Ground floor, 20 Chandos Street
St Leonards NSW 2065
PO Box 21
St Leonards NSW 1590

T 02 9493 9500
E info@emmconsulting.com.au

www.emmconsulting.com.au

7 April 2022

Principal Planner - Industry Assessments
Sally Munk
Department of Planning and Environment
4 Parramatta Square, 12 Darcy Street
Parramatta, NSW 2150

Re: Response to DPE Request for Information (04032022)

Dear Sally,

This letter provides a response to the Department of Planning and Environment (DPE)'s request for additional information in relation to the Luddenham Advanced Resource Recovery Centre (ARRC) (dated 4 March 2022) (DPE ref RFI 04032022).

DPE requests the applicants submit additional information to address the matters identified in Western Sydney Airport (WSA)'s and the Department of Infrastructure, Transport, Regional Development and Communications (DITRDC) submission on the Responses to Request to Information Report (EMM December 2022):

- Cumulative wildlife impact: in accordance with the process detailed in the draft Western Sydney Aerotropolis Wildlife Management Assessment Report (2020), including (but not limited to) potential risk contribution from the proposed resource recovery facility with other wildlife attractors in the area (such as the adjacent unfilled quarry void). This should include all on-site ancillary operations, such as the proposed onsite detention basin and sewage treatment plant.

- Foreign object debris (FOD) impact: specifically addressing the management of FOD risk associated with the delivery of materials (contractor deliveries, covering of loads), visual inspection of waste loads at the weighbridge, opening of roller shutter doors and general operations across the outdoor hardstand area. This should include details of specific mitigation and management measures to address any identified risks.

- Vibration: impact on aviation infrastructure, fuelling equipment and buried pipework in accordance with best-practice standards and guidelines for vibration sensitive equipment and structures (such as the German Standard DIN 4150-3, ASHRAE application handbook on vibration control, and criteria for vibration sensitive equipment by Colin Gordon & Associates). DPE suggested consultation with WSA to obtain details of specific equipment proposed at the airport.

Detailed responses are provided below.

1 Cumulative wildlife impact

A wildlife hazard assessment (WHA) has been prepared in accordance with the Aerotropolis Aviation Wildlife Safeguarding Framework assessment process (Avisure 2020). The WHA has been peer reviewed by Phil Shaw, Managing Director of Avisure. The WHA and is provided in Attachment A of this response and the peer review in Attachment B. The review found that the adoption of the mitigation measures outlined in Section 6 of the

WHA would appropriately and adequately manage potential wildlife strike risks that associated with the ARRC.

2 Foreign object debris

2.1 Overview

Foreign object debris (FOD) is defined by the Civil Aviation Safety Authority (CASA) as fragments of loose material (such as sand, stone, paper, wood, metal, fragments of pavement) that are detrimental to aircraft structures or engines and may impair the operation of aircraft if they strike or are ingested into an aircraft engine (CASA).

WSA concerns, as documented in the WSA submission, are focused on the potential risks of windblown FOD associated with the proposed future activity of filling of the quarry void. The existing quarry consent does not permit disposal of waste on the subject property (including within the void). The Advanced Resource Recovery Centre (ARRC) development application does not include disposal of waste on the subject property.

Potential FOD risks associate with filling the void will be comprehensively assessed in the environmental assessment that will accompany the future modification application of the existing quarry consent.

Notwithstanding the above, DPE has requested consideration of the potential FOD risk to WSA associated with ARRC operations. Accordingly, an assessment of the ARRC's potential FOD risks and how the ARRC's warehouse and overall design and operating procedures will mitigate potential FOD risks is contained in the following sections.

2.2 ARRC potential FOD risks

The ARRC will accept general solid waste (non-putrescible) as defined in the *NSW Protection of the Environment Operations Act 1997* (POAO Act) and the *Waste Classification Guidelines Part 1: Classifying Waste* (EPA 2014). The ARRC will predominately accept waste that will not pose an FOD risk (ie metal and concrete). A review of specific general solid waste (non-putrescible) waste types identified the following potential waste types that will be accepted by the ARRC and that could pose a FOD risk if they were uncontrolled within the subject site and allowed to blow onto the airport land:

- paper, cardboard and delaminated plasterboard;
- plastics; and
- general light waste.

2.3 ARRC design

The following design elements will minimise the potential for ARRC operations to result in the presence of potential FOD within the subject site:

- Transport – all waste and recycled products will be transported to, and dispatched from, the ARRC in covered loads with the potential exception of sorted scrap metal, as permitted by NSW law, as it does not have the potential to become airborne during transport.
- ARRC warehouse – all waste and recycled product will be unloaded, sorted, processed, stored and reloaded within the ARRC warehouse. No waste or recycled products will be sorted, processed or stored outside the enclosed warehouse.

- ARRC entrance misters and dust suppression internal water sprays – each vehicle entrance to the ARRC will be fitted with misting water sprays. This, combined with dust suppression internal water sprays, will minimise the potential for waste within the ARRC to become airborne and be blown outside of the ARRC warehouse.

- Hardstand area – with the exception of small landscaped areas and the netted detention basin, the ARRC site will be hardstand with no unsealed areas.

- Outbound wheelwash — an outbound wheel wash will be installed at the outbound weighbridge, this will remove any material that has inadvertently been tracked out of the ARRC warehouse.

The subject property is fenced by a chain lock security fence, the existing fence is 2.1 m in height. Prior to the commencement of ARRC construction activities, this fence will be lined with scaffold mesh or similar to prevent any windblown material from being blown through the fence and leaving the subject property.

2.4 ARRC operations

An overview of ARRC operations with consideration of potential FOD risk associated with different elements of the waste recycling process if provided below.

2.4.1 Waste delivery, acceptance and rejection

The ARRC will accept waste from councils, contractors, businesses, other KLF facilities and the general public. Accordingly, waste will be delivered to site by a variety of vehicles including:

- single, dual and triple axle 'rigid' heavy vehicles such as skip-bin trucks;

- multiple axle combination heavy vehicles, including truck and dog and B-doubles; and

- light vehicles such as cars with box trailers and utilities.

All vehicles traveling to and from the ARRC will have their loads covered as required by NSW law, EPA minimum standards and ARRC management plans.

Vehicles delivering waste will be directed to the incoming weighbridge where the load will be uncovered and inspected for potential contaminants via video and in person in accordance with the incoming waste management plan. Loads will be issued a ticket at the ticket booth and the driver will be instructed where to deliver the waste within the warehouse. Vehicles will then travel uncovered between the inbound weighbridge into the ARRC warehouse western entrance. To avoid instances of FOD leaving the subject property, the section of fence along the northern and eastern boundary of the ARRC site (ie between the inbound weighbridges and the eastern entrances of the ARRC warehouse) will be increased in height to 4 m and lined with scaffold mesh or similar.

i FOD risk and mitigation

If uncontrolled, there is a risk that items of waste in incoming loads become airborne between loads being uncovered for inspection at the inbound weighbridge and the vehicle entering the ARRC warehouse. This will be mitigated through a combination of the following measures which will be documented in the approved waste management plan for the ARRC:

- Loads will be inspected at the weighbridge for potential FOD risks. Any load with material at risk of being windblown between the weighbridge and the warehouse will be directed to be re-covered after the inspection. The mesh lined, security fence around the subject property will capture and prevent windblown material from being blown through the fence and leaving the ARRC.

- A daily litter patrol will be carried out and consist of an ARRC employee walking the subject property boundary and collecting any litter. Any litter collected will be disposed of within waste bins which are inaccessible to birds and vermin, located within the ARRC warehouse.

- The street sweeper used on the ARRC internal road to minimise dust build-up will also pick up any litter.

- Vehicles leaving the ARRC site will exit via the outbound weighbridge and wheel wash.

- ARRC staff will be trained in FOD risks and will be required to take corrective action (such as removing litter promptly from external areas or implementing street sweeping).

2.4.2 Waste sorting, processing and storage

As described in the EIS and Submissions Report, all sorting, processing and storage of waste will be within the ARRC. There will be no storage of waste and/or recycled product outside of the ARRC warehouse.

i FOD risks and mitigation

If uncontrolled, there is a risk that light waste/recycled product materials being sorted, processed or stored within the ARRC warehouse could become airborne and blow outside of the ARRC warehouse and that vehicles accessing the ARRC may track material outside of the ARRC warehouse. These would be mitigated through a combination by the mitigation measures outlined in Section 1.4.1 and the following which will be documented in the approved waste management plan for the ARRC:

- The ARRC will use the latest technology waste processing plant and equipment. This will ensure waste and recycled material is appropriately contained within the respective processing stages to prevent these waste materials from becoming airborne within the ARRC warehouse (eg the density separator will be an enclosed piece of equipment which will contain the lighter waste fractions such as paper and plastic).

- The ARRC warehouse floor will be kept clean via regular washdown and use of a street sweeper.

- Recycled product and non-recyclable residues will be stored in product bays, the walls of which will be 1 m higher than the maximum stockpile height of 10 m. This will further mitigate stored product from becoming airborne as vehicles move past the product bays.

- Misting water sprays will be used at each ARRC vehicle entrance and internal water sprays will minimise any light material becoming airborne.

- In the unlikely event, waste or recycled product material is observed being blown from within or through the ARRC warehouse to areas external to the warehouse, contingency measures will be implemented. Such contingency measures may include:

    - increasing the pressure of entrance misting water sprays as required;

    - increasing the height of fencing adjacent to the warehouse entrances; and

    - increased frequency of litter patrol/usage of street sweeper.

2.4.3 Recycled product and non-recyclable residue dispatch

Vehicles dispatching recycled product and non-recyclable residues will enter the western ARRC warehouse entrance and will be loaded before exiting the southern ARRC warehouse and the outbound weighbridge. If uncontrolled, there is a risk that vehicles dispatching waste may track material outside of the ARRC

warehouse or that lighter non-recyclable residues or recycle product may become airborne outside of the ARRC warehouse from loads inadequately covered or from loose material collecting on vehicle surfaces (ie due to spillage of material during the loading process). These risks will be mitigated through a combination by the mitigation measures outlined in Section 1.4.1 and Section 1.4.2 and the following which will be documented in the approved waste management plan for the ARRC:

- All loads dispatching recycled product or non-recyclable residues are to be covered prior to leaving the ARRC warehouse.
- ARRC employees are to monitor for presence of recycled product or non-recyclable residues on vehicle surfaces and instruct vehicle drivers to remove before permitting vehicles to exit the ARRC warehouse.
- Vehicles will again be inspected at the outbound weighbridge to ensure loads are adequately covered and there is no material on vehicle surfaces.

2.4.4 Additional management measures

In addition to the mitigation measures outlined above, the following mitigation measures will further mitigate the risk of FOD from the ARRC:

- Waste management on site will include careful management of any food waste from employees, for example by providing waste bins which are inaccessible to birds and vermin and storage of these waste bins within the ARRC warehouse.
- There will be no storage of waste outside of the ARRC warehouse.
- In consideration for the practical and efficient operations of the ARRC, doors are left open while the facility is in operation. When the facility is not in operation (eg on public holidays) all doors will be closed.

3 Vibration

3.1 Overview

EMM has been requested by DPE on behalf of Western Sydney Airport (WSA) to assess potential vibration impact from the proposed ARRC on aviation infrastructure, fuelling equipment and buried pipework in accordance with best-practice standards and guidelines for vibration sensitive equipment and structures (such as the German Standard DIN 4150-3, ASHRAE application handbook on vibration control, and criteria for vibration sensitive equipment by Colin Gordon & Associates).

CPG emailed WSA on 7 March 2022 and requested details and plans of specific vibration sensitive equipment proposed at the airport, the locations of this equipment, and the actual impact of concern. No response to this email has been received. In the absence of specific details from WSA, this review has considered the requirements of BS 7385 Part 2-1993 *Evaluation and measurement for vibration in buildings Part 2*, German Standard DIN 4150 Part 2 1975, and BS 6472–2008, Evaluation of human exposure to vibration in buildings (1-80Hz).

3.2 Human perception of vibration

Humans can detect vibration levels which are well below those causing any risk of damage to a building or its contents.

The actual perception of motion or vibration may not in itself be disturbing or annoying. An individual's response to that perception, and whether the vibration is 'normal' or 'abnormal', depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of

the vibration. For example, the vibration that a person responds to as 'normal' in a car, bus or train is considerably higher than what is perceived as 'normal' in a shop, office or dwelling.

Human tactile perception of random motion, as distinct from human comfort considerations, was investigated by Diekmann and subsequently addressed in German Standard DIN 4150 Part 2 1975. On this basis, the resulting degrees of perception for humans are suggested by the vibration level categories given in Table 3.1.

Table 3.1 indicates that people will just be able to feel floor vibration at levels of approximately 0.15 millimetres per second (mm/s) and that the motion becomes 'noticeable' at a level of approximately 1 mm/s.

Table 3.1 Peak vibration levels and human perception of motion

Approximate vibration level	Degree of perception
0.10 mm/s	Not felt
0.15 mm/s	Threshold of perception
0.35 mm/s	Barely noticeable
1 mm/s	Noticeable
2.2 mm/s	Easily noticeable
6 mm/s	Strongly noticeable
14 mm/s	Very strongly noticeable

Note: These approximate vibration levels (in floors of building) are for vibration having a frequency content in the range of 8 Hertz (Hz) to 80 Hz.

3.2.1 Assessing vibration – a technical guideline

Environmental Noise Management – Assessing Vibration: a technical guideline (DEC 2006) (the guideline) is based on BS 6472–2008, Evaluation of human exposure to vibration in buildings (1-80Hz).

The guideline presents preferred and maximum vibration values for the use in assessing human responses to vibration and provides recommendations for measurement and evaluation techniques. At vibration values below the preferred values, there is a low probability of adverse comment or disturbance to building occupants. Where all feasible and reasonable mitigation measures have been applied and vibration values are still beyond the maximum value, it is recommended that the operator negotiate directly with the affected community.

The guideline defines three vibration types and provides direction for assessing and evaluating the applicable criteria. Table 2.1 of the guideline provides examples of the three vibration types and has been reproduced in Table 3.2.

Table 3.2 Examples of types of vibration

Continuous vibration	Impulsive vibration	Intermittent vibration
Machinery, steady road traffic, continuous construction activity (such as tunnel boring machinery).	Infrequent: Activities that create up to 3 distinct vibration events in an assessment period, e.g. occasional dropping of heavy equipment, occasional loading and unloading. Blasting is assessed using ANZEC (1990).	Trains, intermittent nearby construction activity, passing heavy vehicles, forging machines, impact pile driving, jack hammers. Where the number of vibration events in an assessment period is three or fewer these would be assessed against impulsive vibration criteria.

Continuous vibration associated with compaction of fill on the site is most relevant to the construction of the proposed development.

Intermittent vibration (as defined in Section 2.1 of the guideline) is assessed using the vibration dose concept which relates to vibration magnitude and exposure time.

Intermittent vibration is representative of heavy vehicle pass-bys and construction activities such as impact hammering, rolling or general excavation work.

Section 2.4 of the guideline provides acceptable human response values for intermittent vibration in terms of vibration dose values (VDV) which requires the measurement of the overall weighted RMS (root mean square) acceleration levels over the frequency range 1 Hz to 80 Hz.

To calculate VDV the following formula is used (refer to Section 2.4.1 of the guideline):

$$VDV = \left[\int_0^T a^4(t)dt\right]^{0.25}$$

Where VDV is the vibration dose value in $m/s^{1.75}$, *a (t)* is the frequency-weighted RMS of acceleration in m/s^2 and *T* is the total period of the day (in seconds) during which vibration may occur.

The acceptable VDV for intermittent vibration are reproduced in Table 3.3.

Table 3.3 Acceptable vibration dose values for intermittent vibration

Location	Daytime		Night-time	
	Preferred value, $m/s^{1.75}$	Maximum value, $m/s^{1.75}$	Preferred value, $m/s^{1.75}$	Maximum value, $m/s^{1.75}$
Critical areas	0.10	0.20	0.10	0.20
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

Notes: 1. Daytime is 7 am to 10 pm and night-time is 10 pm to 7 am.
2. These criteria are indicative only, and there may be a need to assess intermittent values against continuous or impulsive criteria for critical areas.

There is a low probability of adverse comment or disturbance to building occupants at vibration values below the preferred values. Adverse comment or complaints may be expected if vibration values approach the maximum values. The guideline recommends that activities should be designed to meet the preferred values where an area is not already exposed to vibration.

3.3 Structural vibration

3.3.1 Australian Standard AS 2187.2 – 2006

In terms of the most recent relevant vibration damage criteria, Australian Standard AS 2187.2 - 2006 *Explosives* - Storage *and Use - Use of Explosives* recommends that the frequency dependent guideline values and assessment methods given in BS 7385 Part 2-1993 *Evaluation and measurement for vibration in buildings Part 2* be used as they are "applicable to Australian conditions".

The standard sets guide values for building vibration based on the lowest vibration levels above which damage has been credibly demonstrated. These levels are judged to give a minimum risk of vibration induced damage, where minimal risk for a named effect is usually taken as a 95% probability of no effect.

Sources of vibration that are considered in the standard include demolition, blasting (carried out during mineral extraction or construction excavation), piling, ground treatments (eg compaction), construction equipment, tunnelling, road and rail traffic and industrial machinery.

The recommended limits (guide values) for transient vibration to manage minimal risk of cosmetic damage to residential and industrial buildings are presented numerically in Table 3.4 and graphically in Figure 3.1.

Table 3.4 Transient vibration guide values - minimal risk of cosmetic damage

Line[1]	Type of Building	Peak component particle velocity in frequency range of predominant pulse	
		4 Hz to 15 Hz	15 Hz and above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s	50 mm/s
2	Unreinforced or light framed structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Notes: Refers to the "Line" in Figure 3.1

The standard notes that the guide values in Table 3.4 relate predominantly to transient vibration which does not give rise to resonant responses in structures and low-rise buildings.

Where the dynamic loading caused by continuous vibration is such as to give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values in Table may need to be reduced by up to 50%.

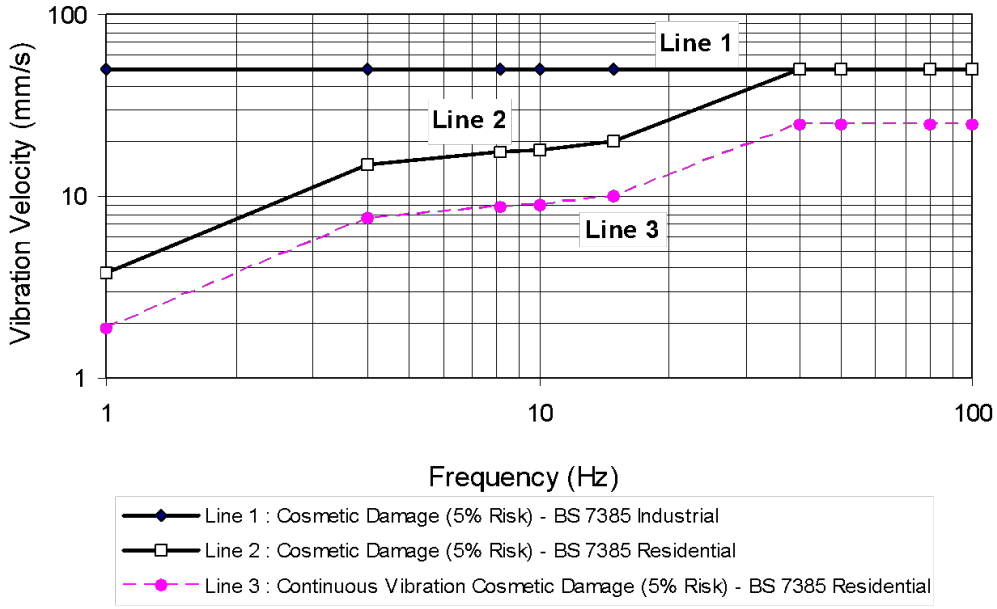


Figure 3.1 Graph of transient vibration guide values for cosmetic damage

In the lower frequency region where strains associated with a given vibration velocity magnitude are higher, the guide values for building types corresponding to Line 2 are reduced. Below a frequency of 4 Hz where a high displacement is associated with the relatively low peak component particle velocity value, a maximum displacement of 0.6 mm (zero to peak) is recommended. This displacement is equivalent to a vibration velocity of 3.7 mm/s at 1 Hz (as shown in Figure 3.1).

Fatigue considerations are also addressed in the standard and it is concluded that unless calculation indicates that the magnitude and number of load reversals is significant (in respect of the fatigue life of building materials) then the guide values in Table should not be reduced for fatigue considerations.

In order to assess the likelihood of cosmetic damage due to vibration, AS2187 specifies that vibration measurements should be undertaken at the base of the building and the highest of the orthogonal vibration components (transverse, longitudinal and vertical directions) should be compared with the criteria curves presented in Table 3.4.

3.3.2 German Standard DIN 4150-3:1999

The German Standard DIN 4150 - Part 3: 1999, provides the strictest guideline levels of vibration velocity for evaluating the effects of vibration in structures. The limits presented in this standard are generally recognised to be conservative.

The DIN 4150 values (maximum levels measured in any direction at the foundation, or maximum levels measured in (x) or (y) horizontal directions, in the plane of the uppermost floor), are summarised in Table 3.5 and shown graphically in Figure 3.2.

For residential and commercial type structures, the standard recommends safe limits as low as 5 mm/s and 20 mm/s respectively. These limits increase with frequency values above 10 Hz. The operational frequency of construction plant typically ranges between 10 Hz to 30 Hz, and hence according to DIN 4150, the safe vibration guide limit range for dwellings is 5 to 15 mm/s. For reinforced commercial type buildings, the limit is as low as 20 mm/s, while for heritage or sensitive structures the lower limit is 3 mm/s.

Table 3.5 Structural damage guideline values of vibration velocity – DIN4150

Line*	Type of structure	Vibration Velocity in mm/s			
		At foundation at a frequency of			Plane of floor of uppermost storey
		1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz	All frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
2	Dwellings and buildings of similar design and/or use	5	5 to 15	5 to 20	15
3	Structures that because of their particular sensitivity to vibration do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8

Notes: 1. "Line*" refers to curves in Figure 1 of DIN4150.
2. For frequencies above 100 Hz the higher values in the 50 Hz to 100 Hz column should be used.

These levels are "safe limits", for which damage due to vibration effects is unlikely to occur. "Damage" is defined in DIN 4150 to include even minor non-structural effects such as superficial cracking in cement render, the enlargement of cracks already present, and the separation of partitions or intermediate walls from load bearing walls.

Should such damage be observed without vibration levels exceeding the "safe limits" then it is likely to be attributable to other causes. DIN 4150 also states that when vibration levels higher than the "safe limits" are present, it does not necessarily follow that damage will occur.

As indicated by the guide levels from DIN 4150 in Table 3.5, high frequency vibration has less potential to cause damage than lower frequencies. Furthermore, the "point source" nature of vibration from plant causes the vibratory disturbances to arrive at different parts of nearby large structures in an out-of-phase manner, thereby reducing its potential to excite in-phase motion of the low order modes of vibration in such structures.

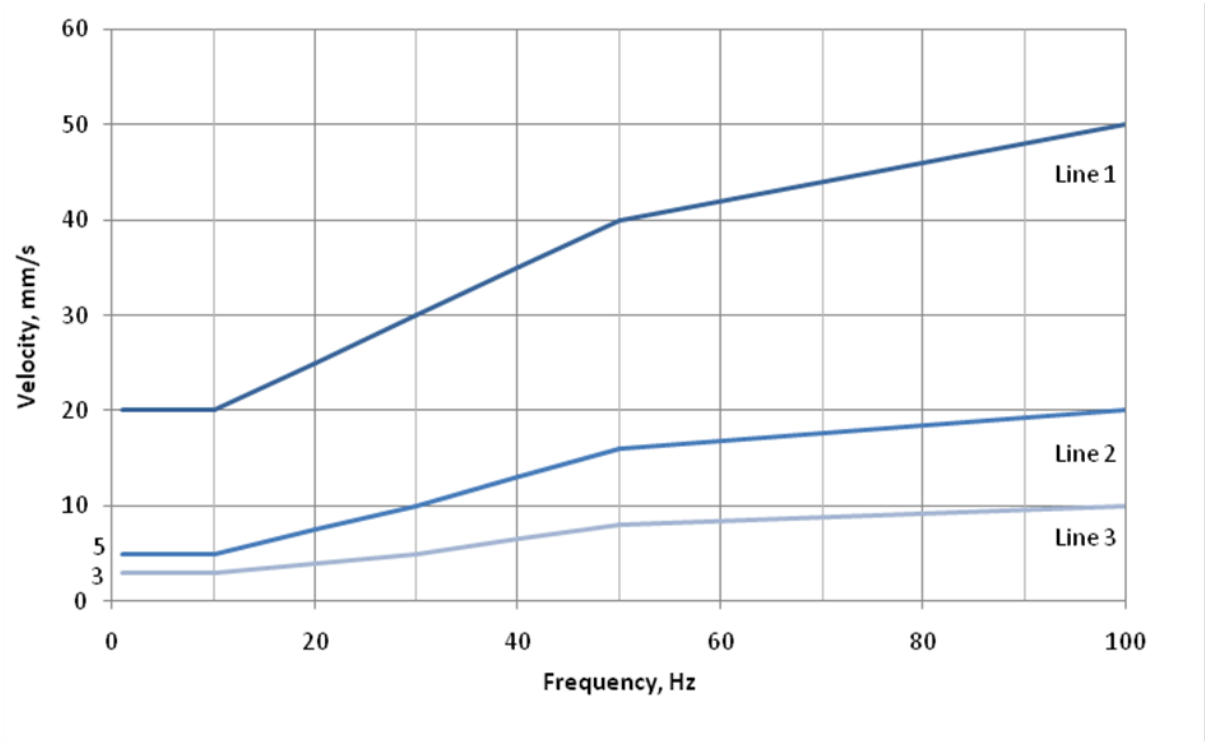


Figure 4.2 DIN4150 structural damage guideline values of vibration velocity

The potential effect of vibration on particular structures can vary depending on many factors including their existing structural integrity and use.

3.4 Vibration sensitive and special structures

The Roads and Maritime Services, Construction Noise and Vibration Strategy (RMS,CNVS 4.1 April 2020) provides further guidance for assessing vibration impacts on sensitive and special structures and outlined as follows.

3.4.1 Heritage structures

Heritage buildings and structures are typically assessed against the criteria outlined in Australian Standard AS 2187.2 - 2006 *Explosives* - Storage *and Use - Use of Explosives* recommends that the frequency dependent guideline values and assessment methods given in BS 7385 Part 2-1993 *Evaluation and measurement for vibration in buildings Part 2* be used as they are "applicable to Australian conditions". Heritage structures should not be assumed to be more sensitive to vibration unless they are found to be structurally unsound. A more conservative cosmetic damage limit of 2.5 mm/s peak component particle velocity (DIN 4150) is used if a heritage building or structure is found following inspection to be unsound.

3.4.2 Sensitive scientific and medical equipment

Some scientific equipment such as electron microscopes and microelectronics manufacturing equipment may require more stringent vibration limits than those applied for human comfort.

Where it has been identified that vibration sensitive scientific and/or medical instruments are likely to be in use inside the premises of an identified vibration sensitive receiver, objectives for the satisfactory operation of the instrument would be sourced from manufacturer's data. Where manufacturer's data is not available, generic vibration criterion (VC) curves as published by the Society of Photo-Optical Instrumentation Engineers (Gordon 1999) may be adopted as vibration objectives. These generic VC curves are presented below in Table 3.6 and Figure 3.3.

Table 3.6 Application and interpretation of the generic Vibration Criterion (VC) curves

Criterion Curve	Max Level (μm/sec, rms)[1]	Detail Size (microns)[2]	Description of Use
VC-A	50	8	Adequate in most instances for optical microscopes to 400X, microbalances, optical balances, proximity and projection aligners, etc.
VC-B	25	3	An appropriate standard for optical microscopes to 1000X, inspection and lithography equipment (including steppers) to 3 micron line widths.
VC-C	12.5	1	A good standard for most lithography and inspection equipment to 1 micron detail size.
VC-D	6	0.3	Suitable in most instances for the most demanding equipment including electron microscopes (TEMs and SEMs) and E-Beam systems, operating to the limits of their capability.
CV-E	3	0.1	A difficult criterion to achieve in most instances. Assumed to be adequate for the most demanding of sensitive systems including long path, laser-based, small target systems and other systems requiring extraordinary dynamic stability.

Note 1: As measured in one-third octave bands of frequency over the frequency range 8 to 100 Hz.

Note 2: The detail size refers to the line widths for microelectronics fabrication, the particle (cell) size for medical and pharmaceutical research, etc. The values given take into account the observation requirements of many items depend upon the detail size of the process.

The application of the VC curves typically applied to scientific equipment such as electron microscopes and microelectronics manufacturing equipment does not seem appropriate for the consideration of buried pipework associated with the operation of the WSA.

Generic Vibration Criteria for Vibration-Sensitive Equipment by Gordon (1999) also provides further data in terms of VC curved for others use in order of greater sensitivity, workshop, office, residential and operating theatres.

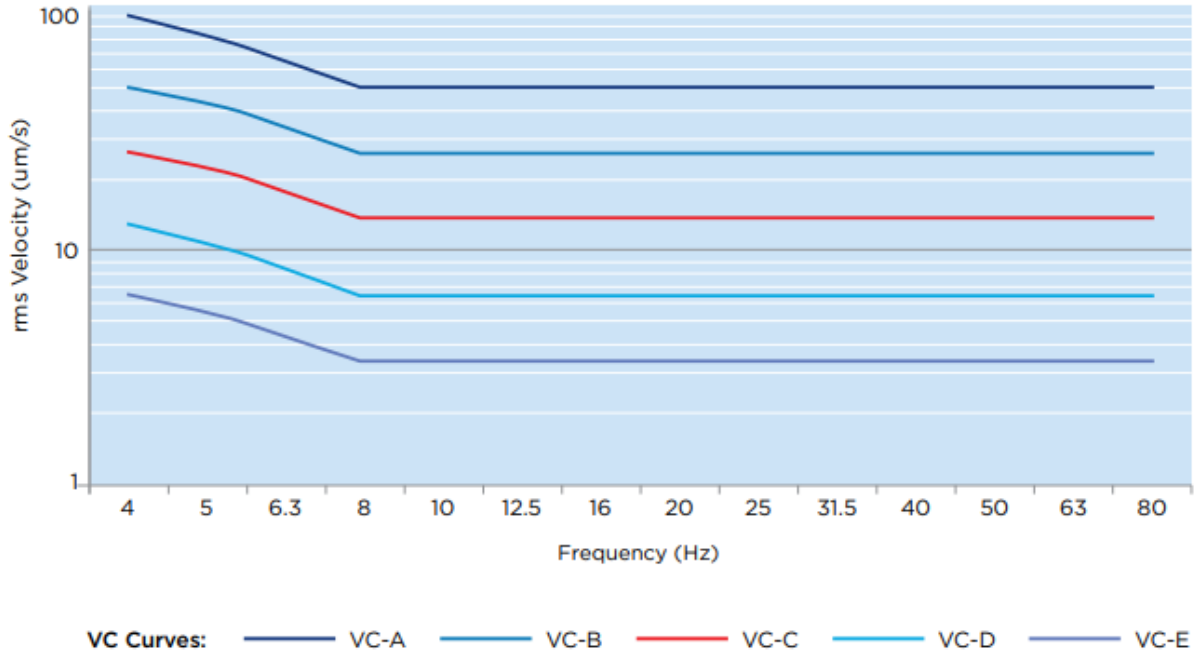


Figure 3.3 Vibration Criterion (VC) Curves

3.4.3 Buried pipework and services

British Standard BS 7385-2:1993 *Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from ground-borne vibration* notes that structures below ground are known to sustain higher levels of vibration and are very resistant to damage unless in very poor condition (British Standard BS 7385-2:1993, p5). Further guidance is taken from the German Standard DIN 4150: Part 3-1999.02 *Structural vibration in buildings – Effects on Structures*. Section 5.3 of DIN 4150: Part 3 sets out guideline values for vibration velocity to be used when evaluating the effects of vibration on buried pipework. These values are reproduced in Table 3.7.

Table 3.7 DIN 4150-3 Guideline values for vibration velocity to be used when evaluating the effects of short-term vibration on buried pipework

Line	Pipe Material	Guideline values for vibration velocity measured on the pipe
1	Steel (including welded pipes)	100 mm/s
2	Clay, concrete, reinforced concrete, pre-stressed concrete, metal (with or without flange)	80 mm/s
3	Masonry, plastic	50 mm/s

Note: rock breaking/hammering and sheet piling activities are considered to have the potential to cause dynamic loading in some structures and it may therefore be appropriate to reduce the transient values by 50%.

3.5 Safe working distances for ground vibration generating plant

Safe working distances for typical items of vibration intensive plant are listed in Table 3.8. The safe working distances are quoted for both “Cosmetic Damage” (refer British Standard BS 7385) and “Human Comfort” (refer British Standard BS 6472-1).

Table 3.8 Recommended safe working distances for vibration intensive plant

Plant Item	Rating/Description	Safe working distance	
		Cosmetic damage (BS 7385)	Human response (BS 6472)
Medium hydraulic hammer	(900 kg - 12 to 18-t excavator)	7 m	23 m
Large hydraulic hammer	(1600 kg - 18 to 34 t excavator)	22 m	73 m
Vibratory pile driver	Sheet piles	2 m to 20 m	20 m
Pile boring	≤ 800 mm	2 m (nominal)	N/A
Vibratory rollers	<50 kN (typically 1-2 t)	5 m	15 to 20 m
	<100 kN (typically 2-4 t)	6 m	20 m
	<200 kN (typically 4-6 t)	12 m	40 m
	<300 kN (typically 7-13 t)	15 m	100 m
	>300 kN (typically 13-18 t)	20 m	100 m
	>300 kN (>18 t)	25 m	100 m

Source: From RMS,CNVS 4.1 April 2020 based on residential building.

Safe work distances relate to continuous vibration. For most construction activity, vibration emissions are intermittent in nature. The safe working distances are therefore conservative.

The safe working distances presented in Table 3.8 are indicative and will vary depending on the item of plant and local geotechnical conditions. They apply to cosmetic damage of typical buildings under typical geotechnical conditions. It is noted that the plant above are typical of high ground vibration generating construction plant utilised during the construction of the site and emit vibration levels far higher than is generated from vibratory screens and crushing plant that will be associated with the operation of the ARRC.

3.6 Vibration levels v distance

A review of the Construction Noise and Vibration Management Sub Plan prepared for the NorthConnex and M2 Integration Project for Lend Lease Bouygues Joint Venture (Document Number: ALL-LLB-01-0001-QA-PL-0052 Revision 17) dated May 2017 provides a useful summary of high-level vibration generating construction plant reproduced in Table 3.9.

Table 3.9 Vibration level versus distance (m)

Plant Item	PPV vibration level (mm/s) at distance					
	5 m	10 m	20 m	30 m	40 m	50 m
Large vibratory roller (20t)	7	4.5	3	2.3	2	1.7
Medium vibratory roller (10t)	-	3.6	2	1.5	1	-
Compactor (7t)	-	6	25	0.3	-	-
Heavy hydraulic hammer (1500kg hammer on 30t excavator)	4.5	2.5	0.5	0.2	0.12	<0.1
Light hydraulic hammer (300kg hammer on 5t excavator)	1.5	0.3	0.1	<0.1	-	-

An indication of the potential vibration from crushing and screening processes, is provided by comparison to *Vibration Test and Shock Absorption of Coal Crusher Chambers in Thermal Power Plants (I): Field Test and Assessment* prepared by (Zhu, et al 2020).

A series of vibration measurements were conducted on the crushing circuits and on the building structures of three Thermal Power Plants in China that contained both a vibratory screen floor level (level 2) and a crushing floor level (level 1). Measurements were taken adjacent the crusher (within two metres) at floor slab level and confirmed vibration levels of 0.1-0.4 mm/s in the horizontal axis and 0.5-1.1 mm/s in the vertical axis. At distances greater than 50 m, the level of ground vibration would be expected to be <0.01-0.04 mm/s in the horizontal axis and 0.05-0.11 mm/s.

The vibration levels from the coal crushing plant are significantly lower than vibration levels generated by typical construction plant including vibratory rollers and hydraulic hammers on excavators. It would also be expected considering the large scale of vibratory screens and crushers in coal power plants, vibration from smaller screens and crushers associated with waste processing would be less than that generated coal power station plant. The lack of available data and research on vibratory screens and crushers in the waste processing industry would further indicate that ground vibration is not an issue.

EMM has conducted ground vibration measurements at an existing waste processing facility in Mortdale to satisfy their Conditions of Consent. In this instance vibration levels are measured as a VDV $m/s^{1.75}$ at the floor slab of the adjacent building. This location is within five metres of the operating vibratory screen and additional site mobile plant including excavators and front-end loaders. A review of the measurements confirmed calculated daytime VDV levels of 0.012-0.037 $m/s^{1.75}$ and clearly comply with the human response acceptable vibration dose values presented in Table 3.3, including critical areas.

3.7 Site constraints

A layout of the WSA under construction is provided in Figure 3.4. The closest WSA boundary to the ARRC is more than 270 m to the south-west. The fuel farm is the closest possible sensitive infrastructure associated with the WSA.

Table 3.7 confirms that the most sensitive type of buried pipe work (masonry and plastic) has a structural damage limit of 50mm/s. The anticipated level of ground vibration from construction of the ARRC at the fuel farm is <0.1 mm/s, whilst vibration levels from operation of the ARRC would be significantly lower and in the order of 0.01 mm/s.

A review of Table 3.8 confirms that the fuel farm is ten times the safe working distance (25 m) to protect against for cosmetic damage to buildings (ie the most sensitive building category in BS 7385) even if the

largest vibratory roller was used. The fuel farm is more than twice the distance for to protect human comfort based on BS 6472.

With reference to construction plant vibration levels at various distances in Table 3.9, the WSA fuel farm is well beyond the limits identified for construction plant and would be less than 0.10 mm/s at the site boundary and suitable for an 'operating theatre' under the VC curves documented in *Generic Vibration Criteria for Vibration-Sensitive Equipment* Gordon (1999).

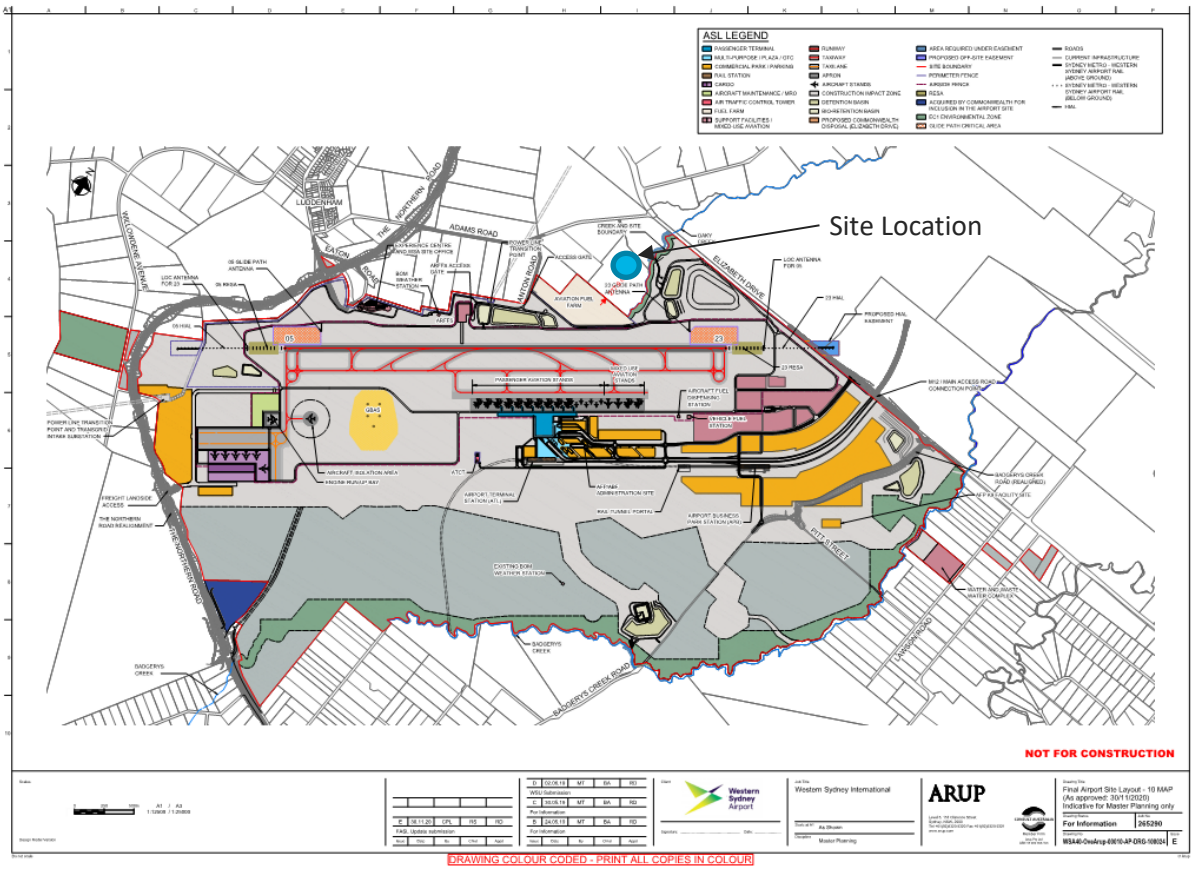


Figure 3.4 WSA layout

3.8 Summary

This review confirms that the construction vibration levels will be greater than operational vibration levels generated by the proposed processing plant at the ARRC. As previously assessed in the Addendum Noise and Vibration Impact Assessment (EMM 2021c), construction vibration levels are not predicted to have any offsite impacts.

The findings of this review confirm ground vibration from ARRC activities including crushing and screening would be less than 0.10 mm/s at the site boundary, and based on the research and criteria outlined above would:

- not generate vibration levels that exceed criteria to prevent structural damage of sensitive structures and buried pipework;
- not generate vibration levels that exceed criteria to prevent cosmetic damage to buildings;
- not generate vibration levels that exceed human comfort guidelines;
- not exceed the VC curve criteria for a sensitive use such as an operating theatre; and

- would be suitable (in absence of information to the contrary from WSA) for all WSA associated operations.

A summary of the vibration criteria for construction and operation, and compliance or otherwise for the closest WSA infrastructure (fuel farm) is provided in Table 3.10.

Table 3.10 Vibration compliance

Vibration standard	Compliance (Y/N)
Construction	
BS 6472–2008, Evaluation of human exposure to vibration in buildings (1-80Hz)	Y
BS 7385 Part 2-1993 *Evaluation and measurement for vibration in buildings Part 2*	Y
German Standard DIN 4150 - Part 3: 1999	Y
VC Curves - *Generic Vibration Criteria for Vibration-Sensitive Equipment* by Gordon (1999)	Y*
Operation	
BS 6472–2008, Evaluation of human exposure to vibration in buildings (1-80Hz)	Y
BS 7385 Part 2-1993 *Evaluation and measurement for vibration in buildings Part 2*	Y
German Standard DIN 4150 - Part 3: 1999	Y
VC Curves - *Generic Vibration Criteria for Vibration-Sensitive Equipment* by Gordon (1999)	Y*

* Operating theatre use

It would be expected that activities associated with the operation of the airport including service vehicles, aircraft operations, fuel trucks and other WSA mobile infrastructure are likely to generate greater levels of ground vibration than the proposed ARRC.

4 Additional matters

Additional matters raised by WSA and DITRDC are detailed in Table 4.1 below along with CPG and KLF's response to these matters.

Table 4.1 Response to additional matters raised by WSA and DITRDC

Matter	Response
DITRDC reiterated its view that the ARRC is not keeping with the objectives and desired outcomes of the Agribusiness zone.	As outlined in detail in the Response Report (EMM 2021b), the Aerotropolis SEPP specifically provided for savings and transitional provisions to enable DAs lodged but not determined when the SEPP was made to be determined and approved as if the SEPP had not commenced. It was possible for the SEPP to have not included such as savings and transitional provision. The fact that such a provision was included indicates a clear intention that any such DAs could be approved. The subject property is on the eastern boundary of the agribusiness precinct, approximately 350 m from Enterprise zoned land (wherein the project would be a permissible land use). The design of the ARRC, as a fully enclosed warehouse consistent with the bulk and scale of the warehouses envisaged in the draft Precinct Plan, will not preclude the use of the remaining subject property or surrounding land parcels for agribusiness land use or the broader development of the Agribusiness precinct In the short- to medium-term, the ARRC will be an enabling development that will facilitate the transformation of the Aerotropolis through the provision of sustainable building materials and resource recovery services. In the long-term the ARRC will continue to address the need for waste and resource recovery infrastructure for the Greater Sydney Area in line with the NSW Government paper Cleaning Up Our Act: The Future for Waste and Resource Recovery (DPIE 2020).
WSA raised concerns regarding the strategic justification of the ARRC relying on the future infilling of the quarry void.	While infilling the quarry void is one objective of the ARRC, as reiterated in Section 2.1.1 of the Response Report (EMM 2021b), the project's stated purpose and objectives provides numerous benefits and as such the ARRC is justified independently of the infilling benefit should this be approved in the future.
DITRDC raised concerns that wastewater run off from the ARRC site could affect waterways in the airport and surrounds if not carefully managed.	The ARRC will be designed, constructed and operated to include all reasonable and practical measures to prevent water pollution. The EIS Surface Water Assessment (Appendix K of the EIS) concluded that the proposed ARRC water management system will function to prevent any material change or degradation of the water quality of Oaky Creek due to discharges of stormwater. There will be no discharge of water used within the ARRC warehouse for dust suppression or processing as this water will be treated and reused onsite
WSA raised concerns regarding the planning approval pathway for infilling the quarry void.	WSA's concerns related to the future planning application required to infill the quarry void and are therefore not relevant to the ARRC project.

Table 4.1 Response to additional matters raised by WSA and DITRDC

Matter	Response
WSA raises concern with the project's compatibility with objectives of the Liverpool Local Environmental Plan RU1 zoned land.	The EIS and Submissions Report note that the project is permissible pursuant to clause 121 of the State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) (now Section 2.152 of State Environmental Planning Policy (Transport and Infrastructure) 2021) which provides that development for the purpose of waste or resource management facilities (which includes resource recovery facilities), may be carried out by any person with consent on land in a prescribed zone. A prescribed zone includes RU1 Primary Production
WSA raised concerns regarding the cost benefit assessment of infilling options carried out in the Response Report (EMM 2021b)	WSA's concerns related to the future planning application required to infill the quarry void and are therefore not relevant to the ARRC project.
WSA raised concerns regarding the proposed infill deed	The applicants proposed a deed between DPE and the applicants to provide WSA and DPE with more certainty around infill of the quarry void. The applicants acknowledge that neither DPE nor WSA require this deed.

5 Closing

We trust the additional information and assessment provided within this letter and attachments adequately addresses DPE's request for additional information (DPE ref RFI 04032022).

Yours sincerely

Janet Krick
Associate Environmental Planner
jkrick@emmconsulting.com.au

References

Avisure 2020, *draft Western Sydney Aerotropolis Wildlife Management Assessment Report,* prepared for the Western Sydney Planning Partnership

CASA 2020, *Advisory Circular AC 139.C-03v1.0 Serviceability inspections,* Australian Government, Civil Aviation Safety Authority

DPIE 2020, *Cleaning Up Our Act: The Future for Waste and Resource Recovery*

EMM 2021a, *Luddenham Resource Recovery Centre, Submissions Report,* prepared for Coombes Property Group and KLF Holdings Pty Ltd, EMM Consulting Pty Ltd

EMM 2021b, *Luddenham Advanced Resource Recovery Centre, Response to Request for Information,* prepared for Coombes Property Group and KLF Holdings, EMM Consulting Pty Ltd

EMM 2021c *Luddenham Advanced Resource Recovery Centre Addendum Noise and Vibration Impact Assessment* prepared for Coombes Property Group and KLF Holdings, EMM Consulting Pty Ltd

EMM 2020a, *Luddenham Advanced Resource Recovery Centre Environmental Impact Statement, ,* prepared for Coombes Property Group and KLF Holdings. EMM Consulting Pty Ltd

EMM 2020b, *Luddenham Advanced Resource Recovery Centre Surface Water Assessment*, prepared for Coombes Property Group and KLF Holdings Pty Ltd by EMM Consulting Pty Limited.

Construction Noise and Vibration Management Sub Plan prepared for the NorthConnex and M2 Integration Project for Lend Lease Bouygues Joint Venture (Document Number: ALL-LLB-01-0001-QA-PL-0052 Revision 17) dated May 2017

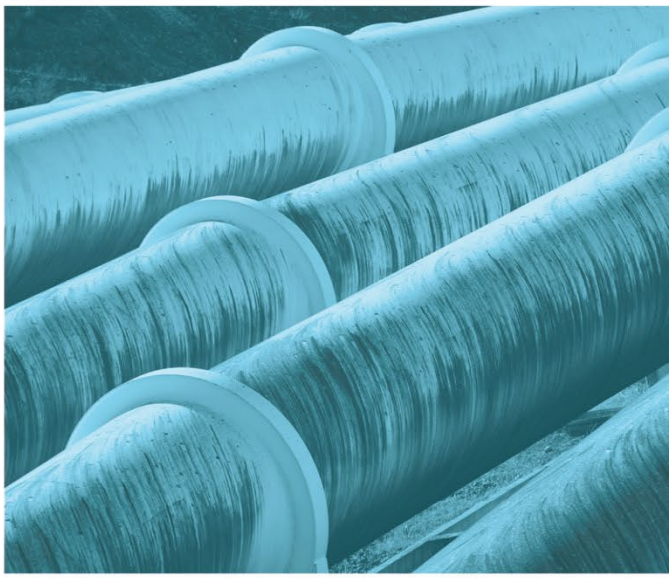
Attachment A

Wildlife Hazard Assessment


Luddenham Advanced Resource Recovery Centre

Wildlife Hazard Assessment

Prepared for Coombes Property Group and KLF Holdings Pty Ltd
April 2022

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Level 9, Suite 2, 109 St Georges Terrace
Perth WA 6000

CANBERRA
Level 2, Suite 2.04
15 London Circuit
Canberra City ACT 2601

Luddenham Advanced Resource Recovery Centre

Wildlife Hazard Assessment

Prepared for Coombes Property Group and KLF Holdings Pty Ltd
April 2022

EMM Sydney
Ground floor, 20 Chandos Street
St Leonards NSW 2065

T 02 9493 9500
E info@emmconsulting.com.au

www.emmconsulting.com.au

Luddenham Advanced Resource Recovery Centre

Wildlife Hazard Assessment

Report Number

J190749a RP68

Client

Coombes Property Group and KLF Holdings Pty Ltd

Date

5 April 2022

Version

v1 Final

Prepared by

Rob Morris
Associate Director
5 April 2022

Approved by

Phil Towler
Associate Director
5 April 2022

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1 Introduction

1.1 Background

CFT No 13 Pty Ltd, a member of Coombes Property Group (CPG), acquired in late 2019 the property at 275 Adams Road, Luddenham New South Wales (NSW) (Lot 3 in DP 623799, 'the subject property') within the Liverpool City Council municipality. The subject property is host to an existing shale/clay quarry (the quarry site). The regional context of the subject property is shown in Figure 1.1.

CPG and KLF Holdings Pty Ltd (KLF) ('the applicants') are seeking a development consent to construct and operate an ARRC within the subject property to the north of the existing quarry void (the ARRC site). The ARRC will predominately accept construction and demolition waste, with some commercial and industrial waste, including tyres. No special, liquid, hazardous, restricted solid waste or general solid waste (putrescible), as defined in the *NSW Protection of the Environment Operations Act 1997* (POEO Act) and the *Waste Classification Guidelines Part 1: Classifying Waste* (EPA 2014a), will be accepted by the ARRC with the exception of tyres meeting the recovered tyres order (EPA 2014c).

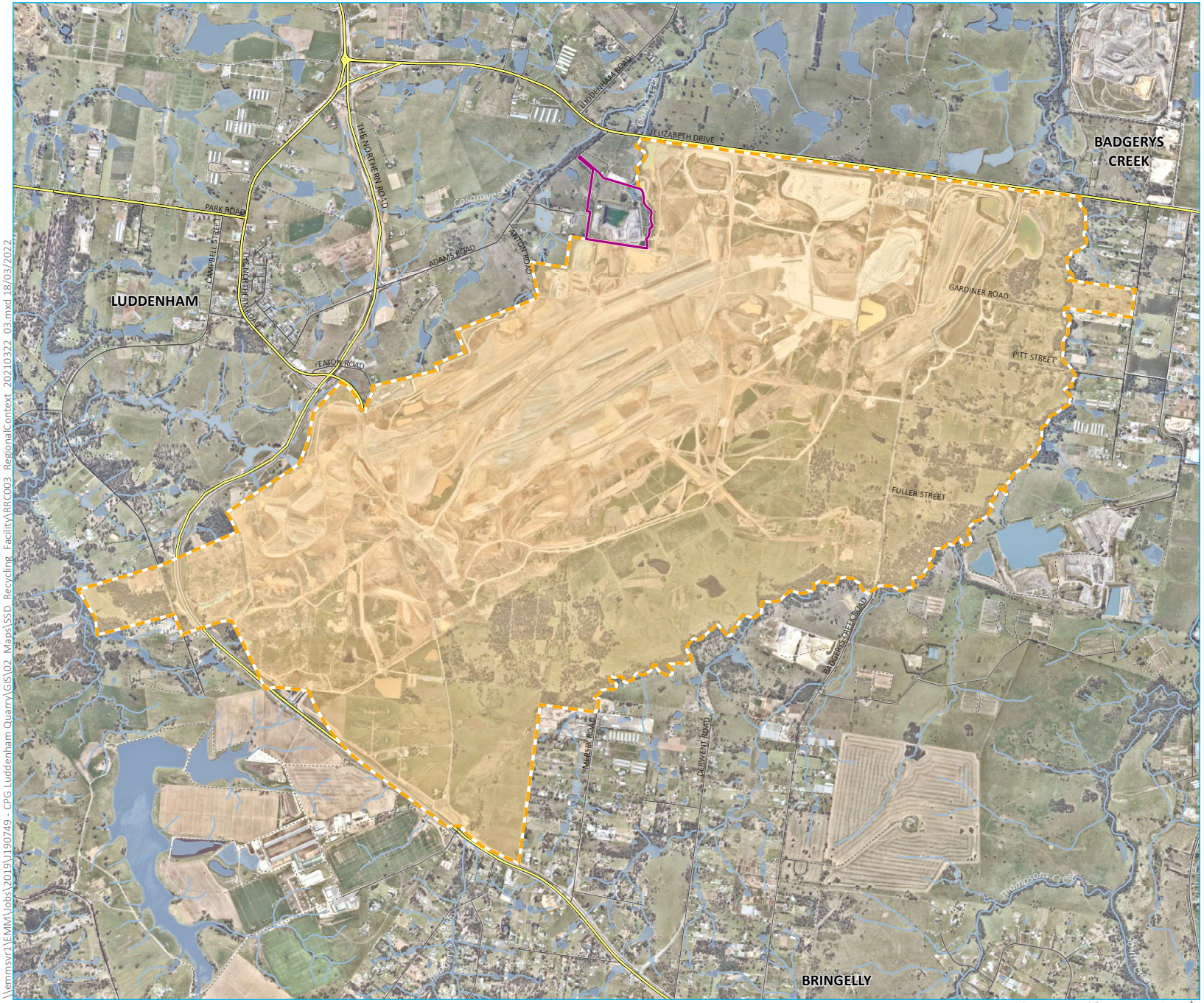
A detailed description of the project was provided in Chapter 2 of the Environmental Impact Statement (EIS) (EMM 2020a). An overview of the ARRC project is shown in Figure 1.2. The key components of the project are:

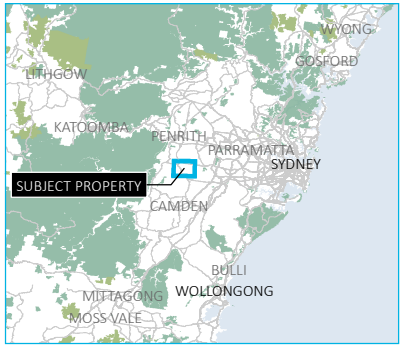
- construction and operation of an advanced construction and demolition resource recovery centre;
- all acceptance, processing, storage and dispatch of waste and recycled product will be carried out within an enclosed warehouse;
- accepting and processing up to 600,000 tonnes per annum (tpa) of waste for recycling;
- dispatch of up to approximately 540,000 tpa of recycled product;
- dispatch of approximately 60,000 tpa of non-recyclable residues either to an offsite licensed waste facility or to the adjacent quarry void (following approval of quarry rehabilitation activities);
- use of the access road from the subject property to Adams Road; and
- ARRC operations up to 24 hours a day, 7 days per week.

It is noted, the infilling of the quarry void on the subject property with non-recyclable residues from the ARRC will be subject to a separate modification application of the existing quarry consent and therefore is outside of the scope of the ARRC project. This modification application will be supported with a robust environmental assessment including a wildlife risk assessment.

KLF is an Australian-owned and operated waste management company that operates two strategically located resource recovery and recycling facilities in Sydney; one at Camellia and another at Asquith. KLF has 20 years' experience in the waste recycling and resource recovery industry. KLF facilities are licensed by the NSW Environment Protection Authority (EPA) and have full International Organisation for Standardisation (ISO) accreditation.

The subject property is situated immediately adjacent to the north-west corner of the Western Sydney Airport (WSA). Construction of the airport is underway and on track to begin operations in 2026.





KEY

- Subject property
- Western Sydney International (Nancy-Bird Walton) Airport
- Major road
- Minor road
- Vehicular track
- Watercourse/drainage line

Source: EMM (2022); DFSI (2017); Nearmap (2021)

0 0.5 1 km

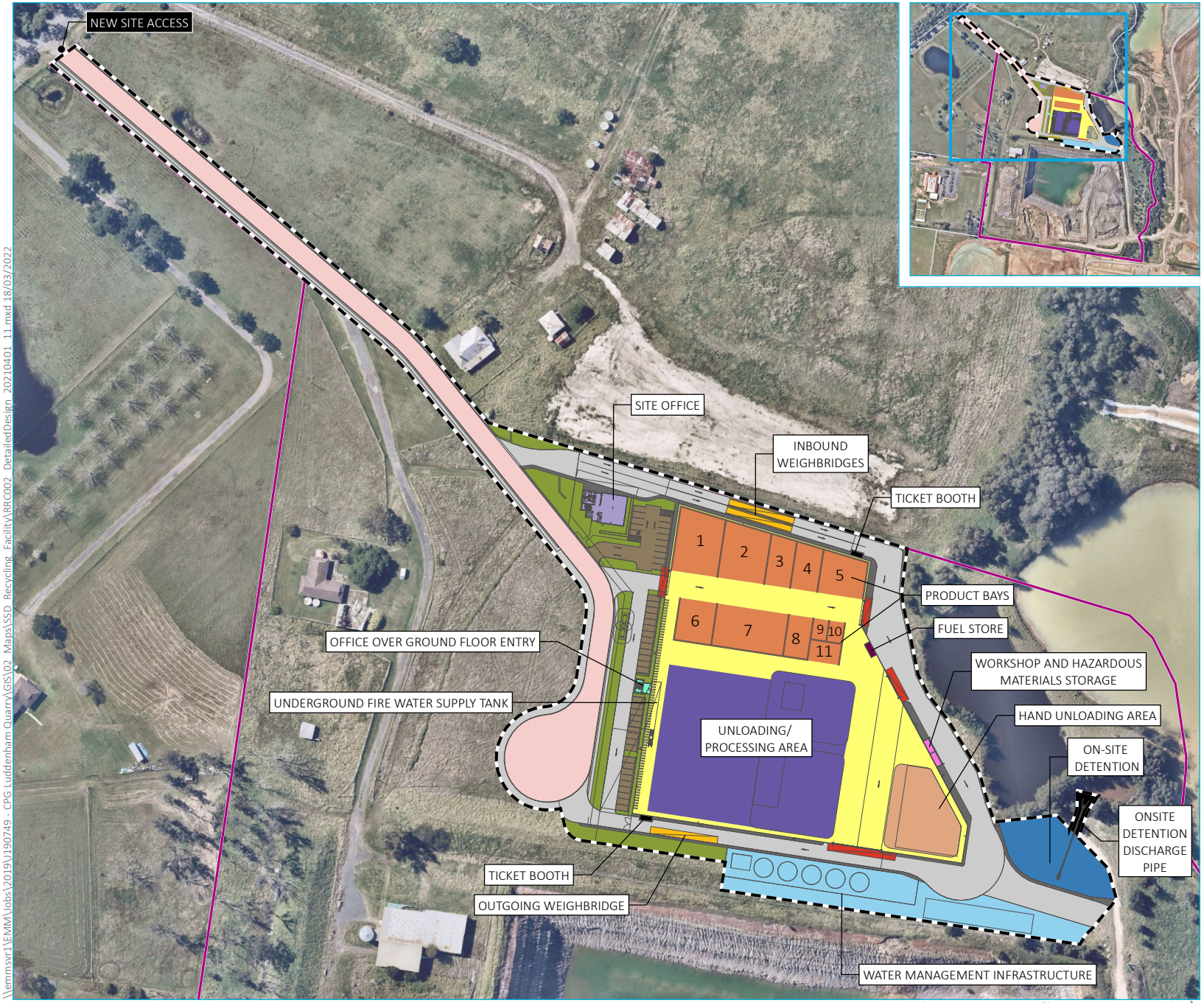
GDA 1994 MGA Zone 56

N

Regional context

Luddenham Advanced Resource Recovery Centre
Wildlife Hazard Assessment
Figure 1.1

EMM creating opportunities



KEY

- Subject property
- ARRC site
- Indicative detailed layout

Proposed element

- ARRC warehouse
- Awning
- Carpark
- Drainage outlet
- Fuel store
- Hand unloading area
- Hardstand
- Internal road
- Kerb/pedestrain area
- Landscaping
- Office over ground floor
- On-site detention
- Product bay
- Site office
- Ticketbooth
- Unloading/processing
- Water treatment infrastruture
- Weighbridge
- Workshop and hazardous materials storage

Product bays

1. Concrete/rubble masonry
2. Clean timber
3. Rigid plastics
4. Paper/cardboard/film
5. Stumps/asphalt/metal
6. Heavy residual
7. Fines screened
8. Soil audit
9. Ferrous
10. Non-ferrous
11. Non-recyclables

Source: EMM (2022); DFSI (2017); GA (2011); Nearmap (2020); Indesco (2021)

0 50 100 m

GDA 1994 MGA Zone 56

N

\\emmsvr1\EMM\Jobs\2019\J190749 - CPG Luddenham Quarry\GIS\02 Maps\SSD Recycling Facility\RRC002 DetailedDesign 20210401 11.mxd 18/03/2022

ARRC detailed project layout

Luddenham Advanced Resource Recovery Centre
Wildlife Hazard Assessment
Figure 1.2

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1.2 Purpose of this report

A Wildlife Strike and Birdstrike Risk Review was originally prepared to inform the Aeronautical Impact Assessment carried out to support the Environmental Impact Statement (EIS) for the ARRC. The original risk review considered the potential wildlife strike and birdstrike risks posed by the approved and proposed future operations on the subject property to the new WSA as such the review considered quarry operations, the ARRC and the future proposed infilling of the quarry void (subject to separate planning approval).

The Risk Review has been substantially updated to a Wildlife Hazard Assessment (WHA) in response to a request for additional information from the Department of Planning and Environment (DPE) regarding matters raised by Western Sydney Airport (WSA) and Department of Infrastructure, Transport, Regional Development and Communities (DITRDC). WSA and DITRDC are concerned the ARRC will attract wildlife and thereby pose a risk to the WSA.

The ARRC will be a modern, non-putrescible resources recovery facility, which will be fully enclosed within a warehouse with all acceptance, processing, storage and dispatch of non-putrescible waste and recycled product taking place within a fully enclosed warehouse. As such, the ARRC is considered to pose a low wildlife hazard risk to WSA.

Notwithstanding, DPE has asked the applicants carry out an assessment of cumulative wildlife impact in accordance with the Aerotropolis Aviation Wildlife Safeguarding Framework (AAWSF) detailed in the draft *Western Sydney Aerotropolis Wildlife Management Assessment Report* (Avisure 2020). Accordingly, this WHA been revised to include an assessment in accordance with the AAWSF. The assessment has also been updated to focus solely on the potential wildlife risk posed by the ARRC, and as such references to the proposed future infilling of the quarry void have been removed. This future proposed infilling activity will be assessed comprehensively as part of a future modification application of the existing quarry consent.

1.3 Report author

This WHA has been prepared and subsequently updated by Rob Morris Associate Director at EMM. Rob has over 30 years knowledge and expertise in the understanding the environmental and social impacts of airports and also the potential impacts of the environment on airports. Rob has worked for many years on both airport expansions and new airport developments from an ecological, birdstrike & environmental assessment. Rob's CV is included as Appendix A of this report.

2 Study approach

2.1 Information and data sources

The following information and data were used to inform this WHA:

- *Aeronautical Impact Assessment Future Land Use at 275 Adams Road Luddenham*, prepared for NSW Coombes Property Group by Landrum & Brown Worldwide (Aust) Pty Ltd (2020);
- Guideline C of the National Airport Safeguarding Framework (NASF), *Managing the Risk of Wildlife Strikes in the Vicinity of Airports* (NASF Guideline C)*;*
- Avisure 2020, *Draft Western Sydney Aerotropolis, Wildlife Management Assessment Report, Western Sydney Planning Partnership*
- *Western Sydney Airport Environmental Impact Statement - Preliminary Bird and Bat Strike Risk Assessment* prepared for GHD by Avisure (2015);
- AC 139-26(0) JULY 2011 - Wildlife Hazard Management at Aerodromes;
- Australian Airports Association (2016)) – *Wildlife Management at Airports Airport Practice Note 9*; and
- Australian Transport Safety Bureau (ATSB) information (www.atsb.gov.au and https://www.atsb.gov.au/media/news-items/2019/latest-birdstrike-stats-released/).

2.2 National Airport Safeguarding Framework

NASF Guideline C provides guidance to land uses and developers regarding the management of wildlife hazards in the vicinity of airports. The Guideline allocates risk categories to land uses from very low to high and recommends actions for both existing and proposed developments. Attachment 1 of NASF provides guidance on land uses that present a risk of attracting wildlife and triggers (based on distance from an airport) for adopting active measures to mitigate that risk.

Under Attachment A of NASF Guideline C, non-putrescible waste facility – transfer stations are considered to pose a moderate wildlife attraction risk. NASF Guideline C recommends mitigation should be applied for non-putrescible waste facility - transfer stations within 3 km radius of an airport.

2.3 Draft Western Sydney Aerotropolis Wildlife Management and Assessment Report

2.3.1 Revised land use categories and wildlife buffers

Avisure (2020) recommends a modified version of Attachment A of the NASF Guidelines to develop the AAWSF which focus on a more comprehensive list of land use categories and sub-divides the 3 km and 8 km wildlife buffers as shown in Figure 2.1 reproduced from Avisure (2020) below. As shown in Figure 2.1, the subject property is located wildlife buffer Sub area A1. The AAWSF outlines that development within this buffer area require a high level of scrutiny to minimise wildlife crossing from south-east to north-west across the main approach and departure axis to access food sources.

An excerpt from Table 13 from AAWSF is reproduced in Plate 2.1 below. A review of this table indicates that non-putrescible resource recovery facilities are not explicitly included in the table, the closest comparable land use is

considered to be non-putrescible waste facility — transfer station. The AAWSF considers this land use to pose a “low” wildlife attraction risk with recommendations to “mitigate” potential risk within sub area A1 (refer Plate 2.1 and Figure 2.1 below). The AAWSF recommends that all land uses whose actions are listed as ‘mitigate’ or ‘conditional’ are assessed using the AAWSF (refer Section 7 of Avisure, 2020). It is noted that if the ARRC was located on the southern side of the WSA, the proposed action would be “monitor” and as such no wildlife hazard assessment would be required.

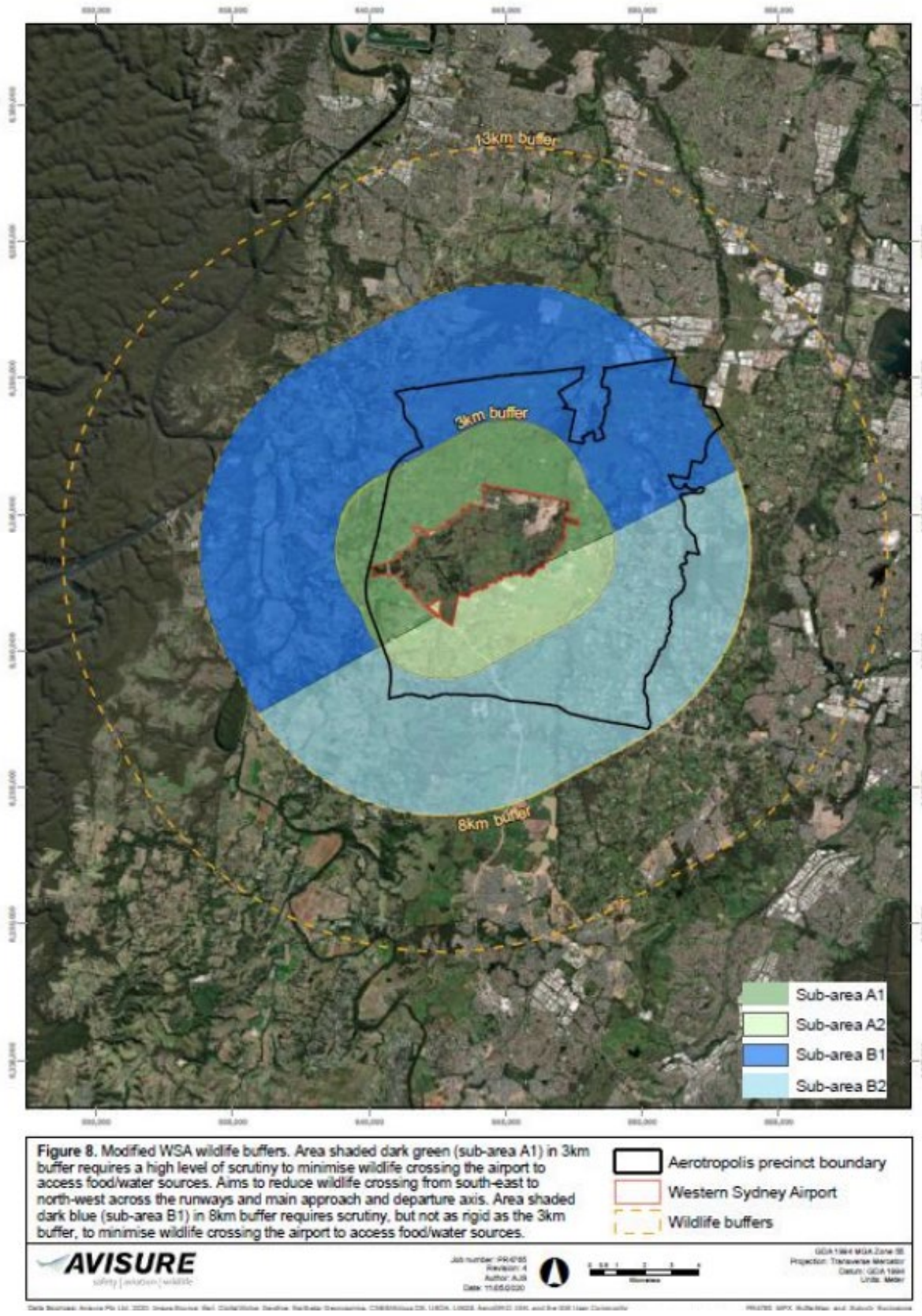


Figure 8. Modified WSA wildlife buffers. Area shaded dark green (sub-area A1) in 3km buffer requires a high level of scrutiny to minimise wildlife crossing the airport to access food/water sources. Aims to reduce wildlife crossing from south-east to north-west across the runways and main approach and departure axis. Area shaded dark blue (sub-area B1) in 8km buffer requires scrutiny, but not as rigid as the 3km buffer, to minimise wildlife crossing the airport to access food/water sources.

Figure 2.1 Modified WSA wildlife buffers

Land Use[12]	Standard Instrument Definition	Wildlife Attraction Risk	Western Sydney Aerotropolis: Actions for Existing Developments					Western Sydney Aerotropolis: Actions for Proposed Developments / Changes to Existing Developments				
			3 km radius (Area A) Sub-area A1	3 km radius (Area A) Sub-area A2	8 km radius (Area B) Sub-area B1	8 km radius (Area B) Sub-area B2	13 km radius (Area C)	3 km radius (Area A) Sub-area A1	3 km radius (Area A) Sub-area A2	8 km radius (Area B) Sub-area B1	8 km radius (Area B) Sub-area B2	13 km radius (Area C)
Waste collection points (commercial)	N/A	High	Mitigate	Mitigate	Mitigate	Monitor	Monitor	Conditional	Mitigate	Mitigate	Monitor	Monitor
Organic waste facility - enclosed	Waste or resource management facility	Moderate	Mitigate	Monitor	Mitigate	Monitor	Monitor	Mitigate	Monitor	Mitigate	Monitor	Monitor
Putrescible waste facility - landfill - enclosed	Waste disposal facility	Moderate	Mitigate	Monitor	Mitigate	Monitor	Monitor	Mitigate	Monitor	Mitigate	Monitor	Monitor
Putrescible waste facility - transfer station - enclosed	Waste or resource transfer station	Moderate	Mitigate	Monitor	Mitigate	Monitor	Monitor	Mitigate	Monitor	Mitigate	Monitor	Monitor
Non-putrescible waste facility - landfill	Waste disposal facility	Moderate	Mitigate	Monitor	Mitigate	Monitor	Monitor	Mitigate	Monitor	Mitigate	Monitor	Monitor
Dams	Water storage facility	Moderate	Mitigate	Monitor	Mitigate	Monitor	Monitor	Mitigate	Monitor	Mitigate	Monitor	Monitor
Stormwater drains	Water storage facility	Moderate	Mitigate	Monitor	Mitigate	Monitor	Monitor	Mitigate	Monitor	Mitigate	Monitor	Monitor
Non-putrescible waste facility - transfer station	Waste or resource transfer station	Low	Monitor	Monitor	Monitor	No Action	No Action	Mitigate	Monitor	Mitigate	No Action	No Action
Potable water treatment facility	Resource recovery facility	Low	Monitor	Monitor	Monitor	No Action	No Action	Mitigate	Monitor	Mitigate	No Action	No Action
Stormwater management facilities	Water storage facility	Low	Monitor	Monitor	Monitor	No Action	No Action	Mitigate	Monitor	Mitigate	No Action	No Action
Landscaping and Vegetation												
Landscaping: parks and gardens	Recreation area	Moderate	Mitigate	Monitor	Mitigate	Monitor	Monitor	Mitigate	Monitor	Mitigate	Monitor	Monitor
Landscaping: natural area revegetation	Environmental protection works	Moderate	Mitigate	Monitor	Mitigate	Monitor	Monitor	Mitigate	Monitor	Mitigate	Monitor	Monitor
Landscaping: streets and transport corridors	Road	Moderate	Mitigate	Monitor	Mitigate	Monitor	Monitor	Mitigate	Monitor	Mitigate	Monitor	Monitor
Landscaping: roads and motorways	Road	Moderate	Mitigate	Monitor	Mitigate	Monitor	Monitor	Mitigate	Monitor	Mitigate	Monitor	Monitor
Landscaping: rooftop gardens	N/A	Moderate	Mitigate	Monitor	Mitigate	Monitor	Monitor	Mitigate	Monitor	Mitigate	Monitor	Monitor

Plate 2.1 **Excerpt from Table 13 Avisure (2020) – Aerotropolis Aviation Wildlife Safeguarding Framework (modified from NASF Guideline C)**

2.3.2 AAWSF - Wildlife hazard assessment

An overview of the assessment framework outlined in AAWSF is reproduced in Figure 2.2 below.

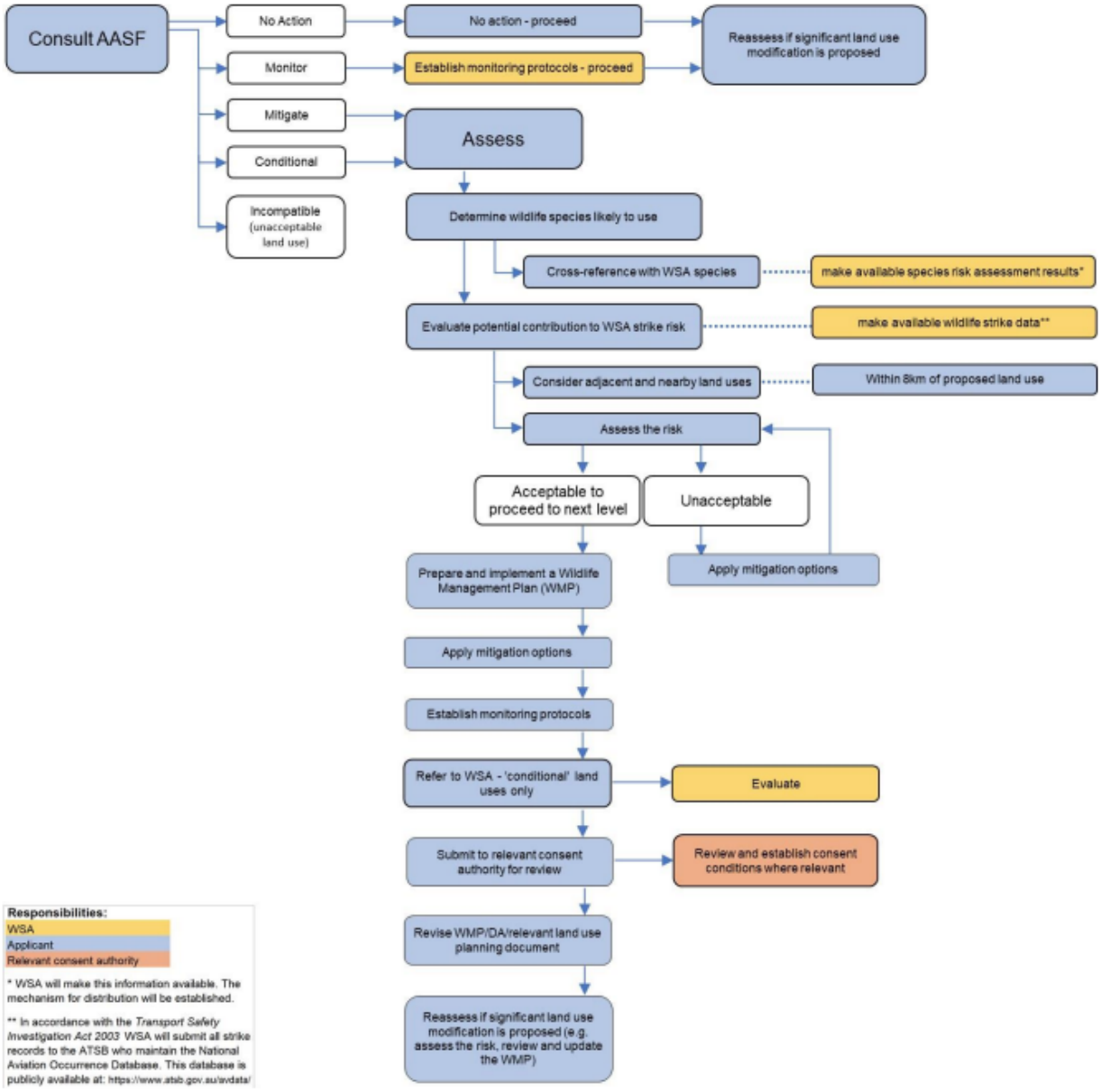


Figure 2.2 Western Sydney Aerotropolis wildlife hazard assessment process (Avisure 2020)

This assessment has been substantially revised to meet the AAWSF assessment framework as outlined Table 2.1below.

Table 2.1 Assessment of ARRC wildlife risk with reference to AAWSF assessment process

Requirement	Where in this report
Consult AAWSF – A review of the AAWSF indicates that while the ARRC, as a non-putrescible resource recovery facility, is considered to pose a low wildlife hazard risk, the AAWSF outlines that due to the ARRC's location on the north-western side of WSA the proposed action to manage wildlife attraction risk is "mitigate" and therefore a wildlife hazard assessment is required.	Refer Section 2.3.1 for discussion on land use categories and action required under AAWSF.
Determine Wildlife species likely to use ARRC/cross reference with WSA species risk assessment results.	Refer Section 3
Evaluate potential contribution of ARRC to WSA strike risk	Refer Section 5
Consider adjacent and nearby land uses and potential cumulative impact	Refer Sections 4.2 and 5
Assess risk of ARRC including cumulative risk to wildlife hazard	Section 5
Prepare and implement a wildlife management plan including mitigation measures and monitoring protocols	Section 6 - A wildlife management plan will be prepared prior to the commencement of construction and implemented throughout the ARRC construction and operational phases.

3 Context of wildlife risk to WSA

3.1 Overview

To operate safely, airports require expansive, flat, open space within the airport's operational area (airside) and in the surrounding areas for at least 20 km. The surrounding land can provide habitats (such as ponds and grasslands) which provide habitat for, or can attract, wildlife. Wildlife which can fly, particularly birds, but also bats, can pose a significant risk to aircrafts, especially during their take-off and landing at airports. All significant civilian and military airports actively manage their land to reduce its attractiveness to key species of bird and other key risks such as flying fox camps. However, many airports face birdstrike hazards from land uses outside of their direct ownership or control. Key habitats or land uses of concern around airports include:

- municipal waste sites (taking food and other putrescible waste);
- wetlands, dams, and reservoirs;
- natural coastal habitats mudflats;
- sewage treatment works;
- abandoned sand, gravel, and clay pits (containing water); and
- agricultural areas such as fruit trees, grape crops, etc.

Since 1912, 657 aircraft have been destroyed due to wildlife strke incidents leading to 581 fatalities (Avisure 2021). Approximately USD $1.2 billion is spent repairing aircraft engines and frames on an annual basis (Avisure 2021).

3.2 The current assessed risk at the Western Sydney Airport

3.2.1 National context

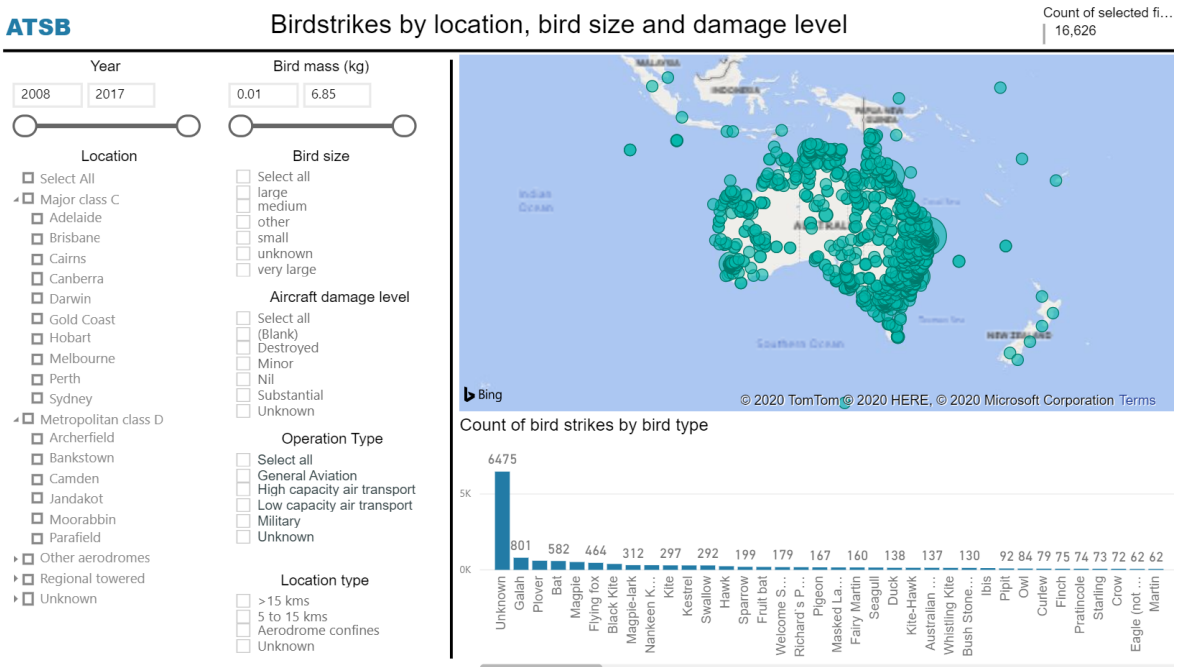
The Australian Transport Safety Bureau (ATSB) collects and publishes birdstrikes data on its website. In 2019, the ATSB stated:

> Between 2008 and 2017, there were 16,626 confirmed birdstrikes reported to the ATSB. The number of reported birdstrikes has increased in recent years, with 2017 having the highest on record with 1,921. Despite being a high frequency occurrence, birdstrikes rarely result in aircraft damage or injuries. Of the 16,626 birdstrikes in this reporting period, 99.8 per cent were classified as incidents, while 19 (~0.1 per cent) were classified as accidents and another five (~0.03 per cent) as serious incidents. Nine birdstrikes, or approximately 0.05 per cent of the birdstrikes in the ten years, resulted in minor injuries to pilots or passengers. There were no reported serious injuries or fatalities associated with a birdstrike occurrence in the ten-year period.
>
> Domestic high capacity aircraft were those most often involved in birdstrikes, and the birdstrike rate per aircraft movement for these aircraft was significantly higher than all other categories. Both the number and rate of birdstrikes per 10,000 movements in high capacity operations have increased in the past two years 2016 – 2017. In contrast, the number of birdstrikes in low capacity operations and general aviation has remained relatively consistent in the most recent two years.
>
> The number of birdstrikes involving a bird ingested into an engine in high capacity air transport operations has risen in recent years with about one in ten birdstrikes for turbofan aircraft involving a bird ingested into

an engine. Additionally, over the ten-year reporting period, there have been 11 occurrences involving one or more birds ingested into two engines of turbofan-powered aircraft.

The five most commonly struck flying animals in the 2016 to 2017 period were flying foxes, galahs, magpies, and 'bats' (many of which were likely to be flying foxes) and plovers.

This data is visually represented below from their website in Figure 3.1. It should be noted that 6,475 (about 39%) of strikes we not found or not identifiable after the collision.



Source: ATSB

Figure 3.1 Birdstrikes by species across Australia (2008–2017)

3.2.2 Birdstrikes by location across Australia

The ATSB examines data by location and by the frequency of strikes per 10,000 aircraft movements. As expected, the busiest airports have higher numbers of birdstrikes. In total numbers in the period from 2008-2017 Brisbane Airport had the highest number of birdstrikes (1139) followed by Sydney (1073) (see Figure 3.2).

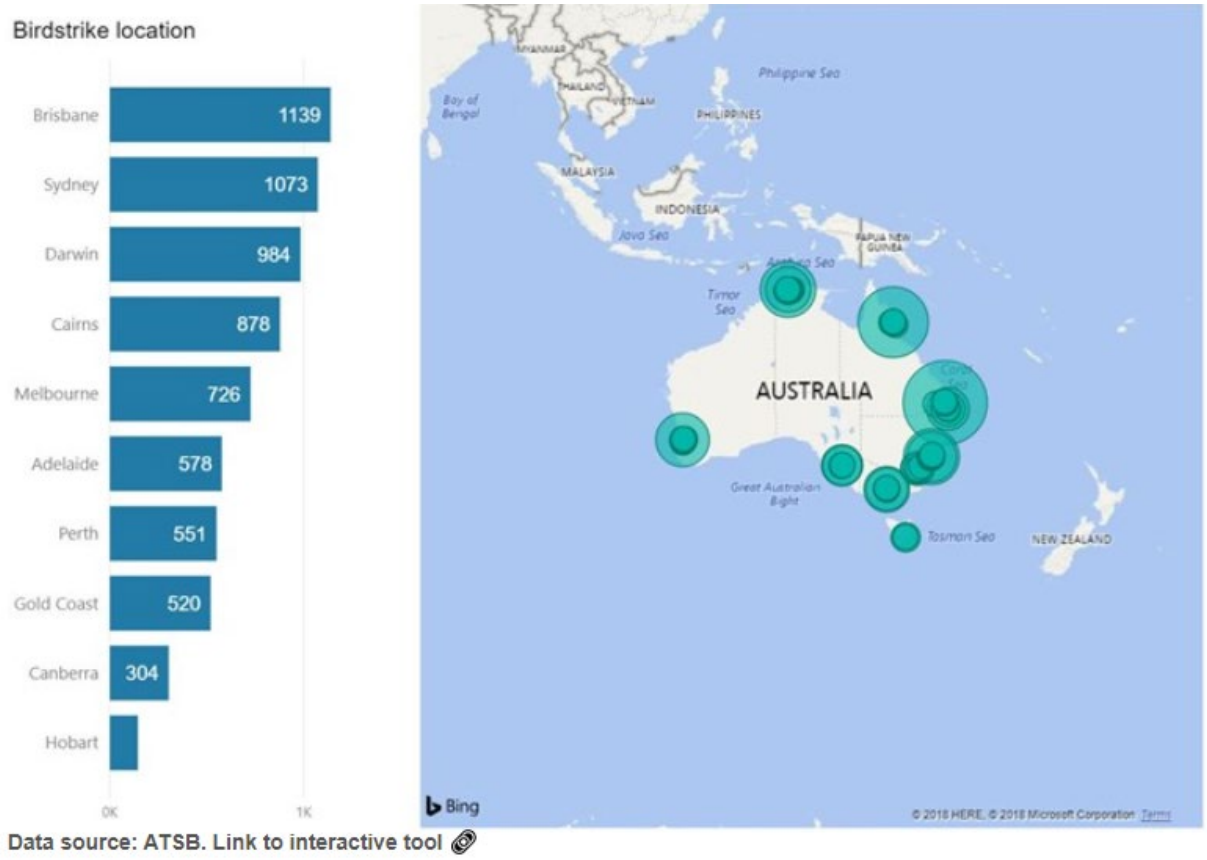
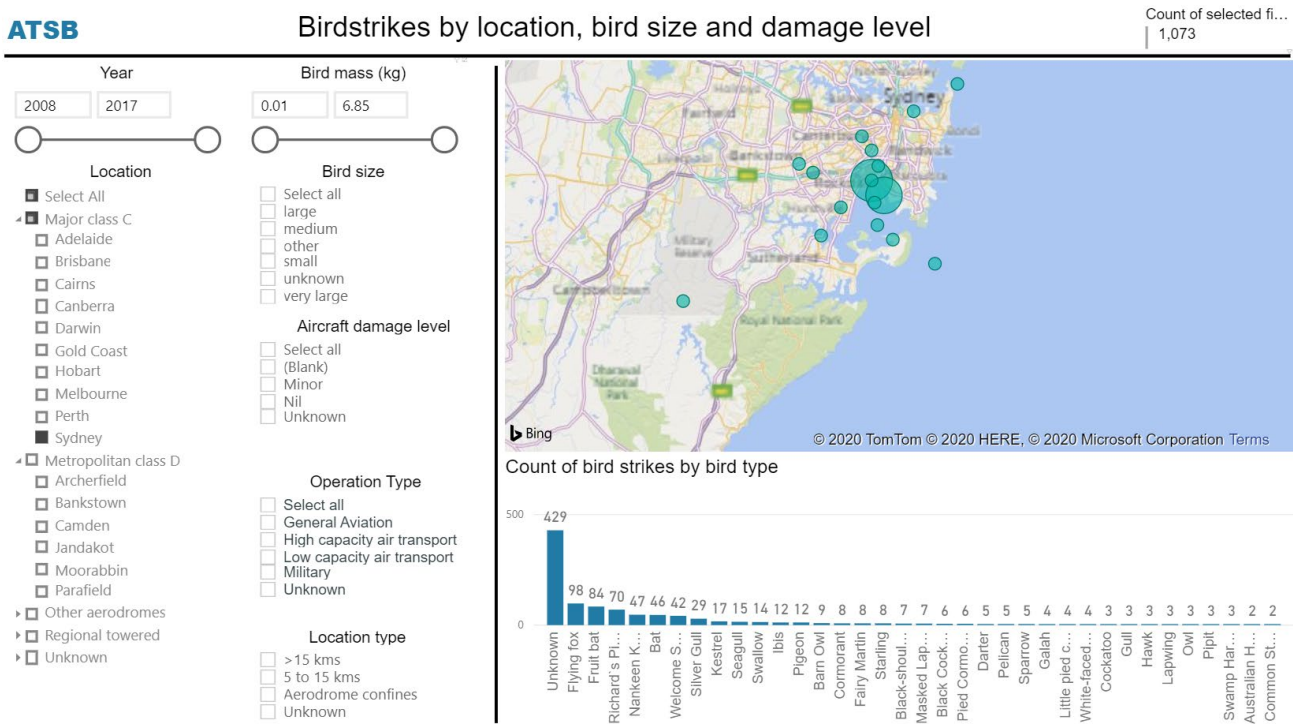


Figure 3.2 Primary birdstrike locations across Australia 2008–2017

3.2.3 Sydney Airport

The current Sydney Airport has significant existing birdstrike data, and is the closest airport with domestic and international air traffic to the new Western Sydney Airport. Whilst its geographical context is different, it still gives come indication of potential species which may be of concern. Of the top five species encountered in incidents at Sydney Airport three are 'bats' of some description (flying fox, fruit bat, and bat). It is clear that flying foxes are a significant issue at Sydney Airport. Nationally, they are the 3rd most commonly struck species. Other species of concern at Sydney are Richard's Pipit (now scientifically Australasian Pipit), Nankeen Kestrel, Welcome Swallow, and Silver Gull. Of these birds, Silver Gull is likely the most concerning due to its size and prevalence of flocking. Further species details for Sydney Airport are given in Figure 3.3.



Source: ATSB

Figure 3.3 Birdstrike species data from Sydney Airport 2008-2017

3.2.4 Western Sydney Airport site

i Overview

As part of the Western Sydney Airport Environmental Impact Statement, Avisure undertook a *Preliminary Bird and Bat Strike Risk Assessment* (2015). A summary of the preliminary assessment is provided below:

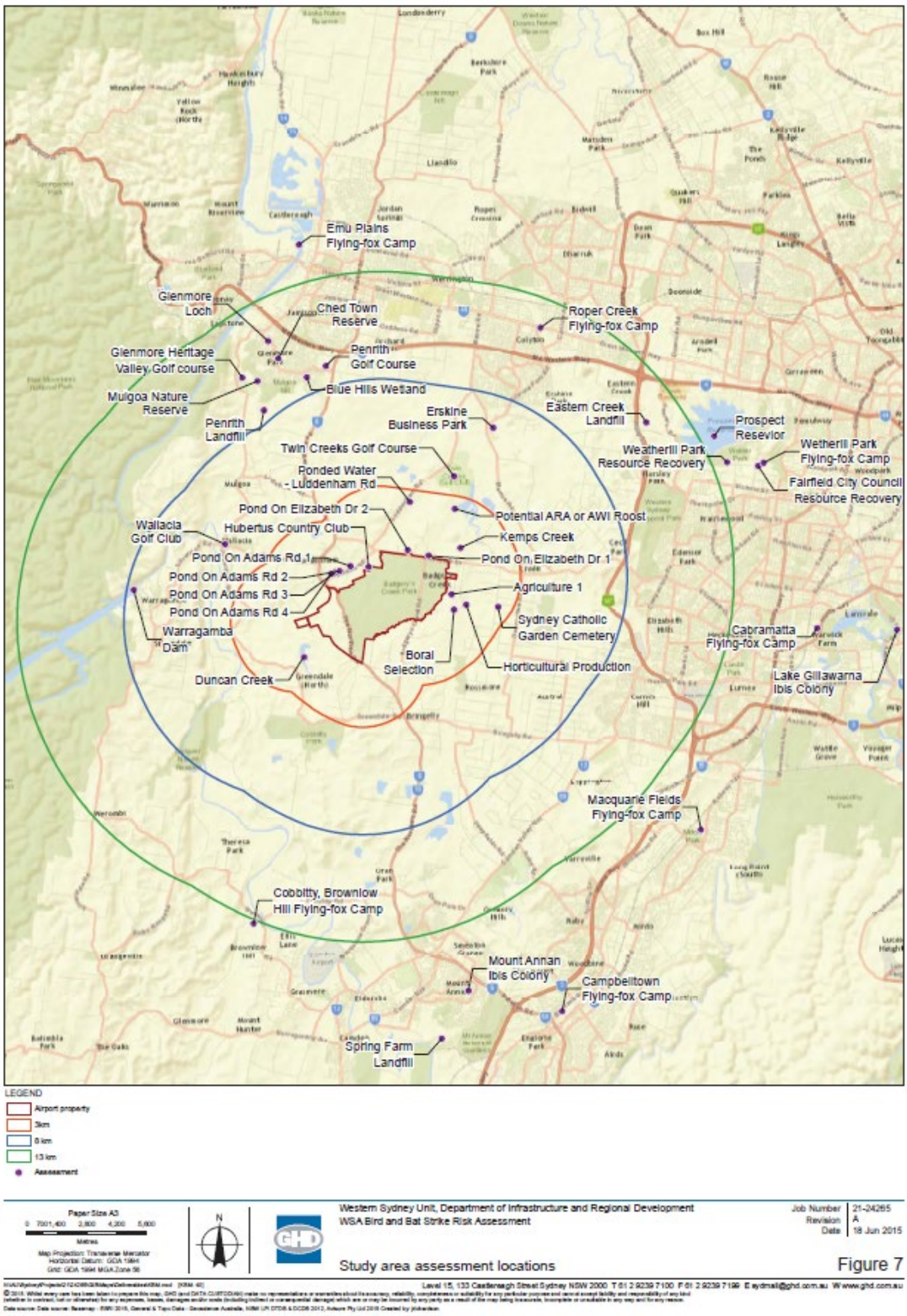
> The assessment was based on a desktop review of relevant literature and a three-day site visit conducted in March 2015. The visit included investigations within the airport site and study area. The study area included the area within a 25 km radius of the airport site centre point. The justification for the distance is based on international standards (ICAO and World Birdstrike Association) and national guidelines (National Airports Safeguarding Framework) and recommended identifying, and where necessary managing potential wildlife attractions within 13 km of runways.
>
> The assessment found that there would be a bird and bat strike risk at the proposed airport due to species presence and abundance, habitat available on the airport site and within the study area, projected aircraft movements and stage construction. The presence of farm dams presents the greatest risk for birdstrike at the proposed airport. Despite the complexity involved in managing an abundant and highly distributed habitat type outside the airport site, it is important to consider this risk relative to other possible features which could present significant bird and bat strike risk for an airport. For example the proposed site does not have a large estuary in close proximity, is not within a major bird migratory route, does not have flying-fox roosts or ibis colonies in closed proximity, and is likely to have reduced available habitat as the airport surrounds urbanise.
>
> Each potential contributor to bird and bat strike risk at the proposed Western Sydney Airport can be managed to an acceptable risk level so the preliminary assessment of overall bird and bat strike risk for the airport is low. Risk management would require the airport operator to implement a suite of mitigation

measures and develop an integrated management program designed for ongoing implementation. The mitigation measures detailed in this report are specific to Stage 1 of the proposed airport site development. Similar strategies will apply to the longer term development with additional risk of bird and bat strike risk due to the operation of one runway during construction of a second. Further review of appropriate mitigation strategies will be required during the detailed design, construction and operation stages of longer term development. In addition, the airport operator would need to comply with the International Civil Aviation Organisation, the Civil Aviation Safety Authority and the National Airport Safeguarding Framework regulations and standards and guidelines.

The mitigation strategies listed in this report are based on our preliminary assessment and need to be refined as more information about the detail design and construction of the proposed airport becomes available. Key considerations include: that the design does not create bird and bat attractive features; that bird and bat populations are monitored to assess strike risk; and, that a plan to implement mitigation actions where hazards are identified is developed.

The Avisure survey area is shown in Figure 3.4. This figure also shows the study area assessment locations. The study area's dams considered to be of concern are shown in Figure 3.5. As stated above, the presence of farm dams scattered across this area presents the greatest risk for birdstrike at the proposed airport.

The subject property at Adams Road was not identified as an area of concern in the *Preliminary Bird and Bat Strike Risk Assessment*.



Source: *Preliminary Bird and Bat Strike Risk Assessment* (Avisure 2015)

Figure 3.4 The Preliminary Birdstrike Assessment (Avisure 2015) survey area

Source: Preliminary Bird and Bat Strike Risk Assessment (Avisure 2015)

Figure 3.5 Farm dams within 3 km of the Western Sydney Airport boundary

ii Species found around Western Sydney Airport

The species mix found around the Western Sydney Airport is typical of an inland semi-rural environment. Avisure (2015) stated the following:

> Of the aforementioned species, Avisure recorded Masked Lapwing, Galah, Australian Magpie, and every duck species in the airport site surveys. Of particular note was the number of Galahs recorded, with an average of 9.33% per survey and four ducks species (Pacific Black Duck, Grey Teal, Australian Wood Duck, and Hardhead) with greater than 10 per survey. In addition the presence of Straw-necked Ibis in high numbers presents a risk as they are a flocking species of significant mass (1.3 kg) and are relatively difficult to manage on an operating airport

Futher details are provided in Figure 3.6.

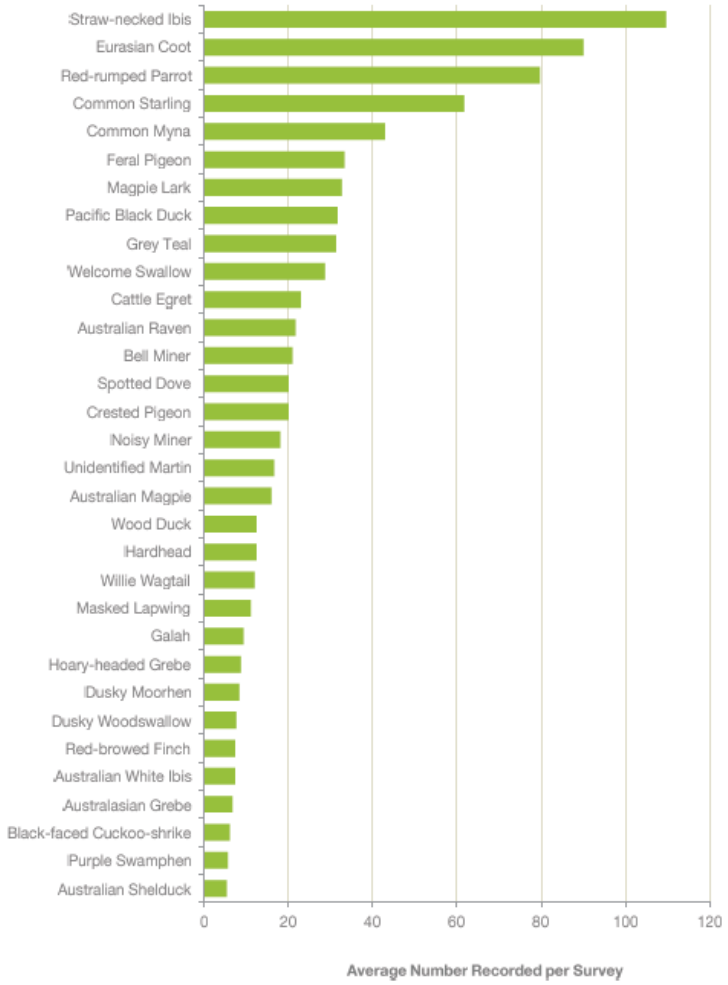


Figure 4. Species and average numbers observed per survey, site for the Western Sydney Airport, March 2015. Note: includes only species with an average number of individuals per survey greater than 5. An additional twenty-eight species were recorded, but had an average less than 5 per survey.

Source: Preliminary Bird and Bat Strike Risk Assessment (Avisure 2015)

Figure 3.6 Bird species and average numbers observed around Western Sydney Airport boundary (2015)

iii ARRC biodiversity surveys

Bird species were opportunistically recorded at across the subject property during biodiversity surveys carried out to inform the biodiversity development assessment report for the ARRC. The species identified across the entire subject property over two days of surveys carried out on 27-28 February 2020 are summarised in Table 3.1.

Table 3.1 Bird species recorded on site

Common name	Scientific name	Number of individuals observed
Australian Wood Duck	*Chenonetta jubata*	2
Pacific Black Duck	*Anas superciliosa*	2
Grey Teal	*Anas gracilis*	2
Eurasian Coot	*Fulica atra*	2
Australasian Swamphen	*Porphyrio melanotus*	1
Great Cormorant	*Phalacrocorax carbo*	1
Brown Goshawk	*Accipiter fasciatus*	1
Sacred Kingfisher	*Todiramphus sanctus*	1
Superb Fairywren	*Malurus cyaneus*	4
Grey Shrikethrush	*Colluricincla harmonica*	1
Grey Butcherbird	*Cracticus torquatus*	1
Magpie-lark	*Grallina cyanoleuca*	1
Australian Raven	*Corvus coronoides*	1
Red-whiskered Bulbul	*Pycnonotus jocosus*	1
Red-browed Finch	*Neochmia temporalis*	1

In addition to the above bird sightings, the anabat surveys recorded numerous Southern Myotis foraging around the main water bodies as well as a Large-eared Pied Bat and possible records of Little Bent-winged Bat and Greater Broad-nosed Bat were also identified within the subject property.

4 ARRC site and surrounds' past (theoretical) and current wildlife risk profile

The following assessment of the ARRC's wildlife strike risk to the Western Sydney Airport, including potential cumulative impacts from other potential wildlife attractants within 8 kms of the ARRC site and WSA, is based on the species recorded around the site, and those which are known to cause risk at Sydney Airport and nationally.

4.1 Wildlife risks in 2015

In 2015, when the Preliminary Bird and Bat Strike Risk Assessment was undertaken, the subject property was an active shale/clay quarry. The ARRC site, located to the north of the quarry void was used for irrigation as part of quarry dewatering requirements. It was not identified as an area of concern by the Avisure (2015) assessment.

The ARRC site, as an irrigated paddock, with scattered woodland in the eastern portion, an ephemeral water body (approximately 0.05 ha in size) and quarry water management dam (approximately 0.09 ha in size), would have acted as a comparable wildlife attractant to the surrounding agricultural land use. However, the very disturbed, actively worked environment across the broader subject property due to quarry operations would have deterred its use, compared to the surrounding agricultural areas, by birds or bats (flying-foxes). Most of these species are attracted to grasslands, agricultural areas and vegetated wetlands. For example, the ARRC site within an operating quarry would have provided lower food, safe roosting areas or attractive habitats, compared to the surrounding rural landscape and number of relatively undisturbed farm dams around it. The site is shown in Figure 4.1 below).

Overall, it is considered that the ARRC site would have had a low contribution to wildlife risk in the context of the broader area should the airport been operational in 2015.

Figure 4.1 The subject site and surrounds in March 2015 (source nearmap)

4.2 Wildlife risk in 2022

4.2.1 ARRC site

As of 2022, there is no material change to the ARRC site which is still a grassed paddock. The quarry has recently recommenced operations after being inactive for about three years. The former water management dam within the ARRC site has now been decommissioned from the quarry water management system and irrigation has not taken place across the ARRC site since quarry operations ceased under the former operators in 2018. The primary change to the subject property (from 2015) is that water has accumulated in the floor of the quarry to the south of the ARRC site. Whilst this could potentially attract water birds, the environment is still relatively sterile and unlikely to provide foraging particularly in the contex of recommenced quarrying operations.

The very disturbed site would still not act as an attractant to any of the birds or bats (flying-foxes) in question, particularly compared to the surrounding rural landscape, number of relatively undisturbed farm dams and the WSA construction site. The ARRC site, from the latest available aerial, is shown in Figure 4.2. The undeveloped ARRC site would pose minimal wildlife hazard risk.

4.2.2 Cumulative wildlife hazard assessment

While the existing ARRC site poses a low wildlife hazard risk, there are moderate and high risk land uses within 8 km of the ARRC site including agricultural land use with numerous water bodies and the WSA construction site with soil stockpiles and large sediment basins. Cumulatively the broader area is considered to pose a moderate wildlife hazard risk, however the ARRC site is not considered to materially contribute to this broader risk.

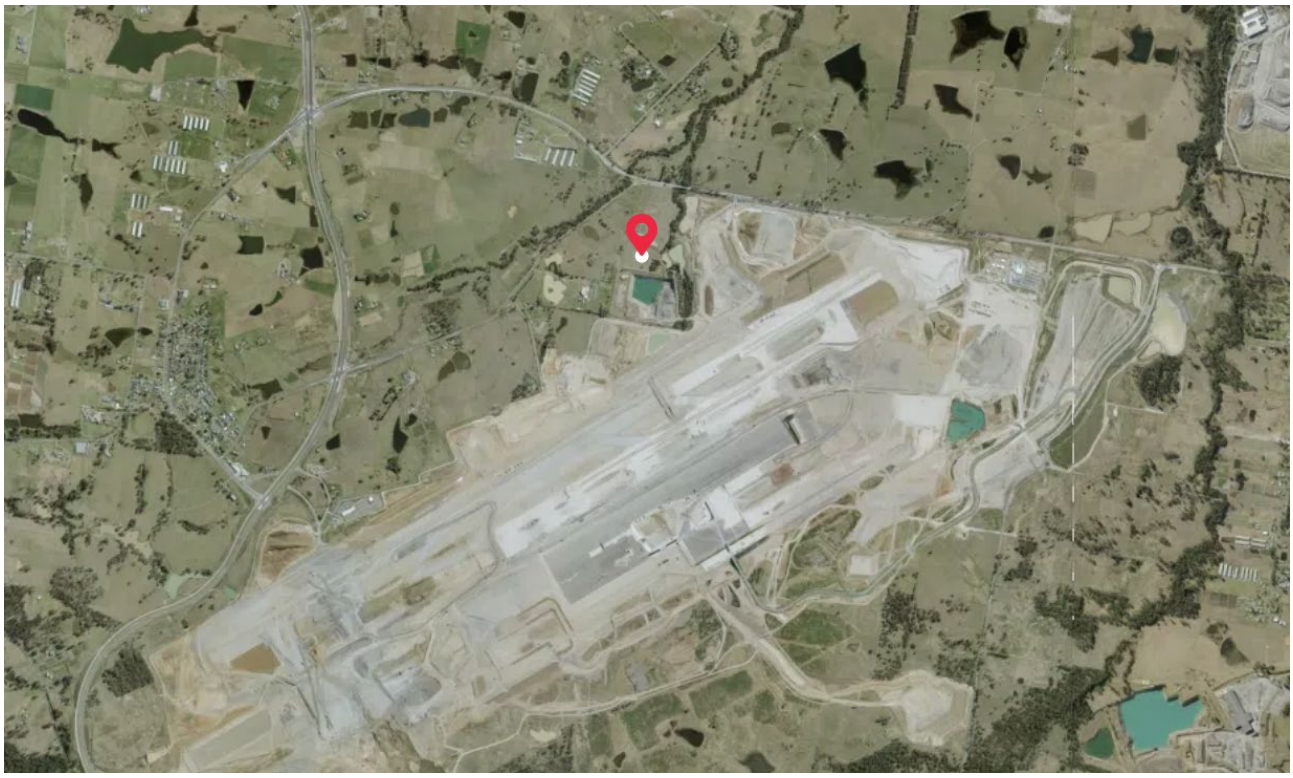


Figure 4.2 The subject site and surrounds in September 2021 (source metromap)

5 Future wildlife hazard risk should the proposed development proceed

5.1 Changes to wildlife hazard risk ARRC site

As outlined above in Section 4, the subject property currently poses minimal wildlife hazard risk to the airport, compared to the surrounding environment. The ARRC will cause the following changes to the site:

- increased use and disturbance of the ARRC site;
- construction activities during the construction phase;
- removal of approximately 0.42 ha of native vegetation in the eastern portion of the ARRC site;
- upgrading and using the site access road to Adams Road;
- removal of a decommissioned water management dam (approximately 0.09 ha in size) formally part of the quarry's water management system to accommodate the ARRC and removal of an ephemeral water body (approximately 0.05 ha in size) to accommodate the ARRC;
- developing a fully enclosed ARRC warehouse which has been designed to meet the requirements of the EPA and Western Sydney Airport to ensure that onsite activities will not impact airport operations;
- establishment of hardstand areas, internal roads, parking and office facilities;
- water management infrastructure including an enclosed water treatment plant to treat operational water for use and reuse within the ARRC warehouse;
- a temporary enclosed wastewater treatment plant (if required) due to the ARRC becoming operational prior to the connection to Sydney Water wastewater system;
- an onsite water detention basin adjacent to the ARRC; and
- landscaping.

The ARRC will process inert, non-putrescible construction and demolition waste. No food or putrescible waste will be processed or disposed of on the site. All waste and recycled product will be accepted, processed, stored within the ARRC warehouse.

Taking the points above in order, the following assessment is provided regarding how they may contribute (or otherwise) to wildlife strike and birdstrike risk at the WSA:

- increased use and activity on the site is likely to reduce the site's attractiveness to wildlife and birds;
- construction activities will involve stripping the grassland paddock and removal of scattered native vegetation. The removal of the grassland paddock for the development of the enclosed ARRC will remove habitat that could attract grassland birds and birds which use grasslands to feed upon – such as Straw-necked Ibis. This will reduce the site's attractiveness for wildlife and birds;

- construction activities may provide temporary foraging habitat to wildlife in the form of soil stockpiles. Notwithstanding, this is considered a low risk in the context of a busy construction site with construction machinery and personnel deterring the presence of wildlife. Under the current schedule for the construction of the ARRC, it is likely that the ARRC will be constructed prior to the commencement of airport operations;

- removal of a decommissioned water management dam and ephemeral water body will remove habitat for bat and bird species currently at the site;

- the operational water and wastewater system (if the latter is required) will be fully enclosed and as such will not provide any foraging habitat for wildlife;

- with suitable management such as netting, the risks associated with the onsite water detention basin, even though these would be minor risks to begin with due to their small size; and

- a landscape plan is provided in Appendix T of the EIS. Landscaping detailed design will be in accordance with the Liverpool City Council Development Control Plan (Liverpool DCP), Western Sydney Aerotropolis DCPs, Landscape Design Guidelines dated May 2020 in Appendix B (of Avisure 2020) and in consultation with the WSA to ensure appropriate landscaping design which incorporates green space while minimising the potential to attract wildlife and birds.

The current ARRC site poses a low wildlife risk to the airport's operation. It is largely disturbed by adjacent quarrying activity and is less attractive to key wildlife and bird species than surrounding agricultural areas, paddocks, and farm dams. Given the type and scale of the ARRC, the site will be even less attractive to wildlife and birds with the removal of a decommissioned water management dam and ephemeral water body, removal of the paddock, removal of vegetation and the general activity that will occur on site.

The development of the ARRC will reduce the likelihood of wildlife strikes and birdstrikes occurring at the airport, albeit by a very small fraction given the site's scale and surrounding environment. The ARRC will process inert, non-putrescible construction and demolition waste. No food or putrescible waste will be processed or disposed of on the site. All waste and recycled product will be accepted, processed, stored within the ARRC warehouse. Overtime, as the Aerotropolis develops and existing agricultural areas are developed in line with the Agribusiness Precinct Plan, the cumulative wildlife risk to the WSA will further decrease.

Notwithstanding, the extremely low risk posed by the ARRC would be further reduced by the implementation of the mitigation and management measures described in Section 6.

5.2 Changes to cumulative wildlife hazard risk

As identified in Section 4.2, cumulatively the broader area within 8 km of the ARRC site currently poses a moderate wildlife hazard risk. This risk is also expected to decrease to a residual low risk as the land uses transition away from traditional agricultural activities to land uses envisaged under the Western Sydney Aerotropolis Plan (WSPP 2020) and the construction of WSA is completed.

6 Mitigation and management

6.1 Wildlife Management Plan

A Wildlife Management Plan will be prepared prior to the commencement of construction and implement throughout the construction and operational phases of the ARRC. The Wildlife Management Plan will be prepared in consultation with WSA and DPE.

6.1.1 Monitoring

The Wildlife Management Plan will establish monitoring protocols including:

- monitoring the presence and behaviour of wildlife;
- monitors for evidence of wildlife sheltering/nesting in ARRC infrastructure (ie warehouse awnings, water management infrastructure, light posts and/or landscaping);
- protocols for the detection and removal of bird nests;
- trigger thresholds for further management;
- identifies attractants (ie water, food sources); and
- monitor the effectiveness of wildlife mitigation measures.

As the ARRC is assessed as having a low risk in terms of wildlife attraction, regular monitoring surveys, ongoing wildlife hazard assessments by qualified ornithologists or establishment of wildlife population triggers will not be included in the Wildlife Management Plan. The AAWSF recommends annual monitoring for wildlife activity at land uses assessed as very-low to low risk.

6.1.2 Training

All staff and construction contractors will receive wildlife awareness and management training as part of the contractor/staff induction process. Feeding of wildlife will not be permitted.

6.1.3 Recommended mitigation/management measures

Despite being considered a very low risk site from the perspective of increasing birdlife strikes at the airport, there are additional mitigation/management measures which can be implemented to further reduce the ARRC's attractiveness for wildlife. The following measures will be incorporated into the detailed design for the ARRC:

- No new planting (eg for landscaping) should occur on the ARRC site that produces fruit or flowers that are likely to attract birds and wildlife.
- The storm water detention basin will be designed and maintained to drain within 48 hours of a rainfall event.
- Any new water features (such as the onsite water detention basin) should either be netted or have lines across it with moving flags on them to deter birds using it.

- The building designs, including on fences and lighting, should ensure that they minimise areas for wildlife, especially birds, to use for breeding, roosting, or perching. This could include:
    - having no eaves or ensuring there is no access to the roof through the eaves; and
    - using 'bird-spikes' on roof edges, fences and lighting.

The following measures will be documented in the Wildlife Management Plan:

- Monitoring protocols – monitoring will likely consist of a weekly checklist conducted by appropriately inducted site personnel;
- Appropriate waste acceptance procedures will be documented in the approved waste management plan and wildlife management plan to ensure putrescible waste is not inadvertently accepted by the ARRC in co-mingled waste loads. This will include initial inspection of incoming waste on the weighbridge and subsequent inspection once the load is tipped within the ARRC warehouse. Any loads contaminated with putrescible loads will be reloaded and directed to leave the ARRC;
- Where perching, roosting or nesting activity is detected on ARRC infrastructure, install exclusionary devices such as netting, or anti-perching strikes and evaluate the effectiveness of any retrospective installation of exclusionary devices;
- Waste management on site will include careful management of any food waste from employees, for example by providing waste bins which are inaccessible to birds and vermin;
- The wildlife management plan will define roles, responsibilities, and actions to ensure management measures are implemented, managed, and maintained;
- A trigger threshold will be established to trigger additional action should birds or other wildlife start using the site, particularly in numbers of concern. An example trigger threshold would be the observation of more than 10 birds/bats present on the ARRC site more than 12 times within an annual monitoring period; and
- If the trigger threshold is reached, specialists will be engaged to survey/monitor the species utilising the site to remedy the situation.

7 Conclusions

The existing ARRC site poses a low wildlife and birdstrike risk to the new Western Sydney Airport in the context of the broader rural landscape and number of relatively undisturbed farm dams around it. The proposed development of the ARRC will further reduce this risk by reducing access to standing water on the site and developing a grass paddock into the ARRC. Based on the work completed as part of airport planning, the surrounding area of open paddocks and dams is of far more concern to the airport at this stage. To ensure the ARRC absolutely minimises its risks, a number of additional management and mitigation measures are recommended. The cumulative wildlife strike risk posed by this development is negligible. Indeed, with the implementation of various mitigative measures, the overall risk the ARRC site presents is likely to be lower than its current state.

References

ATSB 2022, *Australian aviation wildlife strike statistics 2008 - 2017,* Australian Government, Australian Transport Safety Bureau https://www.atsb.gov.au/publications/2018/ar-2018-035/

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Avisure 2020, Draft Western Sydney *Aerotropolis Wildlife Management Assessment Report,* prepared for the Western Sydney Planning Partnership May 2020

Avisure 2015, *Western Sydney Airport, Environmental Impact Statement, Preliminary Bird and Bat Strike Risk Assessment* prepared for GHD in September 2015

WSPP 2020, *Western Sydney Aerotropolis Plan,* Western Sydney Planning Partnership

Appendix A

Curriculum vitae – Rob Morris

Robert Morris

Associate Director

Curriculum vitae

Robert has over 28 years' experience in environmental consulting, taking on leadership, managerial and technical roles. Robert specialises in environmental and ecological impact assessment and environmental management. Robert has managed many major EIA projects in the minerals extraction, oil and gas, waste management, renewable energy and infrastructure sectors both in Australia and internationally. He has also managed World Bank funded projects and acted as an advisor to major banks on the Equator Principals and due-diligence audits.

Robert has particular knowledge and expertise in understanding the environmental and social impacts of airports and also the potential impacts of the environment on airports. Rob has worked for many years on both airport expansions and new airport developments from an ecological, birdstrike & environmental assessment

Qualifications

- Master of Science, Environmental Assessment and Management, Oxford Brookes University, 1995
- Bachelor of Science (Hons) Ecology (2:1), University of East Anglia, 1990
- Graduate of the Australian Institute of Company Directors
- Various vocational qualifications in People Management, Leadership, Safety Leadership, Financial management, Marketing, and Business Development.

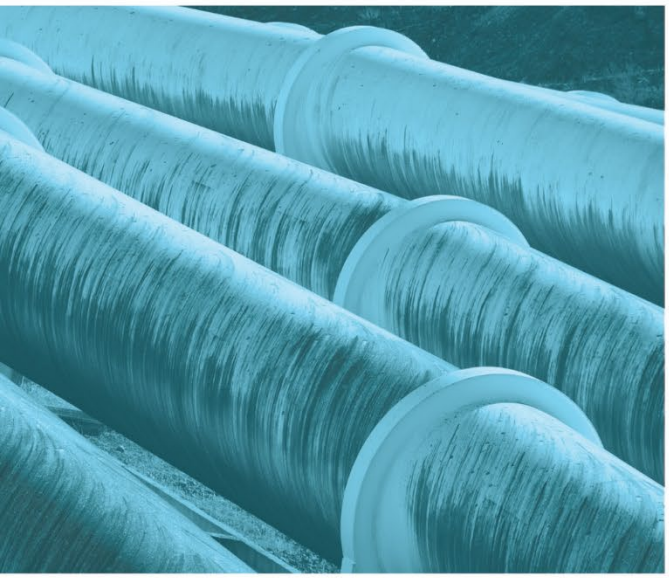
Career

- EMM Consulting, 2017–present
- Group Executive – Energy & Resources, Coffey 2015–2016
- Group Executive – Coffey Environments, 2013–2015
- Principal / General Manager Qld & PNG – Coffey Environments, 2009–2013
- Senior Associate – Coffey Natural Systems, – 2007
- Associate Director, Arup (London), 2006–2007
- Associate Director – Environment, Scott Wilson UK, 2003–2006
- Principal Environmental Specialist, Scott Wilson UK / Hong Kong, 2000–2003
- Senior Environmental Specialist, Scott Wilson Hong Kong, 1997–2000
- Senior Environmental Specialist, Scott Wilson UK and Zimbabwe, 1993–1996
- Environmental Consultant, Scott Wilson (previously (CRC) UK), 1993–1996
- Ecological Consultant, Bioscan (UK), 1992–1993.
- Research Ecologist / Consultant, Oxford University, WildCRU, Zoology Department (Lady Margaret's Hall) / Nature Conservation Bureau UK, 1990–1992

EMM
creating opportunities

Representative experience

- **Williamtown Airport – Expansions** (Defence Australia) PD for the post approvals Ecology issues relating to the EPBC assessment following the project being a controlled action. Liaison with Defence on site and key consultees over operational impacts and proposed monitoring on Bats, migratory waders and Gould's Petrel.
- **Stansted Airport Expansion – SG2** (BAA) Topic manager for economic, employment, community and planning effects. Liaison manager for surface access issues and off-site infrastructure issues.
- **Birmingham International Airport – Master Plan Review** (BIA Ltd) Project Manager for the Environmental work-stream (excluding air and noise work) of the 2030 Masterplan Development. The position included sitting on monthly Board Meetings at BIAL.
- **Dalaman Airport – Environmental Due-diligence Review** (HVB) Environmental review of the terminal expansion of Dalaman Airport based on the Equator Principles for a major German Investment Bank (2005).
- **Birmingham International Airport – Runway Extension EIS;** Carried out and wrote the ecological assessment as part of the EIA for the proposed runway extension (BIAL – 2001).
- **Dublin Airport – Proposed Second Runway** Managed the EIA sub-consultant on behalf of Aer-Rianta, to ensure the EIA is compliant and addresses the issues necessary for the 2nd Runway to receive planning permission (Aer-Rianta, (Secondment 2001-2003)
- **South East Regional Airport Strategy (SERAS)** Provided the ecological and birdstrike risk input to this Strategic Environmental Assessment which is part of a larger study to determine the need for future airport development in the SE of England. (2001)
- **Birmingham Airport Planning and Environmental Review** - Carried out a planning and environmental review of the A45 Tunnel and Diversion Options, associated with the proposed Runway Extension. (BIAL, 2000)
- **Birmingham Airport Environmental Review** of the Revised Master Plan Carried out an environmental review of the revised Master Plan Strategy to be published in 2001. (BIAL, 2000)
- **Brussels International Airport (BIAC) Environmental Review** Environmental Manager for the BIAC Strategic Airport Development Study which aims to set out development options for BIAC for the next 20 years. (BIAC, 2000)
- **UK: London Airport Surface Access Study (LASAS)** Managed a strategic environmental appraisal to ascertain the environmental consequences of several route options for providing surface rail access between Gatwick and Heathrow airports. The study covered all environmental parameters and compared the environmental acceptability of each route option.
- **UK: Birmingham International Airport**. Managed the ecological component of the environmental assessment. The assessment was based upon development proposals including terminal expansion, runway extension, road diversions and other associated infrastructure improvements. Liaison with both English Nature and the local wildlife trust was undertaken.
- **UK: Manchester International Airport** - preparation of the ecology chapter for the final environmental assessment. This involved editing the detailed specialist study to highlight critical points and significant impacts.
- **UK: Bristol Airport,** Avon An ecological assessment of Bristol Airport was coordinated. This included an assessment of the airports ecological value, research into the areas designated sites of ecological importance, research into birdstrike, noise and emission pollution and subsequent mitigation measures.
- **Kooragang Island CO2 Plant and Fairfield Gas distribution centre – Environmental Audit** – desk study, site audit, report and debrief (Air Liquide Australia).
- **Cowal Gold Operations expansion** – PD for the expansion of the gold mine with a new underground mine.
- **Kunioon Coal Mine EIS (Tarong Energy Corp) –** Project Manager for this proposed new coal mine.
- **Meandu Coal Mine Extension - EPBC Referral (Tarong Energy Corp)** Project Manager for this EPBC referral for this proposed new expansion of Meandu Mine.
- **Berrima Cement Works** – Annual Environmental Return. Project manager for a review of the operations' performance against its EPL and associated conditions. Boral Cement.
- **Galilee Basin Railway** – Ecological Team leader for endangered species surveys. Adani
- **San Jorge Nickel Mine** – EIA/EIS – Project Manager and lead ecologist.
- **Contract Manager (Arrow Energy).** Site Selection / due diligence study – Coastal LNG sites (Shell).
- Stanley Power Project, PNG Western Province (Consortium of Banks / PNG Sustainable Energy Ltd.)



Attachment B

Avisure Peer Review of WHA

HEAD OFFICE–GOLD COAST
PO Box 404
West Burleigh QLD 4219 Australia
P +61 7 5508 2046

ADELAIDE OFFICE
PO Box 145
Pooraka SA 5095 Australia
P +61 1300 112 021
M +61 (0)407 295 766

SYDNEY OFFICE
PO Box 880
Surry Hills NSW 2010 Australia
P +61 1300 112 021

ABN 26 131 545 054

06/04/2022

Mr Pascal Bobillier

General Manager – Development
CFT No.13 Pty Ltd
Level 5, 2 Grosvenor Street,
Bondi Junction NSW 2022

Dear Pascal,

I have completed a peer review of the EMM report titled “Luddenham Advanced Resource Recovery Centre Wildlife Hazard Assessment” dated 5 April 2022.

I confirm that in my professional opinion, the adoption of the mitigation measures outlined in section 6 of the report would appropriately and adequately manage the wildlife strike risks that could arise from the proposed development.

I also confirm that, from a wildlife strike perspective, the assessment of cumulative impacts is sufficient.

Yours Sincerely,

Phillip Shaw
Managing Director
pshaw@avisure.com
Mobile: 01414978213