Tamworth Regional Council

Wildlife Hazard Assessment Report

Proposed Organics Recycling Facility &
Tamworth Regional Airport

April 2020

Tamworth Regional Council

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Executive Summary

Tamworth Regional Council proposes to develop an Organic Recycling Facility 10.7 km from Tamworth Regional Airport. Such facilities are known to attract birds; accordingly, Council engaged Avisure to conduct a wildlife strike risk assessment of the proposed development.

To assess the potential risk from the proposed facility, Avisure assessed the current strike risk at Tamworth Regional Airport by completing wildlife surveys on and off airport, analysing strike history and then appraising how the facility could change the risk at the airport and within the current airspace.

Based on strike data and the frequency of strikes causing aircraft damage or an adverse effect (such as a delay or caused the aircraft to go-round), Tamworth Regional Airport has a relatively high strike risk. The implication from this is that any new development in the vicinity of the airport, should not add to that risk.

The proposed development includes diverting food waste from the landfill to the Organic Recycling Facility and is very likely to result in existing hazardous species relocating to other resources on and around the airport. Based on a review of the proposed Organic Recycling Facility it is likely that the enclosed receival shed and tunnel composting system would minimise wildlife attraction to the site and prevent access to potential food resources.

The National Safeguarding Framework identifies organic waste and putrescible waste facilities as a high wildlife attraction risk and are considered compatible within 13 km of an airport provided on-going wildlife monitoring is implemented. This advice is supported in a number of other aviation guidance documents. So in principal this land use is compatible in this location. However for the project to meet the requirements of relevant guidelines and practices, there is a need to ensure that birds and other wildlife that present a hazard to aircraft are not attracted to the site. It is our recommendation that further steps are taken to consider the design of the facility to reduce attraction including reviewing the landscaping, pond design and structures to reduce wildlife attraction and a management plan including a monitoring program be implemented during the construction and operational phases.

Ongoing monitoring of the site during the construction and operational phases will be essential to ensure risks are identified and mitigated throughout the life of the facility. Data from this monitoring should be shared with Tamworth Regional Airport management and where numbers exceed acceptable levels additional controls instigated. Control measures should be established according to the species and nature of the attraction over time but may include active dispersal, covering composted material, netting ponds or amending on site processes.

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Abbreviations

AAWHG	Australian Aviation Wildlife Hazard Group
AC	Advisory Circular
AGL	Above Ground Level
AIP	Aeronautical Information Package
AOA	Air Operation Area
ASRI	Airport Survey Risk Index
ATSB	Australian Transport Safety Bureau
CASA	Civil Aviation Safety Authority
DIT	Department of Infrastructure and Transport
EIS	Environmental Impact Statement
FAA	Federal Aviation Administration
IBSC	International Bird Strike Committee
ICAO	International Civil Aviation Organization
OFA	Object Free Area
OFZ	Obstacle Free Zone
ORF	Organics Recycling Facility
MOS	Manual of Standards
NASF	National Airports Safeguarding Framework
NOTAM	Notice to Airmen
RPT	Regular Passenger Transport
TCS	Tunnel Composting System
TRC	Tamworth Regional Council
TSS	Threshold Siting Surface
WBA	World Birdstrike Association
WHA	Wildlife Hazard Assessment
WHMP	Wildlife Hazard Management Plan
YSTW	Tamworth Regional Airport

1. Background

1.1 The Wildlife Strike Issue

The consequence of wildlife strikes with aircraft can be very serious. Worldwide, in civil and military aviation, fatal bird strike incidents have resulted in more than 532 human fatalities and 614 aircraft losses since the beginning of aviation (Shaw et al, 2019). Bird strikes cost the commercial civil aviation industry an estimated US$1.2 billion per annum and involve more than just the repair of damaged engines and airframes (Allan 2006). Even apparently minor strikes which result in no damage can reduce engine performance, cause concern among aircrew and add to airline operating costs.

Strike risk depends on the probability of colliding with wildlife and the consequence to the aircraft if collision occurs. The probability of a wildlife strike occurring increases as the number of wildlife and aircraft operating in the same airspace increases. Strike probability also increases with airspeed. In practice, this means that the likelihood of colliding with a bird inflight increases when operating at high speed below 5000' above ground level (AGL), which is where the majority of birds operate. Wildlife density, and therefore strike probability, increases with decreasing height above the ground. Operating at low altitudes over, or near, known wildlife hazards will significantly increase strike probability.

The main factors determining the consequences of a strike are the number and size of animals struck, the combined closing speed at which the strike occurred, the phase of flight when struck and the part of the aircraft hit. Generally, the larger the animal, the greater the damage. Large animals have the ability to destroy engines and windshields and cause significant damage to airframe components and leading edges. Strikes involving more than one animal (i.e. a multiple strike) can be serious, even with relatively small wildlife, potentially disabling engines and/or resulting in major accidents. While total mass struck and impact site on the aircraft are important strike consequence considerations, final impact speed is the most significant determinant as impact force varies exponentially with the square of closing speed.

1.2 Wildlife Strikes and Land Use Around Airports

In civil aviation around 93% of strikes occur at below 3500' AGL (Dolbeer 2011), with 96% of flying-fox strikes recorded at or below 1000' AGL (Parsons et al, 2008). Consequently, management focusses largely on terminal airspace and management responsibility has typically resided with aerodrome operators. However, aircrew and air traffic controllers should be engaged in strike risk and mitigation processes, and that high-risk operations consider predicted or observed wildlife movement patterns. It is also critical that external stakeholders, including wildlife authorities, local planning authorities and land users, are engaged to monitor and mitigate wildlife hazards, and that both on- and off-aerodrome hazards are critically assessed. There are a number of national and international requirements and guidance documents that indicate land use in the vicinity of an airport can contribute significantly to the wildlife hazard levels and safety of aircraft operations. This section summarises these requirements. These are summarised in Appendix A.

1.3 Tamworth Regional Airport

Tamworth Regional Airport (YSTW[1]) is a Certified Aerodrome[2] owned and operated by Tamworth Regional Council (TRC). It is an air traffic and security-controlled airport with two sealed parallel runways (12/30R+L) and two grass cross runways (06/24 & 18/36). It is able to support multi-engine turboprop and jet-propelled high capacity regular public transport (RPT) single and multi-engine recreational and training aircraft and helicopters (including a base for Westpac rescue helicopter operations).

1.4 Project Description

Tamworth Regional Council proposes to develop an Organics Recycling Facility (ORF) on 284 Gidley Appleby Road. The proposed site is 10.7 km from YSTW and is situated more than 7 km from the extended centreline of Runway 12L/30R (for site location see Figure 1 below). TRC engaged Avisure in April 2020 to assess the potential wildlife risk to aircraft operations at YSTW in response to the development and operation of the proposed ORF.

The proposed ORF site will comprise of 11-hectares on 284 Gidley Appleby Road[3] and will feature an enclosed receival shed and Tunnel Composting System (TCS), equipment shed, compost laydown areas (maturation pads) and leachate and stormwater ponds. A vegetated screening buffer will also be planted along the perimeter (Annexure 1 Development Plans Version 1).

As part of the proposal, organic waste currently received at the Forest Road Landfill would be diverted to the ORF. Putrescible organic waste deliveries from kerbside collection trucks and semi-trailer tippers would be received at the ORF including materials such as food waste from household waste, green waste and animal waste including carcasses from food production and processing facilities.

This site was identified as the preferred option in the Tamworth Organics Recycling Facility Environmental Impact Statement (EIS) (Pitt & Sherry, 2019) as it:

- is owned by TRC
- is suitably zoned and consists of agricultural premises
- is located 15 km from the city centre and >10 km from YSTW
- has access to an existing road network
- is located >800m from neighbouring residences thus minimising impacts to residents
- has flat and gentle undulating topography
- has >100-hectare plot size
- has low presence of environmentally sensitive areas.

1 Tamworth Regional Airport ICAO code.

2 Refer to https://www.casa.gov.au/aerodromes/aerodromes-register/certified-aerodromes-register

3 Lot 61 DP707563.

The EIS identified that birds may be attracted to organics-processing facilities with exposed, rapidly degradable organics and, due to the site's proximity to the airport, there is potential for bird strikes should the site attract birds. Consultation was undertaken with the Civil Aviation Safety Authority (CASA) and YSTW as part of the revised EIS. YSTW noted that roosting sites and likely flight paths of local bird populations are a risk to aircraft including the flight path between the existing effluent reuse dam, Boltons Creek, Peel River and the proposed ORF. The EIS suggested that implementation of management and mitigation measures will minimise the risk of attracting birds to the site, reducing the bird strike risk.

The EIS identified that the risk of attracting birds is more likely on poorly managed sites that stockpile uncovered putrescible organics and release odour. The EIS suggested that the enclosed receival shed and TCS will minimise the likelihood of attracting birds. The EIS identified that there could be a risk of birds being attracted to the compost stockpiled on the maturation pads, however it was considered a low risk as the product will have undergone the 28-day pasteurisation process.

Figure 1. Organic Recycling Facility location compared to YSTW.

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Organic Recycling Facility Wildlife Hazard Assessment 2020

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Job number: PR5238
Revision: 0
Author: AS
Date: 14/04/2020

0 2.5 5 km

GDA 1994 MGA Zone 56
Projection: Tranverse Mercator
Datum: GDA 1994
Units: Meter

1.4.1 Putrescible Waste and Birds

Putrescible waste is attractive to a number of species as it generally requires no special handling techniques, is abundant, easily obtained, and is nutritionally adequate for most species. In many cases it is used as a constant and reliable food source. This often results in improved breeding success and survival rates which allows for rapid population growth.

The Australian Aviation Wildlife Hazard Group (AAWHG) Recommended Practice – Wildlife Hazard Assessment and Analysis, AAWHG RP 1.3(0), states that:

"Waste management facilities (landfills and waste transfer stations) provide food for a variety of opportunistic wildlife, in particular Australian White Ibis, Australian Pelicans, Torresian Crows, Silver Gulls and Black Kites. This artificial food source can increase localised wildlife populations to unmanageable levels, and can present a significant risk where the facility is located in close proximity to the airport. In addition, where airports are situated between waste management facilities and bird roosts, birds transiting through aircraft flight paths can present a serious strike risk."

2. Wildlife Hazard Assessment

The Wildlife Hazard Assessment (WHA) aims to assess and review potential bird hazards posed to aircraft operations at YSTW as a result of the proposed ORF at 284 Gidley Appleby Road. TRC intends to use the results of the WHA to inform their development application process of the likely risks to aircraft operations at YSTW.

2.1 Methods

Methods included an assessment of on- and off-airport wildlife survey data, ORF design schematics and documentation, and data against regulatory requirements and international best practice.

Table 1 summarises the methods to complete the WHA.

Table 1. Summary of Wildlife Hazard Assessment methods.

Component	Details	Results
Literature Review	Review proposed ORF against relevant regulations and guidance material. Review documentation provided to obtain background information.	Appendix A: Regulations and Guidance Appendix D: Data and Document Reviewed
Site Assessment	An Avisure Wildlife Biologist completed a site visit on the 6th-8th of April 2020, including: • an entry meeting with representatives from TRC Waste Services and Tamworth Regional Airport to discuss key wildlife issues and schedule components of the assessment • a client exit meeting to discuss preliminary results.	
Risk Assessment	A species risk assessment based on the on-airport survey data and previous five-year strike history.	Appendix B: Risk Assessment Methods
	An off-airport risk assessment using based on the off-airport survey data and site inspections.	

Component	Details	Results
Wildlife Strike Review	An analysis of previous five years of strike data to determine strike rates and assess strike trends for time of day and time of year.	Appendix D: Data and Document Reviewed
Avisure Airside Surveys	Standardised wildlife surveys conducted in April 2020.	Appendix C: Survey Methods
Avisure Off-airport Survey	Wildlife surveys at previously identified land uses in the vicinity of the airport and ORF.	Appendix C: Survey Methods
Legislation and Guidance Material Review	Review proposed ORF against the CASA Manual of Standards (MOS) Part 139.	Appendix D: Data and Document Reviewed
	Review proposed ORF against the International Civil Aviation Organisation (ICAO) 9137 and 9184.	
	Review proposed ORF against the International Bird Strike Committee (IBSC) Recommended Standards for Aerodrome Bird/Wildlife Control.	
	Review proposed ORF against the National Airport Safeguarding Framework (NASF).	

2.2 Limitations

The following issues limited the WHA:

- A single site visit. Survey and risk assessment results are a snapshot of wildlife populations and do not account for climatic and seasonal fluctuations.
- One-off risk assessment. The risk assessment cannot accurately quantify changes in local wildlife populations. It identifies attributes that currently attract hazardous species and the likely hazards presented by those species for the proposed ORF to contribute.

However, despite these limitations, Avisure:

- Conducted site assessments at key identified habitats within the vicinity of YSTW to obtain baseline data.
- Analysed the data to identify species which may impact air safety for aircraft operating at YSTW.
- Evaluated the likely attraction of the ORF and its impacts on the YSTW strike risk.

3. Wildlife Strike Review

Avisure reviewed documents provided by TRC (Appendix D) to assess the bird strike risk of the proposed ORF. This section presents an analysis of strike data. YSTW and ATSB provided strike data and Air Services provided aircraft movement data.

Table 2. YSTW wildlife hazard summary 2015 to 2020.

Scorecard	2015	2016	2017	2018	2019	2020
Total strikes	11	14	7	12	22	
Total confirmed on-airport & vicinity strikes	10	14	7	12	22	
Adverse effect strikes	2	0	2	0	1	
Total mass reported struck (kg)	4.89	4.18	5.32	4.30	10.15	
Total movements[4]	76,770	71,982	77,426	80,758	46,594	
Confirmed strikes / 10,000 AC movements	1.30	1.94	0.90	1.49	4.72	
Mass struck / 10,000 AC movements	0.64	0.58	0.69	0.53	2.18	
Adverse effect strikes / 100,000 AC movements	2.61	0	2.58	0	2.15	
% mass (kg) surveyed in critical areas				38%		37%
No. very high risk species				0		0
No. high risk species				3		4
No. moderate risk species				8		4
ASRI[5]				520.71		678.26

Table 3. Aircraft movement summary.

Aircraft Weight		Strike Susceptibility	Annual Movements[6]	Forecast Annual Movements[7]
1	Over 136 tonnes	Moderate	0	Unknown
2	Between 7 to 136 tonnes	High	3,020	Unknown
3	Under 7 tonnes	High	41,506	Unknown

4 Sourced from Airservices.

5 Airport Survey Risk Index.

6 YSTW 2019 calendar year movement data. Sourced from Airservices.

7 Movement forecast data was not available at the time of writing.

Aircraft Weight		Strike Susceptibility	Annual Movements	Forecast Annual Movements
4	Helicopter	High	614	Unknown
5	Unknown Weight	Variable	874	Unknown
6	Military	Variable	580	Unknown

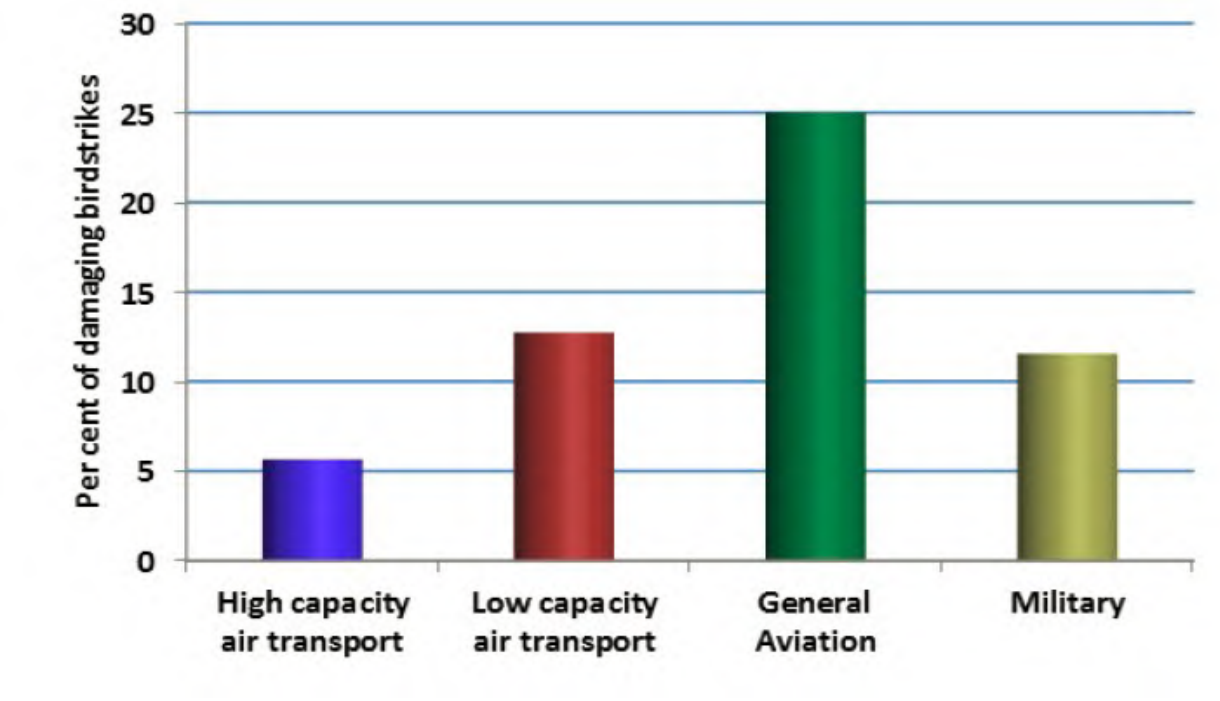

Figure 2. Proportion of bird strikes Australia wide resulting in damage in each operation type, 2006-2015, (ATSB 2017).

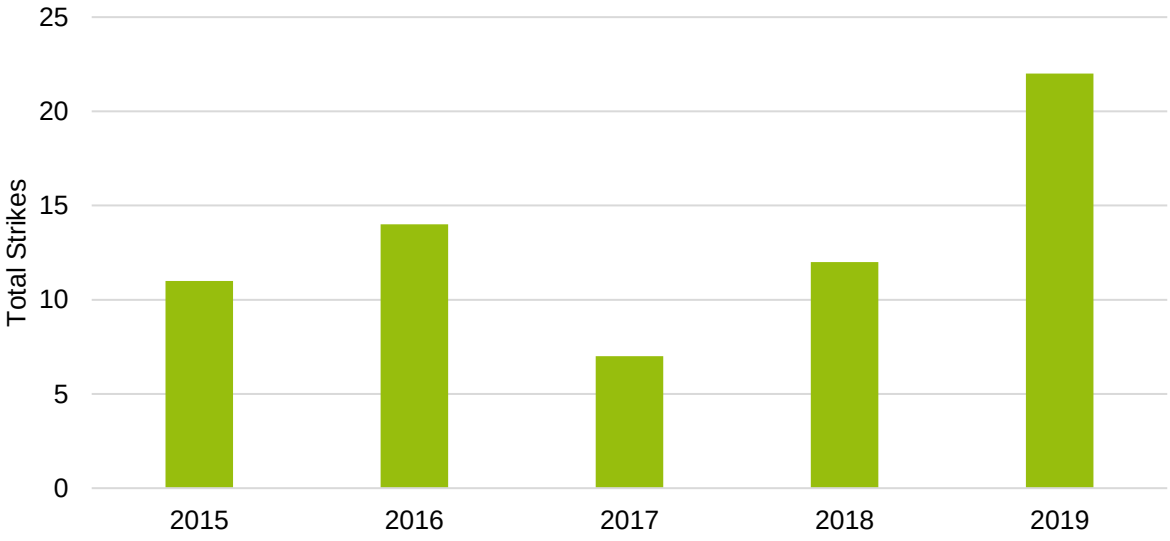

Figure 3. Total strikes per year, YSTW, 2015-2019.

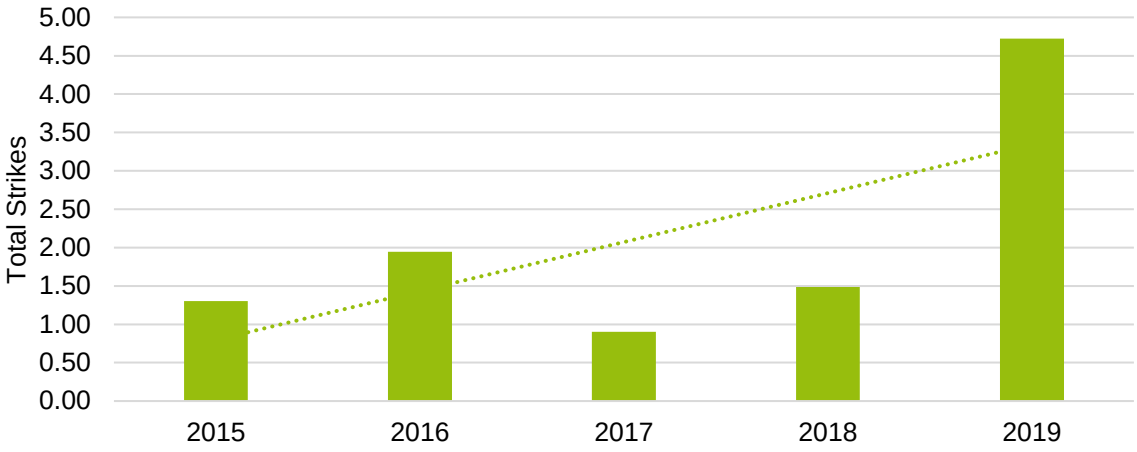

Figure 4. Confirmed strikes per 10,000 movements per year, YSTW, 2015-2019.

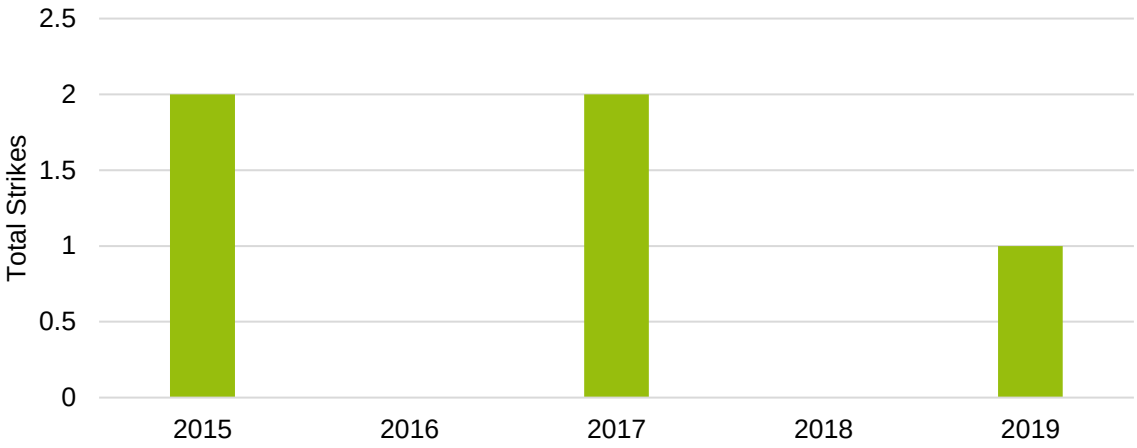

Figure 5. Strikes per year resulting in effect on planned flight or damage to aircraft, YSTW, 2015-2019.

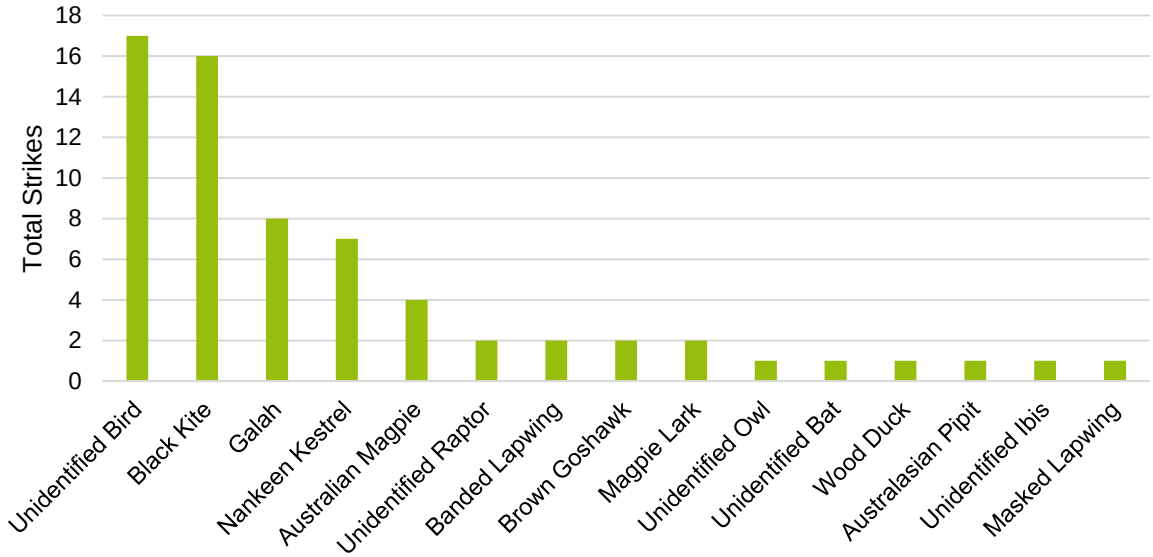

Figure 6. Strikes per species, YSTW, 2015-2019.

4. Risk Evaluation

4.1 Existing strike risk at YSTW

Based on strike data and the frequency of strikes causing damage to aircraft or an adverse effect (such as a delay or caused the aircraft to go-round), YSTW has a relatively high strike risk. The implication from this is that any new development in the vicinity of the airport, should not add to the risk.

Additionally, risks from a significant strike resulting in a forced landing or crash are increased due to no Aircraft Rescue and Firefighting services available at the airport.

4.2 Airport Species Risk Assessment

Avisure used strike data from YSTW and ATSB, and on-airport survey data collected during the site visit to assess the risk. Table 4 summaries the overall risk ranking of high, moderate and low risk species based on the survey risk assessment (Figure 7) and the strike risk assessment (Table 5).

Table 6 identifies key behaviours of these species that contribute to their risk, as well as habitat and food preferences.

Table 4. Overall species risk rankings, YSTW, April 2020.

Overall Risk	Species	Diurnal Survey Risk	Nocturnal Survey Risk	Strike Risk
High	Galah	High	-	Moderate
High	Unidentified Bat	-	-	High
High	Unidentified Bird	-	-	High
High	European Rabbit	-	High	-
Moderate	Australian Magpie	Moderate	-	Low
Moderate	Black Kite	Moderate	-	Low
Moderate	Banded Lapwing	-	-	Moderate
Moderate	Unidentified Raptor	-	-	Moderate
Low	Magpie Lark	Low	-	Low
Low	Nankeen Kestrel	Low	-	Low
Low	Australasian Pipit	Very Low	-	Low
Low	Brown Goshawk	-	-	Low
Low	Unidentified Ibis	-	-	Low
Low	Unidentified Owl	-	-	Low
Low	Wood Duck	-	-	Low

Overall Risk	Species	Diurnal Survey Risk	Nocturnal Survey Risk	Strike Risk
Low	Masked Lapwing	-	-	Low
Low	Common Starling	Low	-	-
Low	Cockatiel	Low	-	-
Low	Australian Hobby	Low	-	-
Low	Crested Pigeon	Low	-	-
Low	Eastern Rosella	Low	-	-
Low	Brown Falcon	Low	-	-

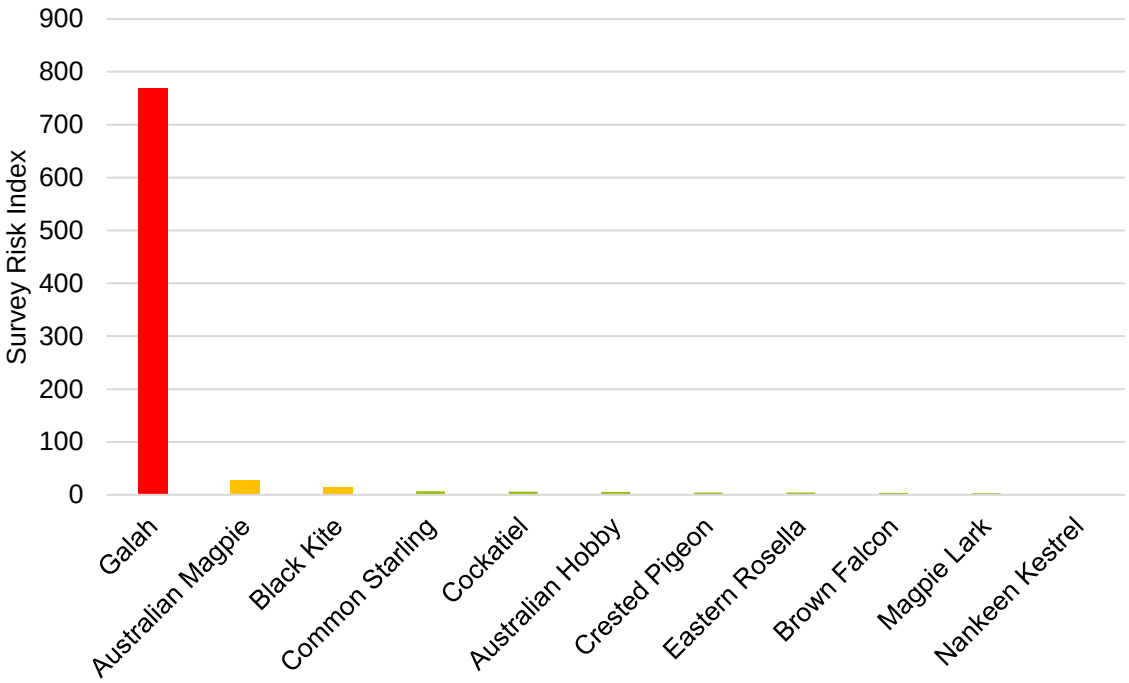

Figure 7. Species Risk Index, YSTW, April 2020.

Table 5. Wildlife species[8] recorded in strikes at YSTW were ranked according to their likelihood to be a hazard to aircraft operating.

Probability of strikes (5 year strike average for each species)						
		Very Low	Low	Moderate	High	Very High
Probability of damage	Very Low	Australasian Pipit	Masked Lapwing Unidentified Owl		Unidentified Ibis Wood Duck	
	Low	Magpie Lark	Australian Magpie	Brown Goshawk	Unidentified Raptor	
	Moderate		Nankeen Kestrel	Banded Lapwing* Galah*		
	High			Black Kite Unidentified Bird*		
	Very High		Unidentified Bat			
Low Risk: no further action beyond current management is required						
Medium Risk: review current management practices and options for additional action required						
High Risk: immediate action required to reduce the current risk						
* **indicates elevation of strike risk rank due to multiple strike**						

8 **Green** = low risk, **brown** = moderate risk, and **red** = high risk.

Table 6. Summary of the food, habitat and behavioural preferences of high and moderate risk species observed at YSTW that currently contribute to the aircraft strike hazard[9].

Species	Habitat Requirements[10]	Behaviour and Strike Risk
Galah	Short grass to forage and loaf. Buildings and other airport infrastructure to perch and roost.	Particularly hazardous to aircraft, despite their small size, because they can form flocks of hundreds of individuals. Attracted to short grass on airports, particularly where it has seeded, and their erratic flight whilst on-airport creates serious hazards for aircraft.
Unidentified Bat	Various.	Various.
Unidentified Bird	Various.	Various.
European Rabbit	Open country with the presence of tussock or rocks to hide amongst. Widespread in grasslands, wooded areas, agriculture and urban areas.	Digs a network of burrows (warrens, housing between 2-10 individuals, unlike hares that are solitary. Unlike hares, young are born in fur-lined nests in the warren and are dependent on the mother. Mainly feed after sunset, with large home of up to 0.7 hectares.
Australian Magpie	Open natural and urban areas with adjacent trees.	Highly territorial during their breeding season, aggressively defending nests and young against all potential predators. Airports offer large areas of short grass to safely forage whilst keeping an eye out for predators. Known to forage on human derived food resources.

9 Based on Airside Survey Risk Assessment and Strike Risks Assessment

10 Source: Handbook of Australian, New Zealand & Antarctic Birds Volumes 1 to 7.

Species	Habitat Requirements[10]	Behaviour and Strike Risk
Black Kite	Utilise a variety of habitats from water courses to open plains and landfills.	Cosmopolitan raptors, widespread and common throughout the world. A social scavenger often observed in groups around human settlement, in search for carrion, food waste and prey items (including insects, frogs, birds, fish and small mammals). Known to forage on human derived food resources. Large numbers, caused by their association with populated areas, has increased their strike rate at Australian airports.
Banded Lapwing	Prefer short open grasslands including agricultural lands and paddocks.	Known for aggressive behaviour and distraction display to lure danger away from young. Walking and running on ground while foraging, will stalk and lunge at prey. Nests and forages in short grass. Highly territorial during their breeding season, aggressively defending nests and young against all potential predators.
Unidentified Raptor	Raptors are found in all habitats but are especially attracted to open grasslands and woodlands. Many raptors are attracted to fires and sources of heat.	Soar and/or thermal while actively hunting, from low to the ground (e.g. Black Kites) to high (Peregrine Falcons). Some hover while hunting; facing into the wind to maintain their position above prey. Most raptors prefer open, high perches with a good view of their hunting ground and can hunt from a perched position. Nests and frequented perches are usually located high in trees and built environment. Raptors will also loaf on the ground while resting or sunbaking.
Other species likely to be attracted		
Australian Pelican	Primarily wetland habitats (marine and freshwater). They often use thermals over airports, in approach and departure paths. Attracted to landfill sites and large waterbodies.	Thermalling and transiting pelicans present a significant strike risk primarily due to their very large body mass. Because of their scavenging behaviour, they are often prevalent at landfills, fish cleaning areas, and areas where people feed birds such as parks and gardens. Known to forage on human derived food resources.

Species	Habitat Requirements[10]	Behaviour and Strike Risk
Australian White Ibis	Terrestrial wetlands, sheltered marine and estuarine habitat. Also landfills and urban parks and gardens.	Airports offer large areas of short grass where ibis can safely forage whilst being vigilant to predators and a relatively predator-free environment thanks to tall perimeter fences and general activity of aircraft and vehicles. Ibis transiting through airport airspace to access adjacent habitats, such as wetlands and landfills, present a serious strike risk because of their large body mass. Known to forage on human derived food resources.
Common Starling	Common in urban environments including landfills use infrastructure to roost.	Particularly hazardous to aircraft, despite their small size, because they can form flocks of hundreds of individuals. They are attracted to short grass on airports, particularly where it has seeded, erratic flight creates serious hazard for aircrafts. Known to forage on human derived food resources.
Flying-foxes (depending on landscaping)	Forage on fruit and nectar and roost within rainforests, open forests, closed and open woodlands (including Melaleuca swamps and Banksia woodland.	Nocturnal, travelling up to 100 kilometres a night, with a foraging radius of up to 50km. They occupy daytime roosts which they leave at dusk, en masse, to forage. Roosts are can support tens of thousands of individuals and are often located in close to a water source, in vegetation with a dense canopy closed understory or protective ground barrier. They pose risk to aircraft due to their large body size, movement in large groups and poor ability to avoid aircraft.
Little Black Cormorant	Wetlands, sheltered coast waters, mangroves, rivers, dams, fish farms and sewage treatment banks.	Known to form large flocks in flight to where food resources are abundant near large water sources (with high fish populations). This flocking behaviour presents a high hazard to aircraft operations, especially at dawn and dusk. For airports that support water bodies on and adjacent to the airfield, cormorant activity can be high.
Little Eagle	Woodland and forests as well as open country and arid zone.	Strike risk is associated with their relatively large body mass, and their aerial hunting behaviour whereby they often fly slowly at low heights in search of prey.

Species	Habitat Requirements[10]	Behaviour and Strike Risk
Little Raven	Common and abundant in grasslands and other open habitats, such as pastures. Attracted to modified habitats, such as agricultural and grazing lands, or to human activities where food is abundant, especially rubbish tips and bins.	Foraging in pastures, they breed and roost in trees in adjacent forest habitats, including dry open sclerophyll woodlands. Medium sized, stocky ravens that are very difficult to distinguish between other ravens and crows other than by call. Known to forage on human derived food resources.
Peregrine Falcon	Inhabits a wide range of urban and natural environments.	Their strike risk is linked to their aerial hunting behaviour. Capable of high-speed flights when chasing prey in flight. Like other raptors, their predator-detection is low, as such, their detection of approaching aircraft around airports is also low.
Silver Gull	Any watered habitat; natural or manmade, permanent or temporary. Common in urban parks, gardens and landfills.	Hazardous to aircraft primarily due to their flocking tendency which can result in large numbers transiting the airport or flight paths. They will often use airfields as a temporary refuge during inclement weather, occasionally congregating in hundreds. Grasslands inundated with water following rainfall is also a significant attractant on airports. Known to forage on human derived food resources.
Straw-necked Ibis	Grasslands, terrestrial wetlands, farmland.	Airports offer large areas of short grass where ibis can safely forage whilst being vigilant to predators and a relatively predator-free environment thanks to tall perimeter fences and general activity of aircraft and vehicles. Ibis transiting through airport airspace to access adjacent habitats, such as wetlands and agricultural fields, present a serious strike risk because of their large body mass.
Swamp Harrier	Primarily terrestrial wetlands and open country of tropical and temperate regions.	Strike risk is associated with their relatively large body mass, and their aerial hunting behaviour whereby they often fly slowly at low heights in search of prey.

Species	Habitat Requirements[10]	Behaviour and Strike Risk
Wedge-tailed Eagle	Open grasslands and woodlands.	Present a significant strike risk because of their very large body mass along with aerial hunting and thermalling activity. They often soar on thermals in pairs, which can result in aircraft conflicts if located in flight paths. As scavengers, they are quick to locate carrion on and adjacent to airports. Land uses such as animal farming or abattoir activities within the vicinity of an airport, can be significant attractants if not well managed.
Whistling Kite	A variety of urban and natural habitats.	Strike risk associated with large body mass, their aerial hunting and thermalling activity, and tendency to occupy urban areas.

Key Point:

- Existing hazardous species at YSTW include Black Kite (high risk) and Australian Magpie (moderate risk). The ORF may be attractive to these, and other, species.
- Hazardous species previously struck at YSTW, such as Unidentified Raptor (moderate risk) and Unidentified Ibis (low risk) could also be attracted to the ORF, increasing the strike risk to YSTW.

4.2.1 Airside Surveys

This section presents an analysis of Avisure survey data collected during the site visit.

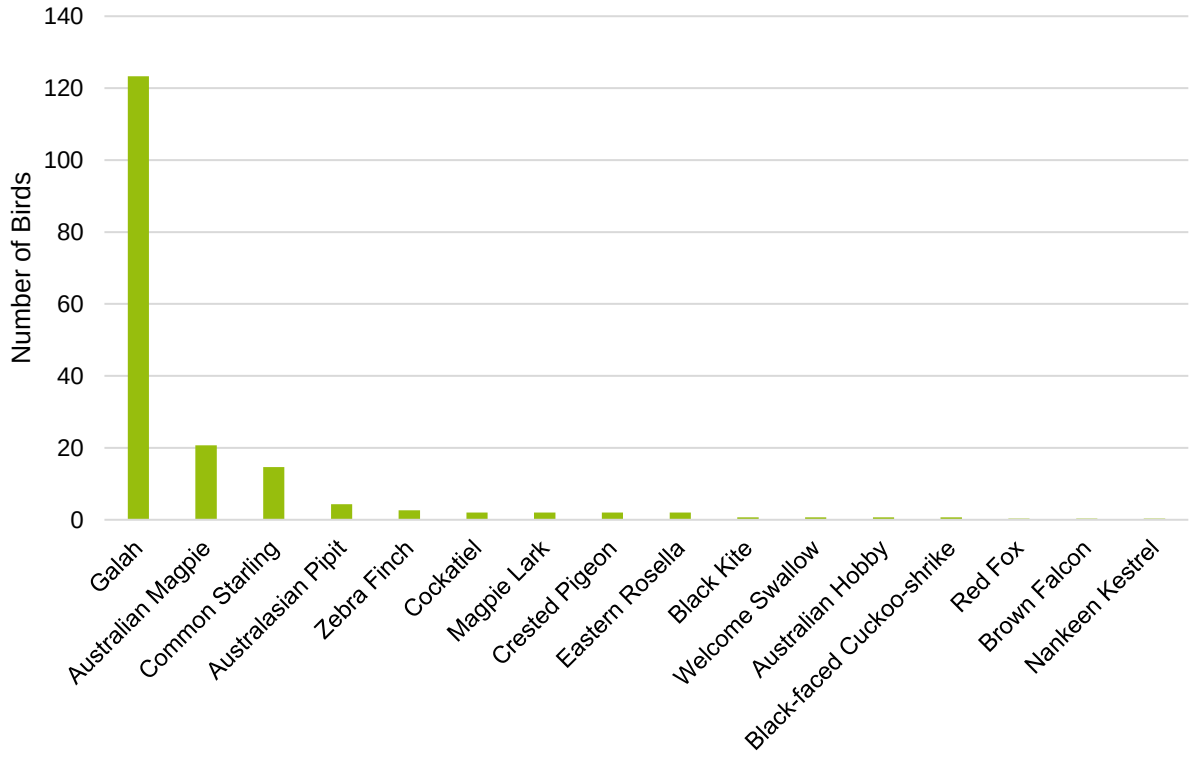

Figure 8. Average number per survey showing species observed during diurnal surveys, YSTW. April 2020.

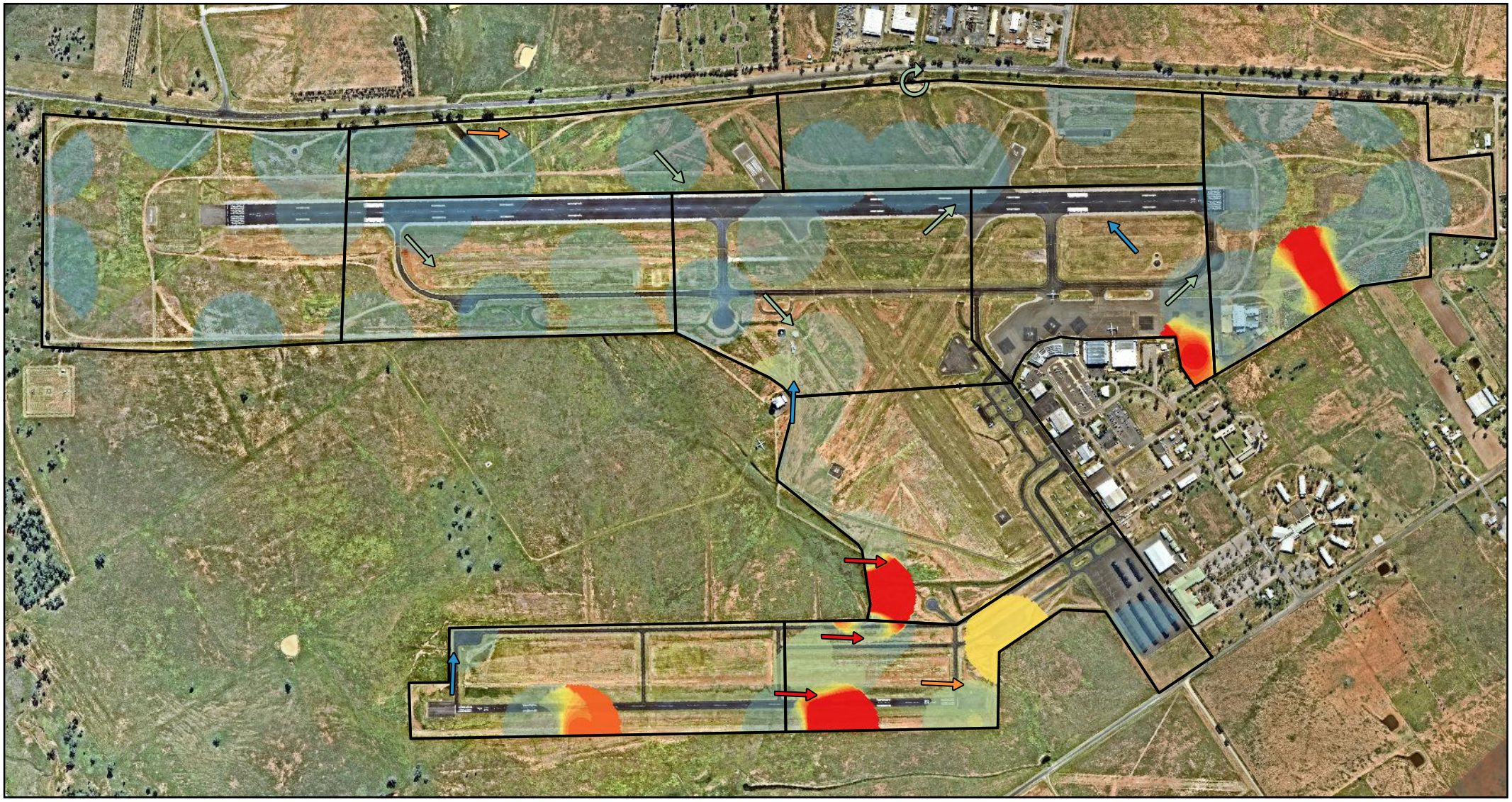

Figure 9. Wildlife survey density, showing average mass recorded per on-airport survey, YSTW, April 2020.

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Job number: PR5238
Revision: 0
Author:KF
Date: 21/04/2020

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Metres

GDA 1994 MGA Zone 56
Projection: Transverse Mercator
Datum: GDA 1994
Units: Meter

4.3 Off-Airport Risk and Airspace Assessment

When assessing habitats that have the potential to attract hazardous wildlife it is important to analyse the impacts of potentially conflicting airspace between birds and aircraft. Their movements may intersect aircraft flight paths either over the airfield, in the approaches, or in areas used for low-level circuit operations (Figure 10). In addition, regional and local wildlife populations may fluctuate in response to seasonal, climactic or other environmental variables, increasing the strike hazard.

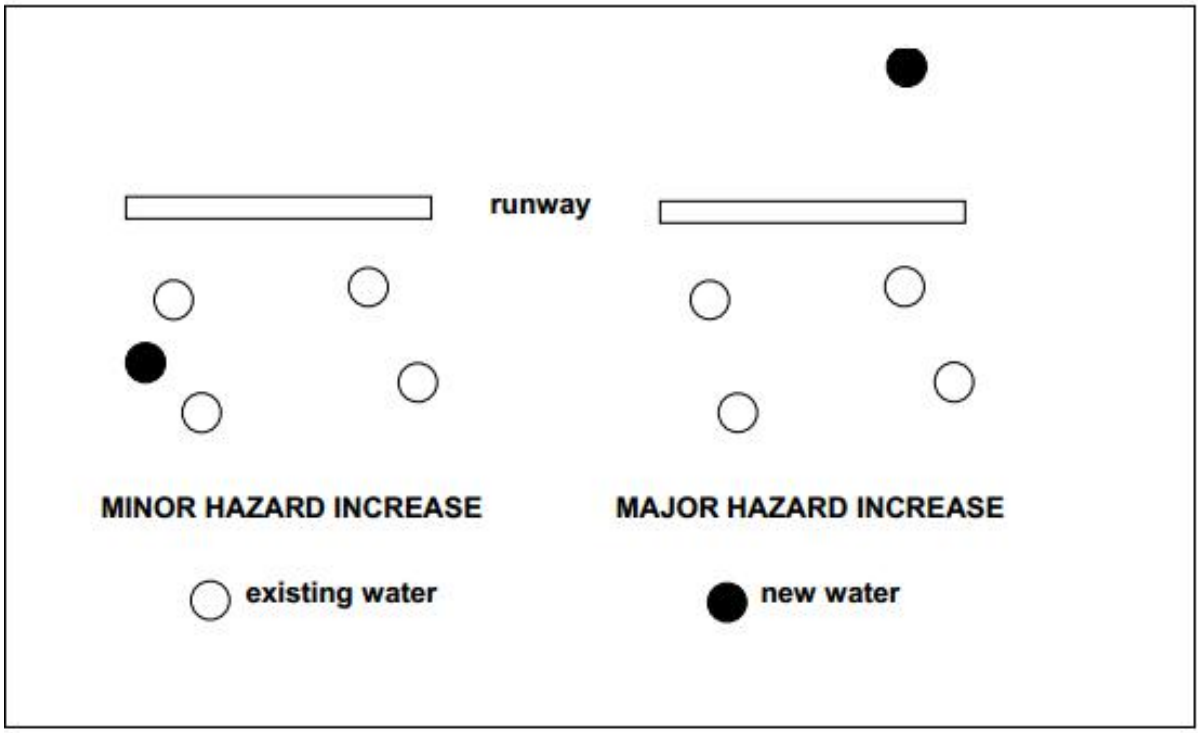

Figure 10. Example of introduction of a new waterbody in relation to a runway, UK, CAA CAP 680.

Avisure has developed a model for determining an off-airport land use's contribution to the wildlife strike risk. It involves probability based on survey data and desktop assessments to derive values for the wildlife attracted (or potentially attracted) to a site and to derive values for the inherent wildlife attractiveness of a location. It also includes strike consequence information based on the wildlife species and the location of the site relative to YSTW. In addition, the risk assessment includes the connectivity of wildlife attractive (or potentially attractive) sites to determine the potential for wildlife to transit through critical airspace.

Figure 11 shows key features of the airspace, hazards and flight paths around YSTW. This information is incorporated into the risk model to assess potential risks associated to the ORF.

Figure 12 summarises the overall risk ranking of high and moderate risk off-airport sites based on the off-airport risk assessment.

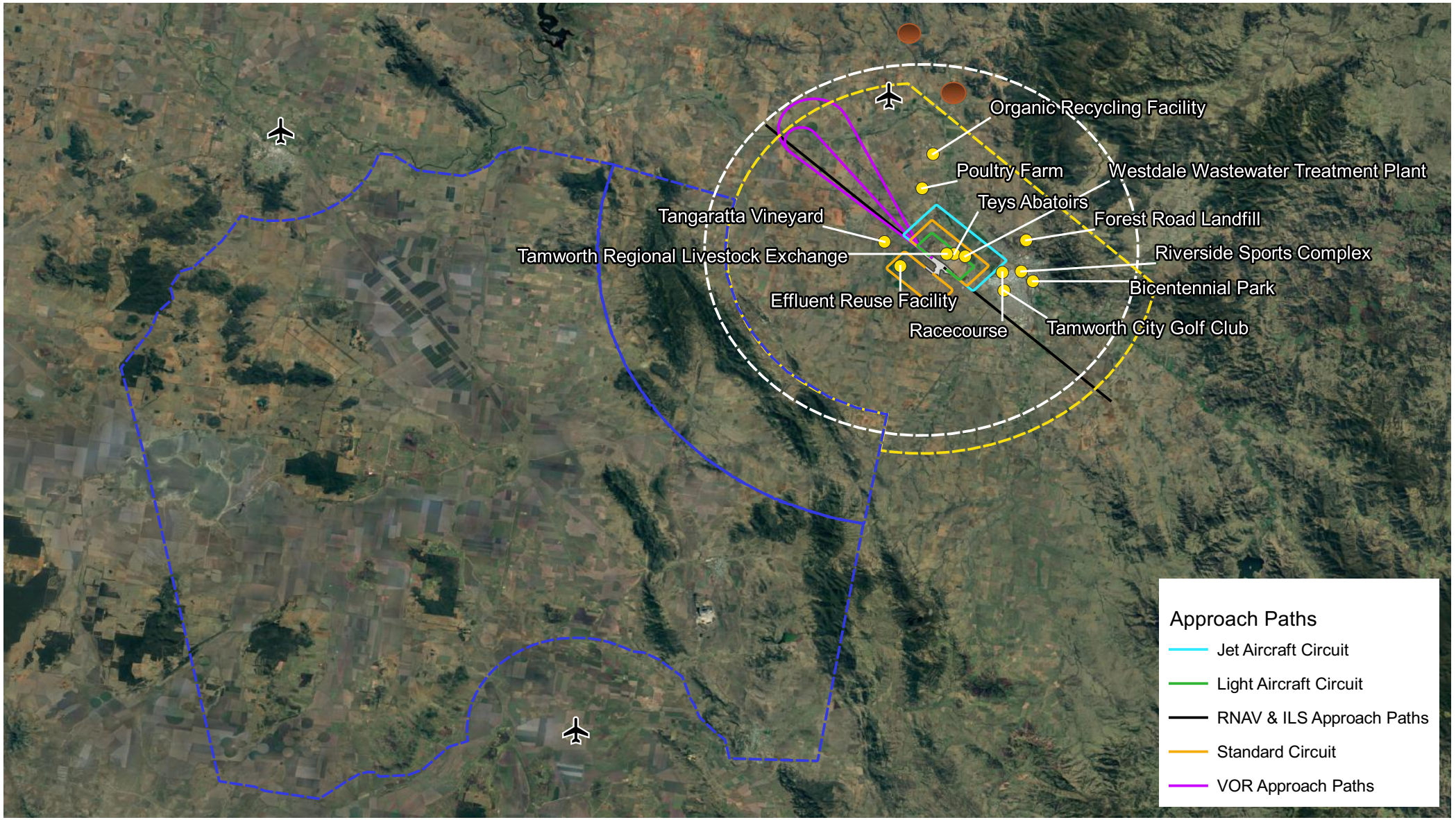

Figure 11. Location of off-airport sites in the vicinity of YSTW shown with airspace features, April 2020.

Tamworth Regional Council

Organic Recycling Facility Wildlife Hazard Assessment

Waypoints
Airport Waypoints
Mine Blasting Zones

Airspace Zones
YSTW Terminal Area
Aircraft Training Areas
YSTW Control Zone
Tamworth Airport Boundary

AVISURE
safety | aviation | wildlife

Job number: PR5238
Revision: 1
Author: AS
Date: 27/04/2020

0 10 20 km

GDA 1994 MGA Zone 56
Projection: Tranverse Mercator
Datum: GDA 1994
Units: Meter

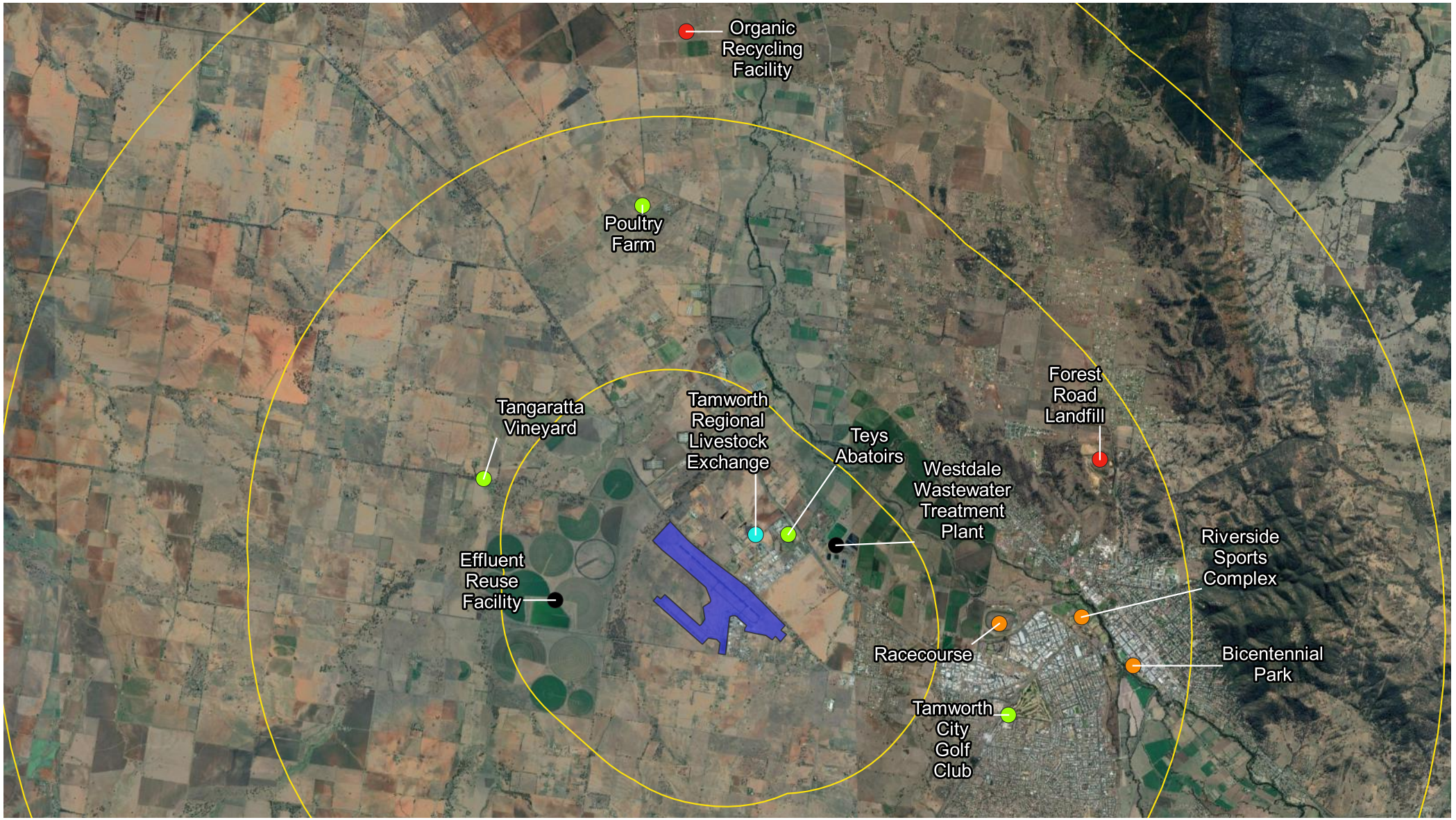

Figure 12. Risk rank of off-airport sites in the vicinity of YSTW, April 2020.

Tamworth Regional Council

Organic Recycling Facility Wildlife Hazard Assessment

Off-airport Risk Rank
- High
- Low
- Moderate
- Very High
- Very Low
- Tamworth Regional Airport
- 3, 8 & 13km Buffers

AVISURE safety | aviation | wildlife

Job number: PR5238
Revision: 0
Author: AS
Date: 17/04/2020

0 1.25 2.5 km

GDA 1994 MGA Zone 56
Projection: Tranverse Mercator
Datum: GDA 1994
Units: Meter

4.3.1 Off-airport Surveys

Avisure identified 3 off-airport sites within 3 km of YSTW, 5 within 8 km and 4 within 13 km (Figure 14) that are attracted, or had the potential to attract, wildlife showing total mass (kg) recorded at each off-airport site. Table 7 shows the number of high, moderate and low risk species observed at each off-airport site. Figure 13 shows flying-fox camps within 50 km of YSTW.

Table 7. High, moderate and low risk species observations at off-airport hazardous sites, YSTW, April 2020.

Site Name	Site Risk Rank[11]	Australian Magpie	Black Kite	Common Starling	Feral Pigeon	Galah	Magpie Lark	Masked Lapwing	Wood Duck
Effluent Reuse Facility	**VH**	12	0	3	0	13	0	0	4
Westdale Wastewater Treatment Plant	**VH**	0	1	0	0	0	4	19	16
Forest Road Landfill	H	6	2	60	57	350	0	4	0
Organic Recycling Facility	H	1	0	30	0	4	0	0	3
Bicentennial Park	M	0	0	0	0	0	0	0	18
Racecourse	M	0	0	0	36	0	0	0	12
Riverside Sports Complex	M	12	0	12	7	0	13	0	3
Poultry Farm	L	0	0	15	0	0	0	0	0
Tamworth City Golf Club	L	4	0	0	0	0	0	0	0
Tangaratta Vineyard	L	0	0	0	0	4	0	0	0
Teys Abattoirs	L	0	38	0	0	0	0	0	0

11 Risk Rank: **VH** = very high, H = high, M = moderate, L = low and VL = very low.

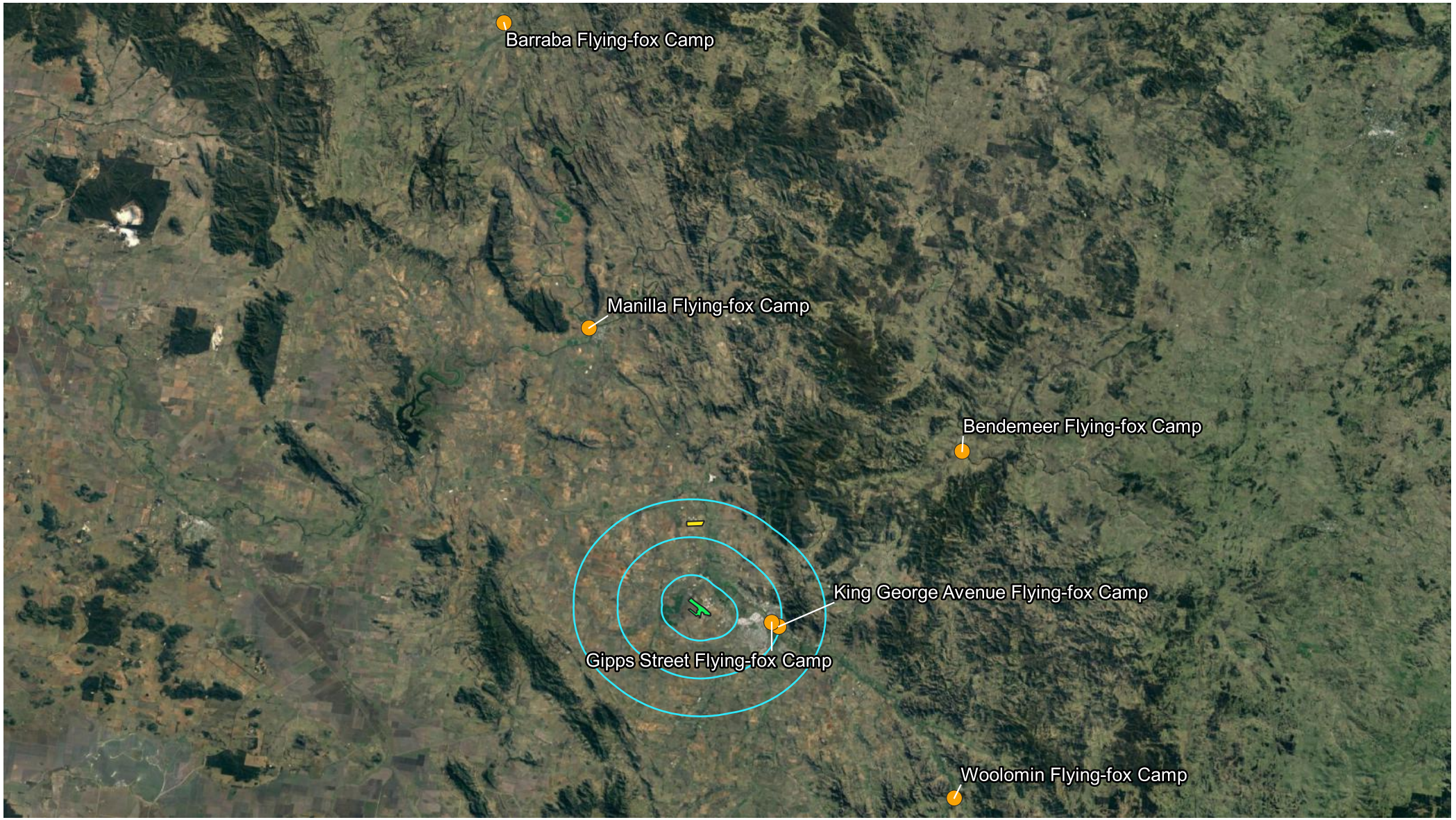

Figure 13. Flying-fox camps within 50km of YSTW.

Tamworth Regional Council

Organic Recycling Facility Wildlife Hazard Assessment 2020

ORF Lot Boundary
Tamworth Regional Airport
3, 8 & 13km Buffers

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Job number: PR5238
Revision: 0
Author: AS
Date: 15/04/2020

0 5 10 km

GDA 1994 MGA Zone 56
Projection: Tranverse Mercator
Datum: GDA 1994
Units: Meter

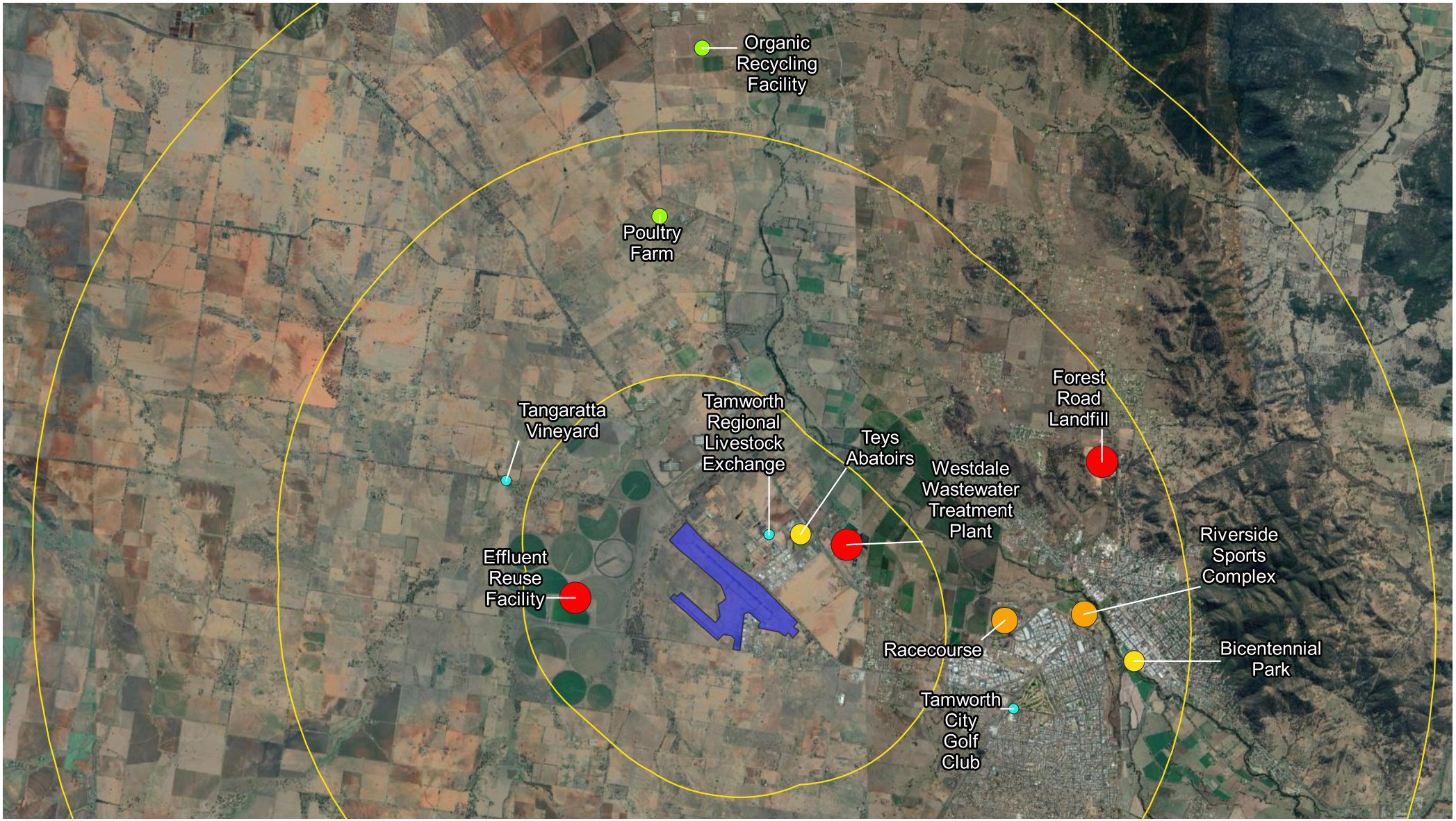

Figure 12. Total mass (kg) recorded per off-airport site, YSTW, April 2020.

Tamworth Regional Council

Organic Recycling Facility Wildlife Hazard Assessment

Total Mass (kg)
- 0 - 2.4
- 2.4 - 19.2
- 19.2 - 22.6
- 22.6 - 151
- 151 - 214

Tamworth Regional Airport
3, 8 & 13km Buffers

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Job number: PR5238
Revision: 0
Author: AS
Date: 17/04/2020

0 1.25 2.5 km

GDA 1994 MGA Zone 56
Projection: Tranverse Mercator
Datum: GDA 1994
Units: Meter

5. Assessment of the Proposed Site

The proposed ORF site was surveyed to provide baseline data, assess the level of bird attractiveness prior to construction. The site contains highly modified grassland with minimal trees for grazing/cropping (Figure 15) and two small dams (Figure 16).

Grassland and tree lined areas attracted hazardous species such as Galah (high risk), Australian Magpie (moderate risk) and Common Starling (low risk) to forage on site. Existing waterbodies currently attract Wood Duck (low risk), Pacific Black Duck and Plumed Whistling-Duck to forage as well. Construction of this site will displace existing wildlife populations, posing a potential wildlife strike risk to YSTW.

Figure 15. Photo of proposed ORF site.

A poultry farm is located to the north of the site, which was surveyed from Gidley Appleby Rd and from the northern border of the ORF site. No birds were observed and it is unlikely the poultry farm would contribute significantly to the risk of the operational site or the airport.

Figure 16. Photo of small dam on proposed ORF site.

5.1 Review of other potential ORF Project Risks

5.1.1 Construction Risk

Construction will create soil disturbance, potentially exposing invertebrates, and may cause ponding after rainfall in uneven areas, both of which may attract opportunistic species such as Australian White Ibis, Australian Magpies, Cattle Egrets and Black Kites. Construction works could also displace current wildlife populations on the site, resulting in these birds searching for foraging and roost sites elsewhere, potentially closer to YSTW. Management of waste from construction workers, including food scraps could also attract birds.

5.1.2 Operational Risk

The enclosed receival shed and TCS is likely to minimise wildlife attraction during the composting process as the putrescible waste will be covered. However, it would not be possible to exclude all birds from the site as the attraction to the unprocessed waste would be high. Any vermin attracted would add to this attraction, particularly for raptors.

Development plans provided show that the composting facility shed does not include eaves, however there are awning and overhanging roof structures covering various external areas of the building. The underside of these areas are likely to provide nesting and roosting opportunities for birds.

It is unlikely composted end-product will include any remaining food material after 28 days pasteurisation. However, material on the maturation storage pad may encourage insect activity, providing an additional food source for insectivorous species and heat from compost material and paved areas may create updrafts attracting thermalling birds. This may attract pelicans and other large waterbirds, as well as raptors (including Black Kites which are a regular issue at YTSW).

5.1.3 Waterbodies

The constructed ponds for leachate and storm water are likely to present an attraction to birds, such as ducks, pelicans, cormorants and ibis.

5.1.4 Vegetated Buffers

Some vegetation (mostly grassland) will be removed as part of the proposed development, but a vegetated buffer will be planted around the site. This buffer will include a large number of flowering *Eucalyptus* sp planted around the site as screening trees which is likely to provide a food source which may attract flying-foxes. Avisure identified six flying-fox camps within 50 km of YSTW (Figure 13). As flying-foxes can travel a 50 km radius from their camps each night to forage, the planting of known flying-fox attracting plants may pose a strike risk to YSTW. The tree species selected as screening trees need to be reviewed to limit flowering gums and other fruiting or flowering species which are likely to attract flying-foxes. Landscaping around the site office area also includes some species that are likely to attract flying-foxes however will not pose a significant food source if the species in used as screening tress are amended.

6. Conclusion

In principal this land use is compatible in this location. For the project to meet the requirements of relevant guidelines and practices, there is a need to ensure that birds and other wildlife that present a hazard to aircraft are not attracted to the site. The design includes an enclosed receival shed and tunnel composting system which will minimise wildlife attraction. Hardstand areas including the maturation pads are likely to create thermal updrafts which may attract hazardous species. Open waterbodies onsite also have potential to attract large waterbird species which pose a hazard to aircraft operations.

The ORF site is likely to draw birds from other areas if it is poorly operated or monitored. Given the number of moderate to very high level attractants already surrounding YSTW, the attraction to the site would likely increasing transit frequency through aerodrome airspace although most of the hazardous sites do not have direct transit tracks that pass through approach or departure areas at YSTW.

There are likely risks are associated to the displacement of birds from the existing landfill as feeding opportunities at this site diminish. Regular monitoring conducted by YSTW at sites surrounding the airport is likely to assist in detecting these changes but we will not know if this the scale of the issues associated to this until after the plant is operational.

For the project to proceed, a review of the trees species specified in the landscaping plan and amendments to the design of the leachate ponds to decrease attraction of hazardous wildlife need to be implemented and a management plan which must be regularly reviewed and monitoring program initiated for the construction and operational phases of the project.

7. Recommendations

This section recommends how TRC can reduce potential impacts of the ORF site on wildlife strike risk at YSTW.

Table 8. TRC wildlife hazard assessment recommendations, April 2020.

Component	Recommendation
Management Plan	Liaise with YSTW to develop a wildlife hazard management program with the aim to reduce wildlife attraction on the ORF site. Include communicating changes in wildlife populations to YSTW, regular monitoring, thresholds and, where required, wildlife dispersal and passive mitigation options. The management plan should include procedures on monitoring, recording and reviewing data, communication and actions. Conduct a follow up risk assessment after the site has been operating for one year to identify significant changes to risks associated to the displacement of wildlife from the existing landfill. Decisions regarding frequency of ongoing monitoring should be based on the results of this review.
Monitoring and thresholds	Perform standardised weekly wildlife monitoring at the ORF and landfill site during and post-construction. Report all changes in wildlife populations to TRC and YSTW. The management plan should establish acceptable thresholds at the ORF based on monitoring completed during the construction phase but should include zero tolerance for large flocking species such as Ibis, Pelicans Feral Pigeons and Black Kites attracted to waste, compost material or leachate ponds. Monitoring and other actions should be scaled depending on attraction to site over time. Should monitoring show that the threshold established in the management plan are being continually breached a review of the plan and site procedures should be completed to effectively mitigate the risk for the longevity of the site. TRC staff should conduct regular audits on the ORF site to confirm site practices are being adhered to and validate bird numbers.

Component	Recommendation
Waste material	Ensure waste material is stored inside enclosed shed and not stockpiled outside. In the event of machinery failure ensure adequate storage inside facility or redundancy planning to divert waste to landfill. Site practices must include regular inspections and cleanup of spillage at the site.
Pest management	Ensure vermin are monitored and controlled onsite to reduce attraction to birds of prey.
Leachate Ponds	Re-design leachate ponds to incorporate features which will reduce attraction of hazardous wildlife. The following principals will reduce wildlife usage of ponds: 1. Limit the surface area of the ponds to the smallest area possible. 2. Ensure steep banks: at least 4:1 (4m vertical to 1m horizontal). 3. Ensure a minimum water depth of 500mm at all times. 4. Ensure there are no built structures on or adjacent to the waterbody which might be used by perching birds. 5. Do not have floating bunds or structures on the water. Where monitoring identifies wildlife attraction, investigate mitigation options such as active dispersal or exclusion devices (e.g. netting or suspended wires). If existing dams onsite are modified as part of the project the above principals should be incorporated.
Landscaping	Review the plant species list on the landscaping plan to remove or place restrictions on species that are attractive to flying-foxes and nectivorous birds.
Building design	Gaps and cavities in the building or under awning will provide areas for birds to nest or roost. Ensure final building designs incorporate mitigations to eliminate access to these areas in and around the composting shed.

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Appendix A: Regulation and Guidance

There are a number of national and international requirements and guidance documents that indicate land use in the vicinity of an airport can contribute significantly to the wildlife hazard levels and safety of aircraft operations. This section summarises these requirements.

A.1 National Standards

A.1.1 Australian Civil Aviation Safety Authority

The MOS Part 139 prescribes the aerodrome requirements. Sections relevant to wildlife hazard management focus on: bird hazard information for the Aeronautical Information Package (AIP), drainage and drains in the runway strip, requirements for serviceability inspections, Notice to Airmen (NOTAM) requirements for bird hazards, Report Officer responsibilities, animal hazard management requirements, and standing water on paved surfaces. Table A1 details requirements specific to wildlife hazards in the vicinity of airports, along with guidance from the Advisory Circular (AC) 139-29(0).

Table A1. MOS Part 139 requirements for wildlife management around airports.

Section	Detail
MOS 11.08 (1)	*Information that must be included in the Aerodrome Manual* The wildlife hazard management procedures must be included or referenced in the aerodrome manual to deal with the hazards to aircraft operations caused by the presence of wildlife on or in the vicinity of the aerodrome, including details of the arrangements for the following: *Information that must be included in the Aerodrome Manual.* The wildlife hazard management procedures must be included or referenced in the aerodrome manual to deal with the hazards to aircraft operations caused by the presence of wildlife on or in the vicinity of the aerodrome, including details of the arrangements for the following: (e) for proposed or actual sources of wildlife attraction outside the aerodrome boundary — liaising with the relevant planning authorities or proponents to facilitate wildlife hazard mitigation.
MOS 17.01 (2)	The aerodrome operator, in consultation with the local planning authority, must attempt to monitor sites within 13 km of the aerodrome reference point that attract wildlife.
MOS 17.04 (2)	The wildlife hazard management plan must at least: (d) specify the liaison arrangements for local planning authorities within a radius of at least 13 km from the aerodrome reference point.

Section	Detail
AC 6.4	Operators of Certified Aerodromes are required to monitor and record the presence of wildlife on or in the vicinity of the aerodrome. Where this monitoring confirms the existence of a wildlife hazard, the aerodrome operator must develop a Wildlife Hazard Management Plan (WHMP).
AC 6.11	For wildlife hazards in the aerodrome vicinity which contribute to the risk but are outside the control of the aerodrome operator (i.e. on land located outside the aerodrome boundary), it is expected that the aerodrome operator will: • advise the relevant land owner(s) or controlling authority of both the nature of the wildlife hazard and the resultant impact on the aerodrome; and • work with the relevant land owner(s) or controlling authority to manage the wildlife hazard.
AC 7.3.1	Operators of Certified Aerodromes are required to monitor and record on a regular basis the presence of wildlife on the aerodrome. This requirement also extends to the aerodrome vicinity where wildlife hazards outside the aerodrome boundary are found to impact on the safe operation of the aerodrome.
AC 9.2	Wildlife monitoring must involve wildlife activity in the vicinity of the aerodrome.
AC 9.4.1	The monitoring of wildlife in the vicinity of the aerodrome should cover any obvious concentrations of wildlife and/or sources of wildlife attraction (i.e. habitat, migratory routes, feeding and breeding areas etc.) which contribute to the risk at the aerodrome.
AC 9.4.4	The outcome of the wildlife monitoring must be recorded. These records should be maintained in order to provide a detailed history of wildlife populations and behaviour over time.
AC 9.4.5	Once monitoring has identified a wildlife hazard, it should then be assessed.

Compared to other airport safeguarding documents, the NASF is of a high standard. It succeeds in meeting the objectives of ICAO reference documents[12] and provides enough detail to develop risk-based land use plans in the vicinity of aerodromes.

12 Primarily ICAO DOC 9184 - Airport Planning Manual Part 2 - Land Use and Environmental Control.

A.1.2 The National Airport Safeguarding Framework

In May 2012, the Department of Infrastructure and Transport (DIT)[13] released the National Airport Safeguarding Framework. The NASF aims to develop informed land use planning regimes to safeguard airports and their adjacent communities.

Guideline C of NASF, *Managing the Risk of Wildlife Strikes in the Vicinity of Airports*, aims to provide guidelines to land users and planning decision makers regarding the management of wildlife hazards. Adhering to the International Civil Aviation Organisation guidelines relating to radial distances from airports (i.e. 3 km, 8 km and 13 km), the NASF allocates risk categories to incompatible land uses from very low to high and recommends actions for both existing and proposed developments (i.e. incompatible, mitigate, monitor, no action). The NASF encourages a coordinated approach between airport operators and land use planning authorities to mitigate risks, and where risks are identified for new developments, the NASF recommends:

- developing a management program
- establishing management performance standards
- allowing for design changes and/or operating procedures where the land use is likely to increase the strike risk
- establishing appropriate habitat management
- creating performance bonds should obligations not be met
- monitoring by airport authorities
- reporting wildlife events as per Australian Transport Safety Bureau (ATSB) requirements.

Relevant sections of Guideline C are presented in Table A2.

Table A2. Relevant sections of NASF Guideline C.

Section	Detail
21	Land use planning authorities should ensure that airport operators are given adequate opportunity to formally comment on planning applications for new or revised land uses that fall within the guidance provided in Attachment 1 (of the NASF). Airport operators will be expected to respond with comments on how the proposed changes to land use might increase the risk of wildlife strike and on any regulatory actions that could increase the risk of wildlife strike, such as permits related to land uses of concern.

13 Now the Department of Infrastructure, Regional Development and Cities.

Section	Detail
22	Airport operators should negotiate with land use planning authorities and land owners if required on agreed action plans for monitoring and, where necessary, reducing wildlife attraction to areas in the vicinity of airports. These plans could include: • regular monitoring surveys; • wildlife hazard assessments by qualified ornithologists or biologists; • wildlife awareness and management training for relevant staff; • establishment of bird population triggers; implementation of activities to reduce hazardous bird populations; and • adoption of wildlife deterrent technologies to reduce hazardous bird populations.
24	Where local authorities seek to establish land uses which may increase the risk of wildlife strike near existing airports, steps should be taken to mitigate risk in consultation with the airport operator and qualified bird and wildlife management experts. Risk mitigation measures that should be considered in such cases include: • a requirement for a Wildlife Management Program; • the establishment of wildlife management performance standards; • allowance for changes to design and/or operating procedures at places/plants where land use has been identified as increasing the risk of wildlife strike to aircraft; • establishment of appropriate habitat management at incompatible land uses; • creation of performance bonds to ensure clean–up and compensation should obligations not be met; • authority for airport operators to inspect and monitor properties close to airports where wildlife hazards have been identified; and • consistent and effective reporting of wildlife events in line with ATSB guidelines.
27	There would be safety benefits if airport operators and land use planning authorities follow a common, coordinated approach to managing existing wildlife hazards at, and within the vicinity of, airports. Managing wildlife attractants is a key strategy in discouraging wildlife on and around airports.

The National Safeguarding Framework identifies organic waste and putrescible waste facilities as a high wildlife attraction risk and are considered compatible within 13 km of an airport but should be monitored for wildlife attraction (Table A3).

Table A3. National Airports Safeguarding Framework Guideline C: Managing the Risk of Wildlife Strikes in the Vicinity of Airports.

Land Use	Wildlife Attraction Risk	Actions for Existing Developments			Actions for Proposed Developments/ Changes to Existing Developments		
		3 km radius (Area A)	8 km radius (Area B)	13 km radius (Area C)	3 km radius (Area A)	8 km radius (Area B)	13 km radius (Area C)
Agriculture							
Turf farm	High	Mitigate	Mitigate	Monitor	Incompatible	Mitigate	Monitor
Piggery	High	Mitigate	Mitigate	Monitor	Incompatible	Mitigate	Monitor
Fruit tree farm	High	Mitigate	Mitigate	Monitor	Incompatible	Mitigate	Monitor
Fish processing /packing plant	High	Mitigate	Mitigate	Monitor	Incompatible	Mitigate	Monitor
Cattle /dairy farm	Moderate	Mitigate	Monitor	Monitor	Mitigate	Mitigate	Monitor
Poultry farm	Moderate	Mitigate	Monitor	Monitor	Mitigate	Mitigate	Monitor
Forestry	Low	Monitor	Monitor	No Action	Monitor	Monitor	No Action
Plant nursery	Low	Monitor	Monitor	No Action	Monitor	Monitor	No Action
Conservation							
Wildlife sanctuary / conservation area - wetland	High	Mitigate	Mitigate	Monitor	Incompatible	Mitigate	Monitor
Wildlife sanctuary / conservation area - dryland	Moderate	Mitigate	Monitor	Monitor	Mitigate	Mitigate	Monitor
Recreation							
Showground	High	Mitigate	Mitigate	Monitor	Incompatible	Mitigate	Monitor
Racetrack / horse riding school	Moderate	Mitigate	Monitor	Monitor	Mitigate	Mitigate	Monitor
Golf course	Moderate	Mitigate	Monitor	Monitor	Mitigate	Mitigate	Monitor
Sports facility (tennis, bowls, etc)	Moderate	Mitigate	Monitor	Monitor	Mitigate	Mitigate	Monitor
Park / Playground	Moderate	Mitigate	Monitor	Monitor	Mitigate	Mitigate	Monitor
Picnic / camping ground	Moderate	Mitigate	Monitor	Monitor	Mitigate	Mitigate	Monitor
Commercial							
Food processing plant	High	Mitigate	Mitigate	Monitor	Incompatible	Mitigate	Monitor
Warehouse (food storage)	Low	Monitor	Monitor	No Action	Monitor	Monitor	No Action
Fast food / drive-in / outdoor restaurant	Low	Monitor	Monitor	No Action	Monitor	Monitor	No Action
Shopping centre	Low	Monitor	Monitor	No Action	Monitor	Monitor	No Action
Office building	Very Low	Monitor	No Action	No Action	Monitor	No Action	No Action
Hotel / motel	Very Low	Monitor	No Action	No Action	Monitor	No Action	No Action
Car park	Very Low	Monitor	No Action	No Action	Monitor	No Action	No Action
Cinemas	Very Low	Monitor	No Action	No Action	Monitor	No Action	No Action
Warehouse (non-food storage)	Very Low	Monitor	No Action	No Action	Monitor	No Action	No Action
Petrol station	Very Low	Monitor	No Action	No Action	Monitor	No Action	No Action
Utilities							
Food / organic waste facility	High	Mitigate	Mitigate	Monitor	Incompatible	Mitigate	Monitor
Putrescible waste facility - landfill	High	Mitigate	Mitigate	Monitor	Incompatible	Mitigate	Monitor
Putrescible waste facility - transfer station	High	Mitigate	Mitigate	Monitor	Incompatible	Mitigate	Monitor
Non-putrescible waste facility - landfill	Moderate	Mitigate	Monitor	Monitor	Mitigate	Mitigate	Monitor
Non-putrescible waste facility - transfer station	Moderate	Mitigate	Monitor	Monitor	Mitigate	Mitigate	Monitor
Sewage / wastewater treatment facility	Moderate	Mitigate	Monitor	Monitor	Mitigate	Mitigate	Monitor
Potable water treatment facility	Low	Monitor	Monitor	No Action	Monitor	Monitor	No Action

A.1.3 The Tamworth Regional Council Local Environmental Plan 2010

The Tamworth Regional Council Local Environmental Plan 2010 outlines guidelines to developments in flight paths of YSTW (Table A4).

Table A4. Tamworth Regional Council Local Environmental Plan 2010.

Section	Guideline
7.4	Development in flight path (1) The objectives of this clause are: (a) to provide for the effective and on-going operation of the Tamworth Regional Airport, and (b) to ensure that any such operation is not compromised by proposed development in the flight path[14] of that airport.

A.1.4 NSW Environment Protection Agency, Waste Classification Guidelines, Part 1: Classifying waste

The NSW Environment Protection Agency outlines the guidelines of and restrictions surrounding non-putrescible materials (Table A5).

Table A5. NSW Environment Protection Agency, Waste Classification Guidelines, Part 1.

Section	Guideline
Step 6	Non-putrescible materials typically do not: • readily decay under standard conditions • emit offensive odours • attract vermin or other vectors (such as flies, birds and rodents). Wastes that are generally not classified as putrescible include soils, timber, garden trimmings, agricultural, forestry and crop materials, and natural fibrous organic and vegetative materials.

14 Note: ICAO regard animals and flocks of birds as an obstruction with regard to runway operations.

A.1.5 Work Health and Safety Act 2011

The *Work Health and Safety Act 2011* describes the requirements to protect the health and safety of other persons in relation to a business or undertaking (Table A6).

Table A6. *Work Health and Safety Act 2011*.

Section	Guideline
19	Primary Duty of Care: (2) A person conducting a business or undertaking must ensure, so far as is reasonably practicable, that the health and safety of other persons is not put at risk from work carried out as part of the conduct of the business or undertaking.

A.1.6 Damage by Aircraft Act 1952

The *Damage by Aircraft Act 1952* outlines requirements and consequences following wildlife strikes (Table A7).

Table A7. *Damage by Aircraft Act 1952*.

Section	Guideline

10	• Imposes strict and unlimited liability
	• Applies if a person or property on land or water suffers personal injury, loss of life, material loss, damage or destruction caused by:
	  ○ Impact with aircraft in flight
	  ○ Impact with aircraft that damaged or destroyed while in flight
	  ○ Impact with persons, animal or thing that dropped or fell from aircraft in flight
	  ○ Something that is a result of (1), (2) or (3)
	• If the act is applied, the owner or operator of the aircraft are jointly and severally liable.
	Damages are recoverable under the *Damage by Aircraft Act* without proof of intention or negligence.

A.2 International Standards

A.2.1 International Civil Aviation Organisation

As a member state to the ICAO, Australia is required to adhere to the rules and regulations stipulated by ICAO, including those relating to wildlife hazard management on and around airports. There are also series of guidance documents and best practice standards airports can refer to assist with wildlife hazard management. ICAO Annex 14, Volume 1 (Aerodrome Design and Operation) establishes requirements for the management of wildlife strikes, including the requirement for authorities to take actions to reduce the number and types of wildlife-attracting sites in the vicinity of airports (Table A8 & A9).

ICAO Airport Services Manual Doc. 9184: Part 2 Land Use and Environmental Control provides airport personnel with guidance on land use planning within the vicinity of aerodromes, and the need for good planning and control measures. It focusses on how the airport impacts on its surroundings, and vice versa, with regard to people, flora, fauna, the atmosphere, water courses, air quality, soil pollution, rural areas, and the environment in general. It frequently discusses the significance of how some land use in the vicinity of airports, such as landfills, can influence an airports strike risk profile. Appendix 2, Land-use Guidelines for the Avoidance of Bird Hazards, is particularly useful however it does remind readers that “Any land use that had the potential to attract birds in the airport vicinity should be subject of a study to determine the likelihood of bird strikes to aircraft using the airport”.

Table A8. Sections of ICAO Annex 14 Vol 1. 6th Ed. 2013 relevant to the proposed ORF.

Section	Requirement
9.4.3	Action shall be taken to decrease the risk to aircraft operations by adopting measures to minimize the likelihood of collisions between wildlife and aircraft.
9.4.4	The appropriate authority shall take action to eliminate or to prevent the establishment of garbage disposal dumps or any other source which may attract wildlife to the aerodrome, or its vicinity, unless an appropriate wildlife assessment indicates that they are unlikely to create conditions conducive to a wildlife hazard problem. Where the elimination of existing sites is not possible, the appropriate authority shall ensure that any risk to aircraft posed by these sites is assessed and reduced to as low as reasonably practicable.
9.4.5	States should give due consideration to aviation safety concerns related to land developments in the vicinity of the aerodrome that may attract wildlife.

Table A9. Sections of ICAO Airport Services Manual Doc 9137 4th Ed. 2012 relevant to the ORF.

Section	Requirement
4.5.1	Airports should systematically review features on, and in the vicinity of, the airport that attract birds/wildlife. A management plan should be developed to reduce the attractiveness of these features and to decrease the number of hazardous birds/wildlife present or to deny them physical access to these areas.
4.5.2	Airport development should be designed such that it will not be attractive to hazardous birds/wildlife and no attraction will be created during construction. This may include denying resting, roosting and feeding opportunities for hazardous birds/wildlife.
4.5.6	Water bodies in many parts of the world can be a particular hazard because they can be very attractive to birds. It may be possible for these to be modified by netting them to exclude birds, fencing them to deny access to birds that walk in, have the sides steepened or made less attractive in other ways.
4.7.3	For any new off-airfield developments being proposed that may attract birds or flight lines across the airport, it is important that the airport operator be consulted and involved in the planning process to ensure that its interests are represented.
7.3	Surface water is often highly attractive to birds. Exposed water should be eliminated or minimized to the greatest extent possible on airport property as follows: a) *Depressions and water bodies*. Pits or depressions that fill with water after rains should be levelled and drained. Larger water bodies, such as storm-water retention lagoons, can be covered with wires or netting to inhibit birds from landing. Larger water bodies that cannot be eliminated should have a perimeter road so that bird/wildlife-control personnel can quickly access all parts of the water body to disperse birds. Water bodies and ditches should have steep slopes to discourage wading birds from feeding in shallow water.
7.4.1	Much care must be taken when selecting and spacing plants for airport landscaping. Avoid plants that produce fruits and seeds desired by wildlife. (Plant selection is also an important consideration for off-airport location in term of wildlife attraction).

A.2.2 World Bird Strike Association

The World Birdstrike Association (International Bird Strike Committee) provides a series of standards relevant to all aspects of integrated wildlife hazard management programs (Table A10).

Table A10. IBSC Standards for Aerodrome Bird/Wildlife Control.

Reference	Recommendation
Standard 9	Airports should conduct an inventory of bird attracting sites within the ICAO defined 13 km bird circle, paying particular attention to sites close to the airfield and the approach and departure corridors. A basic risk assessment should be carried out to determine whether the movement patterns of birds/wildlife attracted to these sites means that they cause, or may cause, a risk to air traffic. If this is the case, options for bird management at the site(s) concerned should be developed and a more detailed risk assessment performed to determine if it is possible and/or cost effective to implement management processes at the site(s) concerned. This process should be repeated annually to identify new sites or changes in the risk levels produced by existing sites. Where national laws permit, airports, or airport authorities, should seek to have an input into planning decisions and land use practices within the 13km bird circle for any development that may attract significant numbers of hazardous birds/wildlife. Such developments should be subjected to a similar risk assessment process as described above and changes sought, or the proposal opposed, if a significant increase in bird strike risk is likely to result.

A.2.3 Federal Aviation Administration

The United States Federal Aviation Administration (FAA) has no jurisdiction over Australian aerodromes; however, they provide critical guidance on composting operations and water body management in Advisory Circular AC 150/5200-33B:

- **Composting operations on or near airport property.** Composting operations that accept only yard waste (e.g., leaves, lawn clippings, or branches) generally do not attract hazardous wildlife. Sewage sludge, woodchips, and similar material are not municipal solid wastes and may be used as compost bulking agents. The compost, however, must never include food or other municipal solid waste. Composting operations should not be located on airport property. Off-airport property composting operations should be located no closer than the greater of the following distances: 1,200 feet from any Air Operation Area (AOA) or the distance called for by airport design requirements (5 statute miles). This spacing should prevent material, personnel, or equipment from penetrating any Object Free Area (OFA), Obstacle Free Zone (OFZ), Threshold Siting Surface (TSS), or Clearway. Airport operators should monitor composting operations located in proximity to the airport to ensure that steam or thermal rise does not adversely affect air traffic.

- **New storm water management facilities.** The FAA strongly recommends that stormwater detention ponds should be designed, engineered, constructed, and maintained for a maximum 48–hour detention period after the design storm and remain completely dry between storms. To facilitate the control of hazardous wildlife, the FAA recommends the use of steep-sided, rip-rap lined, narrow and linearly shaped water detention basins. When it is not possible to place these ponds away from an airport's AOA, airport operators should use physical barriers, such as bird balls, wires grids, pillows, or netting, to prevent access of hazardous wildlife to open water and minimize aircraft-wildlife interactions. When physical barriers are used, airport operators must evaluate their use and ensure they will not adversely affect water rescue. Before installing any physical barriers over detention ponds on Part 139 airports, airport operators must get approval from the appropriate FAA Regional Airports Division Office. All vegetation in or around detention basins that provide food or cover for hazardous wildlife should be eliminated. If soil conditions and other requirements allow, the FAA encourages the use of underground storm water infiltration systems, such as French drains or buried rock fields, because they are less attractive to wildlife.

Appendix B: Risk Assessment Methods

The management of bird and other wildlife hazards at airports requires an understanding of wildlife populations, their behaviour, and the risk management process. Our approach follows the process outlined in the Australian and New Zealand Standard 31000:2009 Risk Management:

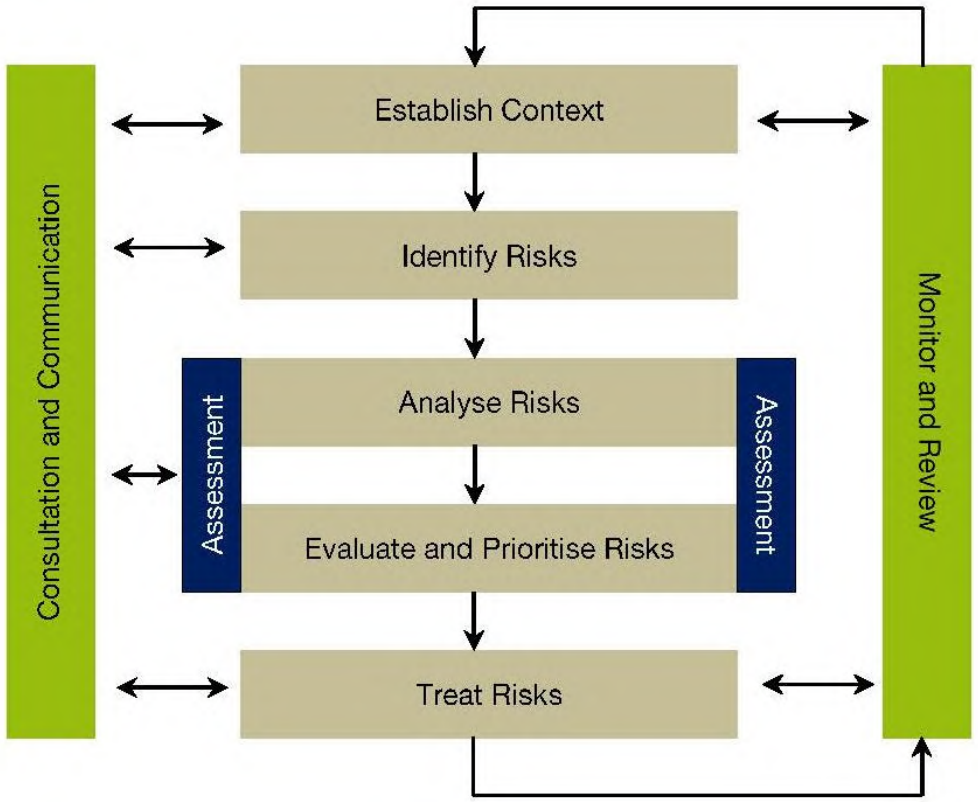

Figure B1. The risk management process (Source: AS/NZS 31000:2009 Risk Management).

Previous efforts to rank species according to risk level have involved one of the following:

1. Using national databases to indicate risk level across a country (Dolbeer et al., 2000). This lacks the resolution required to determine risk at a particular airport, although may be useful as a guide.
2. Subjective assessment based on knowledge of bird species present, interpretation of the strike history and professional judgement. This is the primary method used by advisors to airports worldwide.
3. A more formalised, yet still subjective, assessment of risk based on scoring a species for categories such as population size, bird mass, flock size, time of day, location on airport, time spent in air, etc. (Carter, 2001; Morgenroth, 2003). This assessment is open to the vagaries of professional interpretation and does not allow for comparisons across airports, or objectively compare one year to the next.

4. A determination of strike probability based on bird strike history at the airport over the previous five years to determine a yearly average for each species and using percentage of strikes causing damage for each species in a national bird strike database to determine consequence levels (Allan et al., 2003).This method does not consider the effect of differences in numbers of aircraft movements both between airports and across the same airport for different time periods. It also cannot categorise species which have not been struck in the previous five-year period yet may still remain a significant risk. It is also dependent on effective bird strike reporting which is consistent over time.

Strike Risk Assessment (Allan, 2006)

The assessment phase of the risk management process involves categorising risks. To do this, a hazard needs to be measured in terms of its probability of occurring and the consequence should it occur. This allows it to be placed into a risk matrix as outlined below:

		Probability of Strikes (5yr average)				
		Very Low	Low	Moderate	High	Very High
Probability of damage	Very Low					
	Low		Species A			
	Moderate					
	High	Species B			Species C	
	Very High					

Figure B2. Strike risk assessment matrix (Allan 2006).

Risks which fall into the green section are classified as ‘low’ and require no further action beyond current management; yellow is ‘moderate’ and requires a review of current management practices and options for additional action, and; red is ‘high’ and requires immediate action to reduce the current risk.

Risk assessment procedures based on historical strike data are limited, as they cannot easily accommodate real time changes in bird species composition or distribution.

Survey Risk Assessment (Shaw, 2004)

Avisure has developed a model for determining risk categories using professional bird survey data. The survey data is used to derive probability factors (population size, position on airport, time spent in air and the species ability to avoid) and consequence factors (bird mass and flock size) for all species recorded. The combination of these probability and consequence factors give a numerical risk index, the Species Risk Index (SRI). This provides a real-time method of risk assessment as it is able to react to observed changes in airside bird assemblages and movement patterns.

Table B1 outline the risk rating for wildlife species according to calculated SRI, and the risk ranking of an airport.

Table B1. Species Risk Index and Airport Survey Risk Index for determining risk categories based on survey data.

SRI ranges used to rate risk for each species		ASRI ranges used to rate risk of an airport	
SRI	Risk rating	ASRI	Risk rating
>1000	Very high	>10000	Very high
100 to 999.9	High	1000 to 9999.9	High
10 to 99.9	Moderate	100 to 999.9	Moderate
1 to 9.9	Low	10 to 99.9	Low
< 1	Very low	< 10	Very low

The process intends to provide a transparent, logical and systematic approach to the identification and treatment of wildlife related risks at the airport. The risk assessment identifies high risk species, which allows suitable management practices to be targeted in areas where the maximum reduction in risk may be achieved.

References

Allan, J, 2006, *A Heuristic Risk Assessment Technique for Birdstrike Management at Airports*. Risk Analysis, Vol. 26, No. 3, pp. 723-729, June 2006.

Allan, J, Orosz, A, Badham, A and Bell J 2003, *The Development of Birdstrike Risk Assessment Procedures, Their Use on Airports, and the Potential Benefits to the Aviation Industry*, in Proceedings of the 26th International Bird Strike Committee Meeting, 5–9 May 2003, Warsaw, Poland.

Carter, NB 2001, *All Birds are not Created Equal: Risk Assessment and Prioritisation of Wildlife Hazards at Airfields.* In Bird Strike 2001, Calgary, Canada.

Dolbeer, RA, Wright, SE and Cleary, EC 2000, *Ranking the Hazard Level of Wildlife Species to Aviation*. Wildlife Society Bulletin 28:372–378.

Morgenroth, C 2003, *Development of an Index for Calculating the Flight Safety Relevance of Bird Species for an Assessment of the Bird Strike Hazard at Airports*. Bird and Aviation 23.

Shaw, PP 2004, *A Model for Determining Risk Categories for Birds at Airports Using Bird Survey Data*. Bird Strike Conference 2004, Baltimore, USA.

Standards Australia/Standards New Zealand 2009, *Risk Management – Principles and Guidelines*. Sydney, New South Wales, Australia.

Appendix C: Survey Methods

Avisure divided the airside area into 10 sectors, assigned each an observation point, and completed four surveys (early morning, middle of the day, late afternoon, and post-dusk). The observation points overlooked each sector (Figure C1).

Diurnal Surveys

The observer travelled from one observation point to the next following a set route through each sector making observations while en-route. The observer spent five minutes at each observation point, recording all wildlife seen. Birds in transit or thermalling in the aerodrome boundary or in aircraft flight paths are recorded regardless of whether they are in the current sector or not. Binoculars were used to assist with identification of wildlife. Information recorded in the database included: time, species, number sighted, and position, estimated height above ground level, heading and activity (breeding, chasing, foraging, perching, sheltering, thermalling or transiting). Survey records also include ambient conditions (first and last light, rainfall, temperature, air pressure, wind speed and direction).

Nocturnal Survey

The observer travelled from one observation point to the next in a continuous motion, stopping when necessary to identify species, using a spotlight and vehicle high-beams to illuminate as much of the airside habitat as possible. The observer drove the vehicle at or less than 15 kph to allow effective scanning with the spotlight. Binoculars assisted with identification of wildlife. Information recorded in the database included: time, species, number sighted, and position, estimated height above ground level, heading and activity (breeding, chasing, foraging, perching, sheltering, thermalling or transiting). Survey records also include ambient conditions (first and last light, rainfall, temperature, air pressure, wind speed and direction.

Off-airport Surveys

The observer travels to each off-airport site during the site visit. Depending on the site, the observer walked from one observation point to the next in a continuous motion, stopping when necessary to identify species, or spent ten minutes at one advantage point, recording all wildlife observed during this time. Birds observed in transit or thermalling within the site's boundary, or vacating the site, were recorded. Binoculars were used to assist with identification of wildlife. Information recorded in the database included time, species, number sighted, and position, estimated height above ground level, heading and activity (breeding, chasing, foraging, perching, sheltering, thermalling or transiting). Survey records also included ambient conditions (rainfall, temperature, air pressure, wind speed and direction).

Limitations:

- Sampling was not always from independent replicates: wildlife could be counted twice if they move between sectors with common boundaries, although this was avoided where possible.
- Visibility in areas such as drainage channels and reed beds are lower, thus wildlife in these areas may be under-represented in the data.
- Observations of transiting and thermalling birds, regardless of whether or not they were inside the particular observation sector, may have increased the representation of some bird species which tend to transit or thermal. In some circumstances, transiting birds may have been missed due to the position of the observer.
- The cryptic nature of some bird species may result in the under-representation of these species in the data.
- Ideally, simultaneous all sector counts must get a true representation of species and numbers.

Despite its limitations, this method is satisfactory for good trend analysis if applied consistently between time and operators.

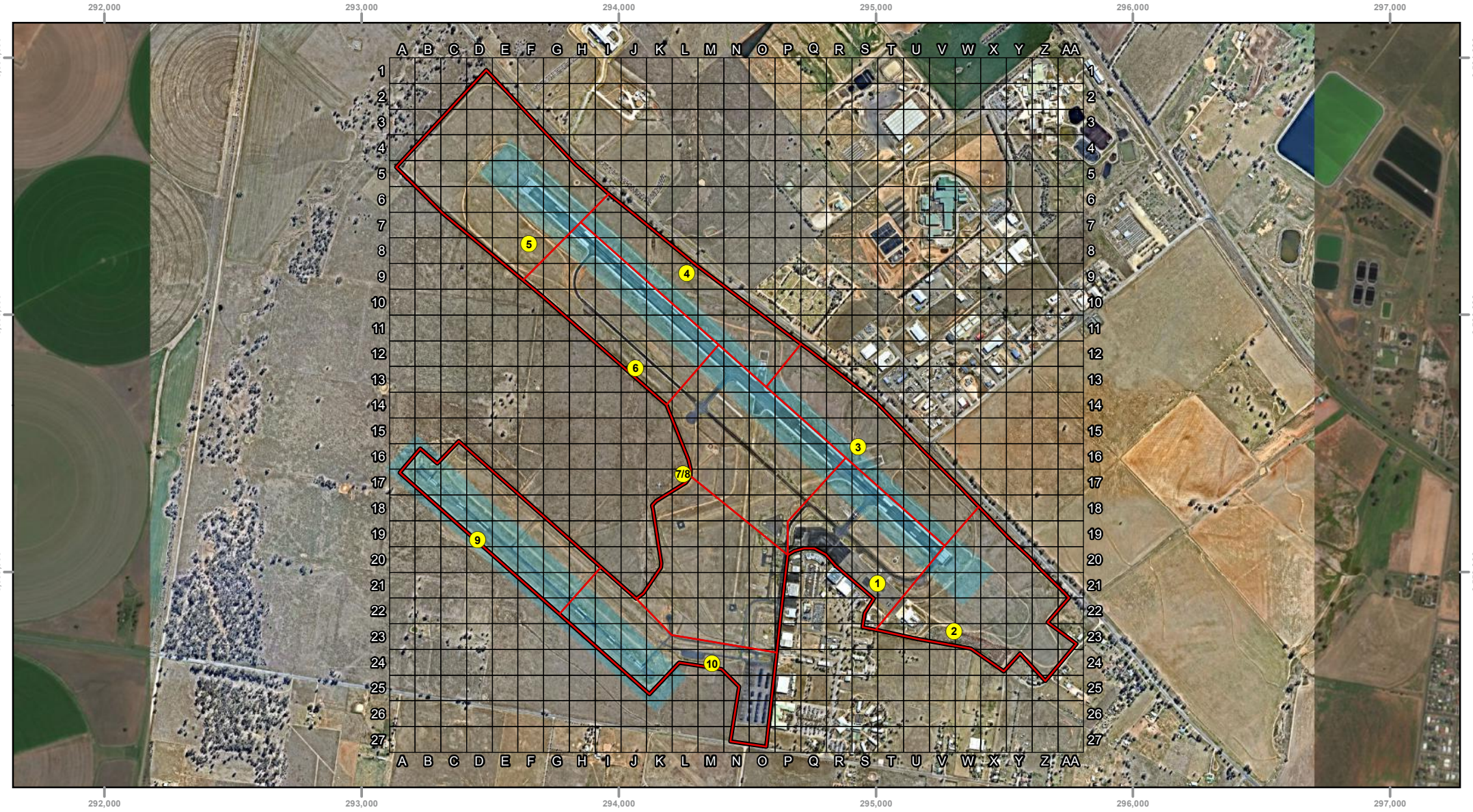

Figure C1. Avisure survey locations at YSTW Airport.

Tamworth Regional Council

Organics recycling facility wildlife hazard assessment

Approximate fenceline
Critical area
Sectors
Survey points

AVISURE
safety | aviation | wildlife

Job number: PR3156
Revision: 0
Author: DB
Date: 4/01/2018

0 200 400 800
Metres

GDA 1994 MGA Zone 56
Projection: Transverse Mercator
Datum: GDA 1994
Units: Meter

PR3156_MP1_AirportSurvey
A4

Appendix D: Document and Data Reviewed

As part of the assessment, Avisure reviewed relevant wildlife management documents and data, including:

- ICAO Annex 14
- ICAO Document 9137 Airport Services Manual: Wildlife Control and Reduction
- ICAO Document 9184 Airport Planning Manual: Land Use and Environmental Control
- International Bird Strike Committee Best Practice
- Civil Aviation Safety Authority Manual of Standards Part 139
- CASA Advisory Circular 139-26
- Federal Aviation Administration Advisory Circular 150/5200-33B - Hazardous Wildlife Attractants On or Near Airports
- The National Airports Safeguarding Framework Guidelines
- Tamworth Regional Local Environmental Plan, 2010
- *NSW Environmental Planning and Assessment Act, 1979*
- *Work Health and Safety Act 2011*
- *Damage by Aircraft Act 1952*
- Council letter on groundwater PPSNTH-11 13/02/2020
- Tamworth Organics Recycling Facility EIS.
  - EIS Annexure 1 – Development Plans Version 1
  - EIS Annexure 2 – Supporting Documentation
  - EIS Annexure 4 – Recommended Conditions of Consent Version 1
  - EIS Annexure 5 – NSW Environment Protection Authority Version 1
  - EIS Annexure 6 – External Referral Agency Responses
- Completed panel member declarations PPSNTH-11 February 2020
- Council Planning Report September 2019
- Northern Regional Planning Panel Notice of Meeting February 2020
- Northern Regional Planning Panel Record of Deferral February 2020
- Australian Aviation Wildlife Hazard Group Recommended Practices
- Tamworth Regional Airport wildlife strike and monitoring data.

Revision History

Rev. No.	Rev. Date	Details	Prepared by	Reviewed by	Approved by
00	29/04/2020	Wildlife Hazard Assessment Draft	Alexandra Stone Wildlife Biologist	Will Jamieson Regional Manager	Will Jamieson Regional Manager
01	07/05/2020	Wildlife Hazard Assessment Final	Alexandra Stone Wildlife Biologist	Will Jamieson Regional Manager	Will Jamieson Regional Manager

Distribution List

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PR5238 Tamworth Regional Council-RE.Organic Recycling Facility Wildlife Risk Assessment Report.R1

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