identify previous records of threatened species and determine their potential to occur on the subject land. These records were used to inform and refine the survey methodology prepared for the Birdlife Monitoring Program.

Substantial information is available on the risk of wildlife strikes to aircraft and airports and the desktop assessment also included a review of the following documents:

- Australian Aviation Wildlife Hazard Group (2011): Attachment 1 to Guideline C: Managing the Risk of Wildlife Strikes in the Vicinity of Airports.
- Australian Aviation Wildlife Hazard Group (2014): Wildlife Risk Assessment and Analysis
- Avisure (2020) Western Sydney Aerotropolis Wildlife Management Assessment;
- Avisure (2021) Tamworth Regional Airport Wildlife Hazard Management Plan;
- Bishop, J., McKay, H., Parrott, D., and Allan, J. (2003) Review of international research literature regarding the effectiveness of auditory bird scaring techniques and potential alternatives.
- Civil Aviation Safety Authority (CASA) (2011) Advisory Circular 139–26(0) Wildlife Hazard Management at Aerodromes;
- International Civil Aviation Organisation (ICAO) (2012) Airport Services Manual, Part 3 — Wildlife Control and Reduction; and
- National Airports Safeguarding Advisory Group (NASAG) (2012) Guideline C: Managing the Risk of Wildlife Strikes in the Vicinity of Airports (National Airports Safeguarding Framework)

In addition, other literature on appropriate methods to deter birds from airports and waterbodies was also reviewed to identify appropriate mitigation measures for the project. These are referenced throughout the document.

2.2. Consultation

This Birdlife Monitoring Program was prepared as required by the conditions of consent in consultation with Tamworth Regional Airport, and the Civil Aviation Safety Authority (CASA) to ensure that it aligns with the relevant objectives and guidelines relating to minimising the risk of bird strike.

Telephone correspondence was conducted with Matthew Thorncroft, Airport Assets & Technical Officer for Tamworth Regional Airport and the Tamworth Regional Airport Wildlife Hazard Management Plan (Avisure 2021) was provided and reviewed for incorporation into this plan.

Documents prepared by CASA relevant to bird strikes at airports and managing the risk of bird strike were reviewed and relevant information incorporated into this document as required.

3. Site Description

3.1. Site Context and Existing Fauna Habitat

The subject land is located in a highly agricultural and industrial environment, and is surrounded by grazing properties, Tamworth Regional Airport, an industrial estate, and Gunnedah Road (see **Figure 1**). It is generally bounded by Gunnedah Road (Oxley Highway) to the south west, Bolton Creek to the north west, rural pasture land to the north east and industrial developments and a Peel River tributary to the south east. Tamworth Regional Airport is situated on the other side of Gunnedah Road, south-west of the subject land.

The subject land currently exists as a predominantly treeless property except for a few scattered paddock trees, four small patches of native trees, and two areas of immature planted natives. For the most part, the subject land is comprised of grasslands that are dominated by exotic pasture grasses with some native grasses interspersed throughout. Areas of grassland towards the Gunnedah Road boundary undergo routine slashing. Landscaped areas of predominantly exotic garden species are situated within the rendering plant compound and as fruit trees planted to border the existing access road to Gunnedah Road.

Aquatic habitat is present in the vicinity of the subject land that may provide habitat for native bird species. Boltons Creek is a 3rd order mapped waterway that lies outside the north western boundary of the subject land and is crossed by Gunnedah Road via a bridge adjacent to the southern-most corner. A small swamp/wetlands area occurs as part of Boltons Creek towards the northern corner of the subject land that contains vegetation and reeds representative of swamp/wetlands area (*Typha orientalis*). This area is recognised as having significant wildlife habitat value and is included on the NSW Environment, Energy and Science Group (EES) Biodiversity Values Map.

Within the subject land an unnamed tributary of the Peel River that is a first order mapped waterway occurs, which will be traversed by the access road under the proposed development. No running water was present in this waterway during surveys undertaken for the BDAR and this is likely to be an ephemeral stream that accumulates water in its depressions and has marginal flows throughout periods of heavy rainfall. Accordingly it is not likely to have a significant wildlife habitat function.

3.2. Development Layout

The project includes the Oakburn Processing Plant, car park, Oakburn Processing Plant Waste Water Treatment Plant, evaporation ponds, and access road; as well as a 10 m buffer surrounding the proposed developments that will account for any encroachment of construction activities into the adjacent land. The area of the Oakburn property occupying the whole of Lot 100 DP 1097471 and the portions of Lots 101 and 102 DP 1097471 are to be utilised for the construction of the access road (including 10m buffers either side). A rendering waste water treatment plant to be located in the northern portion of the subject land has been approved separately under DA 2018-0443. However, this area will also be included in this Birdlife Monitoring Program.

The layout of the project is shown in **Figure 2**.

3.3. Areas of Bird Attraction

Within the subject land, there is currently very little habitat for bird species as it comprises largely grassland with only minor occurrences of trees (see **Section 3.1**). Some areas of aquatic habitat currently occur in the vicinity of the subject land that have potential to provide habitat for waterbirds, however these are minor and are not expected to attract large numbers of birds.

The construction of the poultry processing plant buildings will not increase the amount of habitat for native bird species relative to current levels, however, as part of the development, water evaporation ponds and detention basins will be constructed. The evaporation ponds will contain permanent areas of water while the detention basins will hold and slow stormwater flow, and only periodically contain water after substantial periods of rainfall. Therefore, both the water evaporation ponds and detention basins have potential to attract aquatic bird species (see **Figure 2** and **Figure 3**). Retention and detention basins provide an important hydrological function, but they act as artificial wetlands and can be particularly attractive to wildlife where the water is easily accessible (i.e. from the banks or on the surface area of the water) and where adjacent vegetation offers safety and refuge. During dry periods, when other regional water supplies may be dry, artificial wetlands like retention basins can attract significant numbers of wildlife. Even detention basins which hold water temporarily, can be attractive to wetland birds (Avisure 2020b). Waders and waterbirds present a significant strike risk for aircraft because of their large body mass and tendency to move in flocks (Avisure 2020b), and these have potential to utilise the areas of aquatic habitat that will be created by the project. The areas of bird attraction that will be created on the subject land as a result of the project are identified in **Figure 3**.

Due to the nature of the activities to be conducted on the subject land (poultry processing), there will be a large amount of organic waste produced each day. If this waste were to become available to animals outside the processing plant, or disposed of in an inappropriate manner, then it could attract wild animals including birds. However, the poultry processing plant will operate in such a way that the organic waste produced is removed from the site and is not available to animals or birds. Accordingly, it is unlikely to attract wildlife relative to current levels and this potential source of bird attraction is not considered further.

3.4. Bird Species Previously Recorded

Surveys conducted on the subject land for the BDAR have recorded a total of 36 bird species (see **Table 1**). These are all relatively common, widespread birds that occur in disturbed environments. No threatened species were recorded from the subject land.

Table 1 Bird species recorded within the subject land

Scientific Name	Common Name
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill
<i>Acanthiza nana</i>	Yellow Thornbill
<i>Anas gracilis</i>	Grey Teal
<i>Cacatua sanguinea</i>	Little Corella
<i>Chalcites osculans</i>	Black-eared Cuckoo

Scientific Name	Common Name
<i>Cincloramphus mathewsi</i>	Rufous Songlark
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike
<i>Corvus coronoides</i>	Australian Raven
<i>Coturnix ypsilophora</i>	Brown Quail
<i>Cracticus nigrogularis</i>	Pied Butcherbird
<i>Cracticus tibicen</i>	Australian Magpie
<i>Dacelo novaeguineae</i>	Laughing Kookaburra
<i>Elanus axillaris</i>	Black-shouldered Kite
<i>Eolophus roseicapillus</i>	Galah
<i>Grallina cyanoleuca</i>	Magpie-lark
<i>Haliastur sphenurus</i>	Whistling Kite
<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater
<i>Malurus cyaneus</i>	Superb Fairy-wren
<i>Manorina melanocephala</i>	Noisy Miner
<i>Milvus migrans</i>	Black Kite
<i>Mirafra javanica</i>	Horsfield's Bushlark
<i>Nycticorax caledonicus</i>	Nankeen Night-Heron
<i>Nymphicus hollandicus</i>	Cockatiel
<i>Ocyphaps lophotes</i>	Crested Pigeon
<i>Pardalotus striatus</i>	Striated Pardalote
<i>Petrochelidon ariel</i>	Fairy Martin
<i>Platycercus eximius</i>	Eastern Rosella
<i>Psephotus haematonotus</i>	Red-rumped Parrot
<i>Rhipidura leucophrys</i>	Willie Wagtail
<i>Scythrops novaehollandiae</i>	Channel-billed Cuckoo
<i>Smicronis brevirostris</i>	Weebill
<i>Streptopelia chinensis</i>	Spotted Dove*
<i>Sturnus tristis</i>	Common Myna*
<i>Sturnus vulgaris</i>	Common Starling*
<i>Taeniopygia guttata</i>	Zebra Finch
<i>Vanellus miles</i>	Masked Lapwing

* Denotes exotic species

In general, the subject land does not provide high quality habitat for these species and is unlikely to support high numbers of these species due to the lack of preferred habitat such as native vegetation. Despite the

presence of some existing waterbodies in the subject land, it is noted that most of the species recorded with the exception of the Grey Teal and Nankeen Night Heron are not waterbirds and depend on terrestrial habitat. Existing levels of terrestrial habitats are not expected to change significantly as a result of the project and will likely decrease due to the construction of buildings, and therefore the majority of these birds are not expected to increase as a result of the project. As outlined previously it is the creation of the evaporation ponds and detention basins that will have the potential to increase bird usage of the subject land, mostly by waterbirds.

3.4.1. Threatened Bird Species

Although not recorded from the subject land, according to the BDAR that has been prepared for the project (Cumberland Ecology 2020), the threatened species identified in **Table 2** are considered to have some limited potential to occur in the subject land due to the presence of some elements of habitat and their occurrence in the locality as indicated by database searches.

Table 2 Threatened bird species considered to have the potential to occur within the subject land

Scientific Name	Common Name
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow
<i>Chthonicola sagittata</i>	Speckled Warbler
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll
<i>Glossopsitta pusilla</i>	Little Lorikeet
<i>Melanodryas cucullata cucullata</i>	Hooded Robin (south-eastern form)
<i>Petroica boodang</i>	Scarlet Robin
<i>Petroica phoenicea</i>	Flame Robin
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)
<i>Stagonopleura guttata</i>	Diamond Firetail

In common with the non-threatened birds recorded from the subject land, these species are all terrestrial species with little habitat on the subject land. These species are not considered likely to increase in abundance on the subject land as a result of the project as no additional suitable habitat will be created.

3.5. Identifying High Risk Bird Species

This section provides an assessment of the bird species that are considered to have potential to be a high risk to aviation at Tamworth Regional Airport, and which therefore are of high priority to monitor and manage according to this plan.

The subject land is not currently considered to pose a high risk to Tamworth Regional Airport in terms of attracting or supporting bird species that may cause a hazard to aviation. The majority of the development of the Poultry Processing Plant will not increase this risk relative to current levels, with the exception of the

creation of the waterbodies (see **Section 3.2** and **Figure 3**). These have the potential to attract waterbirds, several of which are known to have potential to cause a hazard to aviation. Therefore, the high risk bird species with potential to increase as a result of the project are waterbirds and these are the focus of this plan.

Tamworth Regional Airport has collected bird strike data for numerous years, and the main birds that have been involved in a strike with an aircraft between 2015 and 2019 are the Black Kite and Galah (Avisure 2020a). The Tamworth Regional Airport Wildlife Hazard Management Plan (Avisure 2021) provides species risk rankings of species likely to cause a risk to aircraft. This indicated that the Black Kite and Galah were ranked as high risk, with the Australian Magpie, Banded Lapwing, Straw-necked Ibis and Wood Duck being ranked as moderate risk. The two high risk bird species (Black Kite and Galah) are not wetland birds and are not likely to be attracted by the construction of the waterbodies associated with the project, although two of the moderate risk species (Straw-necked Ibis and Wood Duck) are wetland birds that may increase as a result of the wetland habitat being created on the subject land. These two species were assessed as currently having a very low probability of strike with an aircraft based on a 5-year strike average for each species (Avisure 2021), however due to their relatively large size, the probability of damage resulting from any collision was assessed as being high, and therefore both species were considered to pose medium risk to the airport requiring options for additional management if required (Cumberland Ecology 2020). Species Action Plans have been prepared for the Tamworth Regional Airport for wildlife considered to pose a high or moderate risk to aviation, including the Wood Duck and Straw-necked Ibis.

Wetland birds known to cause problems for aircraft in other locations include the Australian Pelican, due to their large body mass and use of thermals over airports, Australian White Ibis, due to their use of grassland habitats adjacent to wetlands including airports, and Little Cormorants, due to their flocking behaviour (Avisure 2021). Surveys conducted in areas adjacent to Tamworth Regional Airport by Avisure in 2020 identified that the Baiada Poultry Processing Facility had the potential to attract Common Starlings, but these were given a low risk ranking (Avisure 2020a). The project is unlikely to create additional habitat for the Common Starling relative to current levels as they are not attracted to water and are unlikely to increase as a result of the project.

4. Birdlife Monitoring Program

4.1. Introduction

This chapter presents a Birdlife Monitoring Program for implementation in the subject land. The objective of this plan is to ensure that bird numbers do not increase as a result of the project to a level that increases the risk to aviation in the Tamworth Regional Airport.

The first stage of wildlife management is to collect information in order to determine priorities and appropriate responses to observed patterns. This chapter presents the details of the bird monitoring that will be conducted in the subject land to determine the usage of the area by birds, and to determine whether usage is increasing as a result of the project, in particular as a result of the construction of the water storage areas identified in **Section 3.3** and **Figure 3**.

A qualified ecological consultant or ornithologist should be engaged to carry out a program of regular monitoring of birds in the subject land. Initially, the current levels of bird usage of the subject land prior to the development will be determined to provide a baseline indication of bird usage. Subsequently, monitoring will be conducted quarterly (i.e. every three months) during the construction and operation of the project to collect data on the usage of the subject land by birds and to identify if bird usage is increasing. The results from the initial monitoring surveys (i.e. collection of baseline data) will be compared to those from after the construction of the project is complete and subsequent surveys to gain an appreciation of whether the project has resulted in an increase in bird usage on the subject land. The results of the quarterly monitoring will be reviewed and an annual report prepared to identify any patterns in bird occurrence, any increase in birds and to determine whether any mitigation measures are required to reduce the numbers of birds using the subject land. A summary of recommended mitigation measures is included in this chapter as well as details of reporting requirements.

4.2. Bird Monitoring Methodology

4.2.1. Survey Locations

Bird surveys will be undertaken in all areas within the subject land that are likely to attract birds. These mainly include the waterbodies that exist on the subject land and those that will be created as a result of the project. The waterbodies are identified in **Figure 3**. The monitoring sites will be identified and marked during the first round of baseline monitoring surveys as described below.

At each potential bird attractant area (see **Figure 3**), a monitoring site will be established where birds will be repeatedly surveyed over time in order to determine the level of usage of birds of each potential attractant area and whether the level of usage is increasing over time. This will enable potentially problematic levels of bird visitation to be identified and will facilitate the development of appropriate mitigation measures. The location of each monitoring site will be recorded with a Geographic Positioning System (GPS) device and allocated a discrete identification number to allow for repeated surveys and comparisons over time.

4.2.2. Monitoring Surveys

Systematic bird surveys will be undertaken at each monitoring site using the 'area search' technique recommended by Birdlife Australia (BirdLife Australia 2021). This involves searching for birds in a user defined area up to 5 km from a defined point for a period of at least 20 minutes by two observers. This has been

recommended by Birdlife Australia for use when surveying wetlands as the entire wetland can be surveyed if it is within 5 km of a central point. This is most appropriate for the subject land as the areas with potential to be attractive to birds are the additional waterbodies that will be created, and the entirety of each waterbody will be surveyed during the monitoring surveys. All birds within each survey area will be recorded during the monitoring surveys, including birds flying overhead. During the surveys, notes will be made about how birds are utilising the subject land, in particular whether any nesting or roosting is observed.

Following the surveys, the data collected will be tabulated and analysed. The analysis will include determining the numbers of each species recorded, the most abundant species, size of flocks, and any evidence of residency or breeding.

4.2.3. Habitat Assessment

During each monitoring survey, a bird habitat assessment will be conducted at each monitoring site. Each site will be assessed for the presence of bird habitat, including but not limited to: area of open water, presence and extent of fringing vegetation such as reeds and rushes, visual assessment of the quality of the water, presence of weeds, presence of specific habitat features such as branches or rocks. Photographs will be taken of each monitoring location to enable comparison with other monitoring periods.

The information collected during the habitat assessments will be used in conjunction with the bird survey data to provide an indication of the types of birds that are likely to utilise the subject land and can also be used in the development of specific mitigation measures that make habitats in the subject land less attractive to birds.

4.3. Mitigation Measures

Following review and analysis of the monitoring data there may be the requirement to implement mitigation measures to reduce the numbers of birds visiting the subject land and thereby reduce the risk to aviation in the nearby Tamworth Regional Airport.

This section provided details of some recommended mitigation measures that can be employed to reduce the number of birds visiting the subject land. These include exclusion techniques to make the subject land less attractive to bird species by covering the waterbodies, or by employing dispersal techniques to actively move them away. The long-term cost-effectiveness of dispersing birds does not compare favourably with habitat modification or exclusion techniques as birds will tend to return as long as the attractant is accessible (International Civil Aviation Organisation 2012). However, habitat modification and exclusion techniques will never prevent all birds from utilising an area and therefore dispersal techniques are a key ingredient of any management plan.

It is beyond the scope of this Birdlife Monitoring Plan to consider in detail all the potential methods by which birds may be deterred from utilising the subject land. If it is determined that mitigation measures are required and bird deterrents are appropriate, they will be considered and included in the overall strategy as required. The final mitigation measures to be employed will be determined based on the results of the monitoring and will take into consideration the bird species involved and the characteristics of the subject land that are leading to an increase in bird numbers and will likely comprise a combination of habitat exclusion and repellent strategies.

It is acknowledged that not all the mitigation measures listed here are feasible in every situation, however it is strongly recommended that they are applied, to some extent, wherever possible and where required to meet acceptable risk outcomes. Additional information regarding dispersal techniques recommended for use on specific bird species at the Tamworth Regional Airport is provided in the individual Species Action Plans presented in the Tamworth Airport Wildlife Hazard Management Plan (Avisure 2021). This includes specific information on measures appropriate for use on the Ibis and Wood Ducks.

4.3.1. Exclusion Measures

This section considers measures to exclude birds from utilising key habitats on the subject land, in particular the waterbodies identified previously. According to the Draft Western Sydney Aerotropolis Wildlife Management Assessment (2020), the continuous water surface area of permanent waterbodies such as retention basins should not exceed 100 m². If they do exceed 100 m², exclusion options or structures should be installed to break the continuity of the surface area of the water. The areas of bird attraction that will be established in the subject land as identified in **Section 3.3** are waterbodies that will be in excess of 100 m², and therefore exclusion is an appropriate mitigation measure for consideration.

Options for exclusion include installing netting, shade balls, overhead wires, flagged wires in the water or floating/permeable cover. Netting is one of the most common ways to exclude birds from waterways and involves covering the entire waterbody with netting to prevent access. Overhead wires involve suspending numerous parallel wires above the surface of the waterbody. Although they are spaced widely enough apart so that birds could fit through, they are a flying hazard and birds tend to avoid the waterbody. Permeable covering is a solid plastic sheet that is used to cover the entire waterbody and prevent bird access completely. Flagged wires in the water involves installing numerous wires with flags attached spiked into the substrate. Shade balls involves covering the surface of the water with floating balls, also preventing access.

Care must be taken that these structures do not provide opportunities for birds to perch or roost. Where perching, roosting or nesting activity is detected on structures, exclusionary devices such as anti-perching spikes should be installed. Bird spikes are an inconspicuous humane bird control product designed to prevent larger birds from landing on protected surfaces.

These options for covering water bodies are widely used to deter birds from using areas of water, however initial costs for material and installation are likely to be high.

4.3.2. Dispersal Measures

This section provides details of a range of dispersal measures that may be implemented to disperse birds that have entered the subject land, and some general principles for their use.

4.3.2.1. Acoustic Bird Deterrents

One of the main dispersal measures that may be considered to deter birds from utilising the subject land include the use of acoustic deterrents such as gas scare guns. These are widely used in the horticulture industry for deterring birds from crops. Gas guns operate with LP gas, allowing the scare gun to make loud detonations and therefore frightening away birds. These detonations may be regulated to the desired frequency, from approximately every 2 minutes to every half hour and the loudness of the detonations can also be adjusted.

However, birds have been found to quickly habituate to gas guns that detonate at random or pre-set intervals throughout the day (Bishop et al 2003). Thus, to ensure they remain effective, gas guns should be used only sparingly and when birds are in specific areas (International Civil Aviation Organisation 2012). The area protected by a gas scare gun is approximately three to four hectares depending on the type of land. Thus it is likely that only one scare gun would be required to adequately scare birds from the entire subject land.

Other acoustic methods include machines that emit a wide variety of sounds and effects designed to alarm birds and scare them away. These include loud startling air horn blasts, stockwhip cracks, fireworks, blank ammunition in firearms, and other noises such as electronic shrieks and wails. Bio-acoustics such as bird alarms have been found to be highly effective against gulls and herons (Bishop et al 2003). Bird alarms utilise birds' natural responses to danger. When a bird spots a potential predator it may give an alarm call. Those within earshot are alerted and may take evasive action and leave the area. A number of pre-recorded alarm and distress calls are available commercially and such devices are widely used for bird control (Bishop et al. 2003). However, in common with gas guns, distress calls routinely broadcast from stationary speakers, with no associated reinforcement to provide added fear or stress, have been found in some instances to have limited effectiveness (International Civil Aviation Organisation 2012). Birds habituate rapidly to these sounds and they should be used randomly and in association with other deterrents.

Ultrasonic sound has also been widely used as a bird deterrent. This method uses 'silent' (to humans) sound pulses that confuse, disorientate, and scare birds. Birds are naturally driven from areas where they feel uncomfortable or threatened and theoretically will not linger while exposed to this sound. The scientific literature is unclear on the efficacy of these measures. Despite their usage around the world, the use of ultrasonic sound devices in some instances has not proven to be an effective bird repellent (International Civil Aviation Organisation 2012). Bird species hazardous to aircraft are unable to hear ultrasonic frequencies, and therefore some claim that these devices are largely ineffective as bird deterrents (International Civil Aviation Organisation 2012).

Due to the risk of habituation, any acoustic deterrent methods utilised should be varied, and moved regularly to prevent birds becoming accustomed to them and thereby losing their efficacy.

4.3.2.2. Visual Deterrents

Visual bird deterrent methods vary and include the use of a wide range of techniques including lasers, scarecrows, kites, balloons, flags, warning tapes, dyes, lights, floating solar-powered beacons, and mirrors (Bishop et. al. 2003). Additionally, radio-controlled aircraft, drones, boats, and other vehicles, as well as simulated predators (called effigies), can be used to scare wild birds away.

A common option is the use of laser lights. This method commonly uses lasers at random intervals in red and green combinations that birds dislike, forcing them to move on and find calmer landing areas. Birds are startled by the strong contrast between the ambient light and the laser beam and relocate (Bishop et al. 2003). This method is noiseless and can sweep up to 1 km in a straight line, and therefore would be adequate for use in the subject land. Hand-held laser projectors projecting a one-inch diameter red beam have been used successfully during trials in Europe to disperse birds such as Canada geese, double-crested cormorants and crows from night-time roosting areas in reservoirs and trees (International Civil Aviation Organisation 2012).

4.3.2.3. Principles for the use of Dispersal Measures

This section provides some general guidelines for the implementation of the dispersal measures outlined previously. These are principles that have been developed by the Australian Airports Association (Australian Airports Association 2016) for use on airports, but they are applicable to the subject land as the goal of dispersing problematic birds for the purposes of flight safety is the same.

Dispersal should be most intense at the end of the breeding season to discourage young wildlife from foraging on the subject land. Young birds are likely to be easily deterred provided they recognise the subject land as an unattractive and threatening environment (note that different species breed at different times of the year).

If possible settling wildlife should not be allowed to feed in order to discourage regular visitation. It is easier and more effective to harass newcomers to the subject land than birds that have established their territory on-site. Dispersal activities for most species should be concentrated in the early morning and mid-afternoon, prior to peak feeding periods. Early morning harassment discourages visitors settling in for the day (Australian Airports Association 2016).

It is important to select the most appropriate tool/technique for the situation as not all birds and situations are the same. For example, what works for an individual Ibis, may not work for a flock of Ibis, or what is effective for gulls during wet stormy weather may not work when conditions are sunny and calm.

4.3.3. Lethal Control

Lethal control is an important element of integrated wildlife management programs at airports (Australian Airports Association 2016) and there is potential for it to be utilised in the subject land. When applied sparingly, and as a last resort option, it can be used:

- To target high- and moderate-risk species;
- In circumstances when there is a clear and present danger with strike event highly probable;
- To reinforce non-lethal dispersal tools (as outlined previously); and
- When other dispersal techniques are ineffective.

Lethal control is usually performed in Australia using firearms, although trapping and poisoning, or poisoning alone is sometimes also used (Australian Airports Association 2016). Lethal control should target young inexperienced birds during and after the breeding season, as well as naïve vagrants. Lethal control should adhere to animal welfare guidelines and codes of practice and all legislative requirements regarding the keeping and use of firearms.

4.3.4. Nest Removal

If nesting is observed anywhere in the subject land, protocols will be established to remove bird nests under a Licence to Harm Protected Animals under the *Biodiversity Conservation Act 2016* (BC Act) issued by the Department of Planning Industry and Environment (DPIE) (Environment Energy and Science Group). Nests cannot be removed if chicks are present. In this instance, nests can only be removed once chicks have fully

fledged. Appropriate personal protective equipment (PPE) should be used (i.e. gloves, safety glasses, face masks) and care must be taken for aggressive territorial behaviour (Australian Airports Association 2015).

4.3.5. Implementation Triggers

Triggers for the implementation of mitigation measures will be developed following the implementation of the monitoring program. It is not clear at this stage what species of birds will occur in the wetland habitats to be created at the subject land and to what extent the waterbodies will be utilised by birds. Therefore, no specific trigger levels for the implementation of mitigation measures have been provided as part of this plan. In general, however, some species are known to be a high risk to aircraft due to their size or flocking nature, and therefore priority species for the implementation of mitigation measures in the subject land are large flocking species that are known to be attracted to waterbodies.

Priority wetland species that are known to cause a high risk to aircraft include the following (Australian Airports Association 2015):

- Australian Pelican (*Pelecanus conspicillatus*);
- Australian White Ibis (*Threskiornis molucca*);
- Straw-necked Ibis (*Threskiornis spinicollis*);
- Silver Gull (*Larus novaehollandiae*);
- Australian Wood Duck (*Chenonetta jubata*); and
- Pacific Black Duck (*Anas superciliosa*).

Of these species, the Australian Pelican, the Australian White Ibis and the Straw-necked Ibis are of the highest priority due to their large size and the consequences of any interaction with aircraft. All of the above listed species have been involved in strikes with aircraft in Australia since 2003, with the Silver Gull recording the highest number of strikes (324) between 2003 and 2014 (Australian Airports Association 2015). Ibis have previously been reported to be a problem at Tamworth Regional Airport and have been subject to dispersal operations. The Straw-necked Ibis and the Wood Duck have also been assessed as being a moderate threat to aviation at Tamworth Regional Airport (Avisure 2021).

It is recommended that if any of these species are recorded utilising the subject land that mitigation measures are implemented as a priority, as it has been found that it is easier to discourage birds from utilising an area if deterrents are implemented before they have a chance to habituate to an area (Australian Airports Association 2015). It is recommended to execute a rapid sequence of actions, with multiple tools, to reinforce the dispersal intent.

Detailed, site specific mitigation measures will be developed as required based on the species found to utilise the subject land and depending on the extent of utilisation. All the mitigation measures discussed above will result in different levels of effectiveness and it is uncertain which methods will be effective in the subject land. Birds are to some extent unpredictable and bird control around waterbodies is therefore highly challenging. Detailed monitoring information provided by the surveys outlined in **Section 4.2** (e.g. location, species,

movements, time of year, habitat resources) will be used to identify appropriate mitigation measures for implementation in the subject land. As discussed previously, there are numerous options available, some of which have limited effect in the long-term due to habituation. The most successful management programs utilise a combination of tools and techniques, supplemented with passive management options such as covering waterbodies. A mixed approach of the mitigation measures outlined above may be necessary to deter birds from utilising the subject land and an integrated approach using a variety of techniques is likely to be more effective and reduce habituation rates (Bishop et. al. 2003). Moreover, deterrence should be started as soon as possible to prevent birds from establishing patterns as birds learn quickly and it has been found difficult to deter birds from using a known habitat resource.

4.4. Reporting

Following the completion of four rounds of three-monthly monitoring (see **Section 4.2**) an annual monitoring report is to be prepared for submission to Tamworth Regional Council. This report will document the results of the previous four rounds of monitoring and will provide recommendations for the next year's surveys and whether or not mitigation measures are required to be implemented.

Each report will contain the findings of the monitoring activities and will include the following:

- Description of the monitoring surveys undertaken, including details of the survey locations, species of birds recorded and number of birds recorded of each species;
- An evaluation of bird usage of the subject land and comparison to previous years;
- Discussion of bird habitat present and any changes from previous monitoring periods;
- Photographs of each monitoring site;
- Identification of the times of highest abundance throughout the year;
- Assessment of whether the abundance of birds and usage of the subject land trigger the requirement for the implementation of mitigation measures;
- Details of recommended mitigation measures; and
- Recommendations of any adaptations or additions to the monitoring program.

The annual monitoring report will contain site photographs and complete species lists from each round of monitoring undertaken in the previous year, as well as a short comparison and discussion of the results of each monitoring survey. Any other occurrences of birds in the subject land outside of the identified monitoring locations will also be reported. If indicated by the monitoring data, the report will also recommend mitigation measures to reduce bird visitation in the subject land. This may include the mitigation measures identified previously, or may also include some additional measures as appropriate.

4.5. Responsibilities

It is recommended that a project manager/supervisor with Baiada be assigned to coordinate, supervise, and manage all works and correspondence with respect to the management of birds in the subject land. This person will be responsible for ensuring the monitoring outlined in this Birdlife Monitoring Program are implemented and that mitigation measures are implemented if recommended. The project manager will become familiar with the objectives of this plan and will progress of all aspects of works undertaken.

4.6. Timing

This Birdlife Monitoring Program will be valid for five years, after which a revised program will be prepared, taking into consideration the findings of the monitoring conducted during this time.

Initially, prior to the commencement of the project and construction of the processing plants and detention basins, monitoring sites will be established, and monitoring surveys will be conducted as outlined above to determine the existing levels of bird usage of the subject land. Thereafter, ongoing monitoring will be undertaken at each monitoring site during the construction and operation of the project to determine if they are attracting any additional birds.

Bird monitoring surveys will be conducted seasonally (i.e. every three months) for the first five years of this Birdlife Monitoring Program to capture any variation in bird visitation that is attributable to seasonality. At the end of five years, it is expected that this Birdlife Monitoring Program will be revised and the future monitoring requirements identified. There is potential for subsequent monitoring after the initial five-year period to be conducted annually, in the time of year that has previously recorded the highest numbers of birds, but this will be determined following the initial five-year period.

Reporting will be conducted annually, at the completion of four monitoring surveys. A final report will be prepared after the initial five year period of this plan. It is envisaged that that a revised Birdlife Monitoring Program will be prepared at the end of five years, taking into consideration the previous years of monitoring and any feedback received from Council and/or the Tamworth Regional Airport.

During the preparation of the annual monitoring report, the bird strike data from the monitoring undertaken at Tamworth Regional Airport will be reviewed to determine whether any patterns of bird usage of the subject land correlate with any bird data collected from the airport.

The report will also recommend mitigation measures where appropriate as determined by the results of the monitoring surveys. Mitigation measures are expected to be based on those presented in **Section 4.3** but the final recommended mitigation measures to be employed will be determined in consultation with Baiada Poultry based on the results of the monitoring surveys. The responsibility for the implementation of the recommended mitigation measures will be Baiada.

This Birdlife Monitoring Program will be valid for a period of five years. After five years, a comprehensive final monitoring report will be prepared that compares the results of the previous five years' monitoring surveys and identifies any patterns present. This report will detail any mitigation measures employed and the efficacy

of these measures as evidenced by monitoring data. The final monitoring report will identify whether ongoing monitoring is required, and whether any changes are required to be made to this document.

5. References

- Australian Airports Association. 2015. Airport Practice Note 6, Managing Bird Strike Risk.
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- Bishop et al. 2003. Review of international research literature regarding the effectiveness of auditory bird scaring techniques and potential alternatives.
- Cumberland Ecology. 2020. 1154 Gunedah Road, Westdale - Biodiversity Development Assessment Report.
- International Civil Aviation Organisation. 2012. Airport Services Manual, Part 3 — Wildlife Control and Reduction.
- National Airports Safeguarding Advisory Group. 2011. Guideline C: National Airports Safeguarding Framework Managing the Risk of Wildlife Strikes in the Vicinity of Airports.

FIGURES





- Legend**
- Subject Land
 - Project Boundary
 - Wetland
- Watercourses**
- 1st Order stream
 - 2nd Order stream
 - 3rd Order stream
 - 6th Order or above

Image Source:
Image © NearMap 2020
Dated: 21/3/2020

Data Source:
Sixmaps Clip and Ship,
Spatial Services (2021)
NSW Department of
Finance and Services



Coordinate System: MGA Zone 56 (GDA 94)

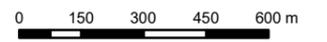


Figure 1. Location of the subject land



Legend

- Subject Land
- Project Boundary

Areas of Potential Bird Attraction

- Existing Waterbody
- Proposed Waterbody

Image Source:
 Image © NearMap 2020
 Dated: 21/3/2020

Data Source:
 SBA Architects (2020)
 Sixmaps Clip and Ship,
 Spatial Services (2021)
 NSW Department of
 Finance and Services

Coordinate System: MGA Zone 56 (GDA 94)



Figure 3. Areas of potential bird attraction