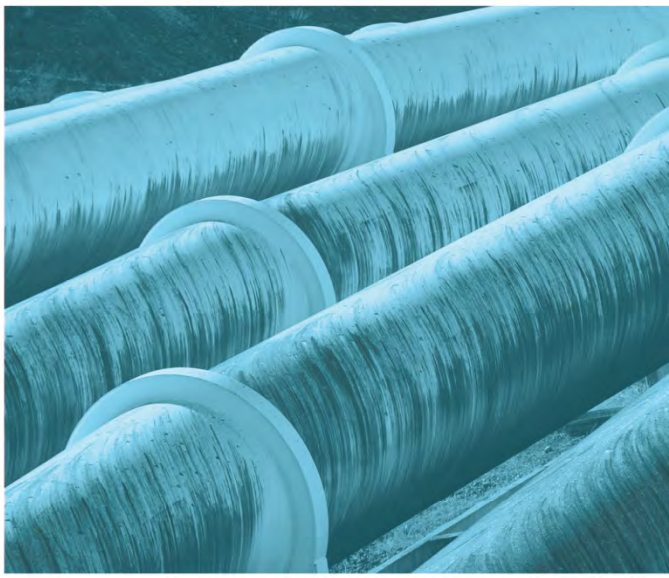



Luddenham Quarry

Final Land Use Plan

Prepared for Luddenham Operations Pty Ltd
October 2021

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Final Land Use Plan

Report Number

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Client

Luddenham Operations Pty Ltd

Date

21 October 2021

Version

v9 Final

Prepared by	**Approved by**
	
Michael Frankcombe National Technical Leader – Land, Water and Rehabilitation 21 October 2021	**Phil Towler** Associate Director 21 October 2021

Executive Summary

Luddenham Quarry is located at 275 Adams Road, Luddenham, NSW (the subject property), within the Liverpool Council municipality, and is described as Lot 3, DP 623799. CFT No 13 Pty Ltd, a member of Coombes Property Group (CPG), acquired the property in late 2019.

The quarry is approved under DA 315-7-2003 (the consent). A modification to the consent (Modification 5 or MOD 5) was approved on 24 May 2021. Modification 5 approved changes to the quarry access, site layout and operations to allow Luddenham Operations Pty Ltd, a joint venture between CPG and KLF Holdings Pty Ltd (KLF), to reactivate quarrying operations.

CPG has the following staged vision to the long-term development of the site:

- Stage 1 Quarry Reactivation: **Solving a problem**. CPG intends to responsibly avoid the sterilisation of the remaining natural resource by completing the extraction of shale which is important to the local construction industry as raw material used by brick manufacturers in Western Sydney. Following the completion of approved extraction activities, the void will be prepared for rehabilitation.

- Stage 2 Advanced Resource Recovery Centre and Quarry Rehabilitation: **A smart way to fill the void**: CPG in partnership with KLF and in collaboration between the circular economy industry and the material science research sector, intends to establish a technology-led approach to resource recovery, management, and reuse of Western Sydney's construction waste, and repurposing those materials that cannot be recovered for use to rehabilitate the void. This will provide a sustainable and economically viable method of rehabilitating the void for development. This stage requires approval of the currently lodged development application for the Advanced Resource Recovery Centre and approval for a yet to be lodged modification application to permit the infilling of the quarry void with construction and demolition waste.

- Stage 3 High Value Employment Generating Development: **Transform the land to deliver high value agribusiness jobs**. CPG intends to develop the rehabilitated quarry site into a sustainable and high-tech agribusiness hub supporting food production, processing, freight transport, warehousing, and distribution, whilst continuing to invest in the resource recovery research and development initiatives. This will deliver the vision of a technology-led agribusiness precinct as part of the Aerotropolis that balances its valuable assets including proximity to the future Western Sydney Airport (WSA) and M12.

This Final Land Use Plan describes the final land use for the quarry. It addresses Schedule 3, Conditions 36 and 36A of the development consent (DA No. 315-7-2003)

As noted above, it is intended to infill the quarry void with unrecyclable construction and demolition waste as envisaged by the original Environmental Impact Statement (EIS) (Douglas Nicolaisen & Associates 2003) to allow agribusiness/commercial/industrial final land uses across the majority of the subject property. However, infilling the void is not currently approved and there is no legal obligation to infill the void. Therefore, this Final Land Use Plan presents the following final land uses that are consistent with the approved *Site Rehabilitation Management Plan* (VGT 2021):

- the part of the subject site containing the void will remain unfilled and will be left as a safe and non-polluting landform;

- there will be no change to the land use in the biodiversity land use in the Oaky Creek riparian zone as prescribed in Condition 34 of the consent; and

- the remainder of the site will left in a manner that allows the development of agribusiness/commercial/industrial final land uses.

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Appendices

Tables

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1 Introduction

1.1 Background

The Luddenham Clay Quarry is located at 275 Adams Road, Luddenham, NSW (the subject property), within the Liverpool Council municipality, and is described as Lot 3, DP 623799 (Figure 1.1). CFT No 13 Pty Ltd, a member of Coombes Property Group (CPG), acquired the property in late 2019.

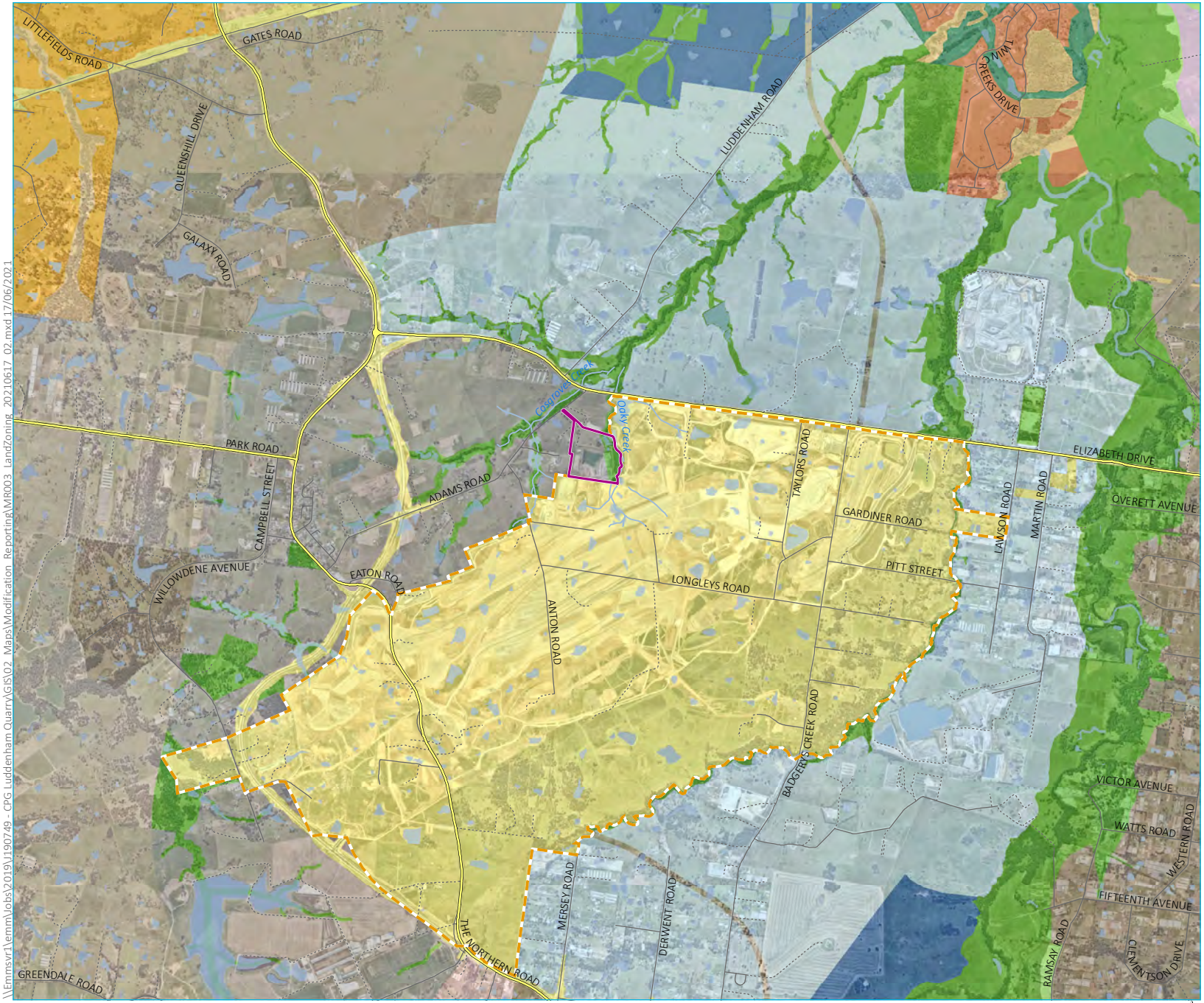
The quarry is approved under DA 315-7-2003 (the consent). A modification to the consent (Modification 5 or MOD 5) was approved on 24 May 2021. Modification 5 approved changes to the quarry access, site layout and operations to allow Luddenham Operations Pty Ltd (Luddenham Operations), a joint venture between CPG and KLF Holdings Pty Ltd (KLF), to reactivate quarrying operations.

1.2 Purpose and scope

This Final Land Use Report describes the approved final land use for the quarry. It addresses Schedule 3, Conditions 36 and 36A of the development consent (DA No. 315-7-2003) as described in Table 1.1.

Table 1.1 Relevant consent conditions

Number	Condition	Overview
Schedule 4 ENVIRONMENTAL PERFORMANCE		
36.	Prior to 5 years of the estimated completion of extractive activities at the site, the Applicant must submit a Final Land Use Plan to the Department identifying the final land use of the site and method of treatment for the final void.	This report identifies the approved final land use of the site and method of treatment for the final void.
36A.	Prior to recommencing quarrying operations approved under Modification 5, or other timeframe agreed by the Planning Secretary, the Applicant must review and update the Site Rehabilitation Plan, Biodiversity Management Plan, and Final Land Use Plan in consultation with EPA, DITRDC and WSA, and to the satisfaction of the Planning Secretary. The updated plans must:	This report has been updated to address the consent as modified following the approval of MOD 5. See separate *Site Rehabilitation Plan* (VGT 2021) and *Biodiversity Management Plan* (EMM 2021). EPA, DITRDC and WSA have been consulted during the preparation of this plan – see Section 1.4.
	(a) be consistent with any related approvals that provide for filling the final void, while also providing contingency rehabilitation activities in the event that such approvals are not obtained; and	Filling of the void is not currently approved. Accordingly, this Final Land Use Report has been prepared on the basis that the void will remain unfilled – see Section 2.1. As noted in Section 2.4, detailed contingency rehabilitation activities are provided in the *Site Rehabilitation Plan* (VGT 2021).
	(b) include measures to minimise the short, medium and long term risks to the construction and operation of the Western Sydney Airport and other surrounding land users.	See Section 2.3 and Section 4.1 of the *Site Rehabilitation Plan* (VGT 2021).



KEY

- Study area
- Western Sydney airport
- Waterbody
- Major road
- Minor road
- Vehicular track
- Watercourse

Land zoning

- AGB | Agribusiness
- E2 | Environmental Conservation
- E3 | Environmental Management
- E4 | Environmental Living
- ENT | Enterprise
- ENZ | Environment and Recreation
- IN1 | General Industrial
- MU | Mixed Use
- R5 | Large Lot Residential
- RE1 | Public Recreation
- RE2 | Private Recreation
- RU1 | Primary Production
- RU2 | Rural Landscape
- RU4 | Primary Production Small Lots
- SP1, Special Activities
- SP2, Infrastructure

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Source: EMM (2020); DFSI (2017); GA (2011); Nearmap (2019); DPIE (2021)

0 1 2 km

GDA 1994 MGA Zone 56

N

Site location and zoning

Luddenham Quarry
Final Land Use Plan
Figure 1.1

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A previous version of this report (version 3, 4 June 2020) was provided as Appendix L to the *Luddenham Quarry Modification Report* (EMM 2020) as part of the MOD 5 application process. This updated version addresses the current conditions of approval (as modified).

As noted above, it is intended to infill the quarry void with unrecyclable construction and demolition waste as envisaged by the original Environmental Impact Statement (EIS) (Douglas Nicolaisen & Associates 2003) to allow agribusiness/commercial/industrial final land uses across the majority of the subject property. However, infilling the void is not currently approved and there is no legal obligation to infill the void.

Given that infilling is not currently approved, this report is based on leaving the void unfilled as a safe and non-polluting landform, the riparian corridor along Oaky Creek for biodiversity uses and the remainder of the site available development to agribusiness/commercial/industrial final land uses.

Luddenham Operations will implement this Final Land Use Plan as approved by the Planning Secretary.

1.3 Site overview and approvals history

The subject property is approximately 19 hectares (ha) and is primarily zoned Agribusiness, with Environment and Recreation zone along Oaky Creek, under the State Environmental Planning Policy (Western Sydney Aerotropolis) 2020 (the 'Aerotropolis SEPP').

The original Development Consent (DA No. 315-7-2003) for the quarry as was granted on 23 May 2004. The quarry is State significant development (SSD).

The consent has been modified four times (MOD 1–3 and MOD 5), with the fourth modification (MOD 4) withdrawn. The quarry has approval to extract and transport up to 300,000 tonnes per annum (tpa) of clay and shale product up to 31 December 2024.

1.4 Consultation

It is a requirement of the consent that this Final Land Use Plan is prepared in consultation with:

- Environment Protection Authority (EPA);
- Commonwealth Department of Infrastructure, Transport, Regional Development and Communities (DITRDC); and
- Western Sydney Airport Authority (WSA).

Agency correspondence is provided in Appendix A. Responses the matters raised are provided in Table 1.2.

Previous versions of this plan described Luddenham Operations intended final land uses for the subject site. In subsequent correspondence, DPIE have indicated that this plan is to only address approved final land uses. The plan has been amended accordingly.

Table 1.2 Agency comments

Agency comments	Responses
EPA	
The EPA responded that the EPA's role is to set environmental objectives for environmental management and not to be directly involved in the development of strategies to achieve those	This response is noted.

objectives. The EPA noted accordingly, that they would not be providing comments on the draft Final Land Use Plan.	
DITRDC	
There is very little detail at this stage as to how the potential risk of wildlife attraction will be mitigated and/or managed. A Wildlife Hazard Assessment should be conducted to identify potential risks and a 'live' Wildlife Management Plan, should be developed and reviewed regularly in line with growth of airport operations for ongoing effectiveness.	The Final Land Use Plan identifies the final land use of the site and method of treatment for the final void based on the proponent's plans for the site. In-filling the void has not been approved. A Modification Report that will be prepared as part of the application to fill the void will provide further details of the infilling method, potential impacts and management measures to be employed during the filling process. Section 2.3 outlines the management measures to minimise risks to surrounding land uses including the WSA and surrounding users. The trigger for preparing a wildlife management plan has been added to Section 2.3.2.
The Department also notes that a species survey has yet to be conducted for the subject site. Such a survey would confirm species that regularly or seasonally use the subject site for breeding/shelter purposes or visit as part of foraging activities. This survey information is an important tool in assessing whether the proposed development will impact on habitat and also informs the development of a Wildlife Hazard Assessment or Management Plan.	A Biodiversity Development Assessment Report (BDAR) was prepared to support the modification application to recommence quarrying operations. While the biodiversity assessment method (DPIE 2020) does not require recording of non-listed species, bird species observed during the targeted threatened flora and fauna were recorded. Bird species observed during the targeted threatened flora and fauna survey have been added to Section 2.3.2. This species list will be used to inform the wildlife hazard assessment carried out to inform the future modification application for infilling.
The LUP purports "little or no organic content" will be used, however, in the second paragraph on page 46 of the pdf states "garden waste, wood waste and vegetative waste will be chipped, mulched and converted to compost…". Depending on storage time, methods, etc, these types of waste may provide suitable habitats for insects and vermin, which in themselves are a potential food attractant for birds. They may also provide habitat for breeding and nesting.	This comment is in relation to the Concept Design and Filling Strategy (CDFS) (Insitu 2020) appended to the Final Land Use Plan. This comment is no longer relevant as this Final Land Use Plan is now based on leaving the void unfilled.
The forecast size of the void and/or the water management dam does not appear to be specified. If these are substantial areas the proposed netting mitigation might not be practicable.	The existing water management dam is approximately 80 m in length and a maximum of around 30 m in width, accordingly, netting mitigation of this water body is considered feasible. The void lake is shown in Figure 2.1.
Regarding the existing/proposed infrastructure on the subject site, there does not appear to be discussion about potential nesting/roosting risks or vermin habitat and associated mitigation.	The proposed ARRC has been designed to meet the relevant Western Sydney Aerotropolis Development Control Plan provisions. It will not introduce habitat for shelter or breeding on site. Wildlife management measures including measures to minimise nesting/roosting risks or prevent formation vermin habitat are provided in Section 2.3. Final agribusiness land uses such as logistic warehouses following the completion of infilling will be designed and assessed to meet relevant Aerotropolis provisions and design standards to manage wildlife risk through respective development consents.

Regarding the long-term management measures at section 3.1.3(iii) (page 21 of the pdf), while the LUP proposes to implement measures that will be common to all of the agribusiness/commercial/industrial sites, specific details of the proposed measures should be provided to determine if they are suitable in the context of WSI's long-term operations.	Final agribusiness/commercial/industrial land uses will be designed and assessed to meet relevant Aerotropolis provisions and design standards to manage wildlife risk through respective development consents. However, as the agribusiness/commercial/industrial land uses have not been approved they are not the subject of this plan.
Regarding 4.1.1 paragraph six, a better approach might be to undertake an assessment of the potential wildlife hazard risks for the activities outlined. A follow on to this would be the development of a Wildlife Management Plan encompassing all of the timeframes mentioned.	Wildlife management measures are presented in Section 2.3. It is agreed that if approval is not given to infill the quarry void, there is the potential for an ongoing wildlife hazard risk. A wildlife strike and birdstrike risk review has been provided in Appendix B. The trigger for preparing a wildlife management plan has been added to Section 2.3.2.
Regarding 4.1.2(ii) dot-point one, this information appears to contradict other related text within the document. If the deterrent refers to the netting, the size of the water body will influence if this is a suitable mitigation.	Netting is one of two options, the other being the installation of lines with flags (see Section 2.3.2). It is acknowledged that leaving the void open with a void lake has the potential to increase the wildlife risk. This is as inherent risk to the quarry operations as currently approved. The applicant therefore intends to lodge a modification application to fill the void.
Please note, putrescible items as a source of food is not the only issue in wildlife hazard management. Introduction of desirable habitat for shelter and breeding is also a risk.	Responses in relation to potential wildlife hazard risks of proposed future activities on site is provided above.
Regarding dot-point two of page 46 of the pdf, this appears to contradict the previous text. Also, is organic matter not considered putrescible?	This comment is no longer relevant as this Final Land Use Plan is now based on leaving the void unfilled.
The list of references at section 8 should make reference to the NASF Guidelines.	The reference list has been updated accordingly.
WSA	
The report has a significant emphasis on filling of the void, with limited information available on the final land uses contemplated at the site and the timing/ staging of development, or consideration of various different alternative outcomes to rehabilitate the site. Further information on the final land use outcomes alongside various different filling outcomes (i.e. filling with construction waste / filling with VENM ENM / not filling the void) would assist.	This comment is no longer relevant as this Final Land Use Plan is now based on leaving the void unfilled.
The report includes references that the future ARRC application needs to be approved. As far as WSA is aware, the original EIS did not contemplate the infilling of the quarry void with unrecyclable construction and demolition waste from such a facility. The original EIS noted there was uncertainty about the type and sourcing of filling materials due to the timeframe in which filling would occur. The proposed filling of the void with unrecyclable construction and demolition waste has only been proposed due to the recent application for the ARRC (and we note that this application is undetermined). It would be more appropriate to identify that approvals for filling the void would be subject to a future development consent.	This comment is no longer relevant as this Final Land Use Plan is now based on leaving the void unfilled.
This report should be updated following determination of the ARRC application, or drafted in such a manner that it does not rely on the ARRC application (i.e. with adequate contingencies that would allow the report to still be considered in the instance that the ARRC application is not approved, given the final land use concept would need to amended in this scenario).	This comment is no longer relevant as this Final Land Use Plan is now based on leaving the void unfilled.

Short, medium and long term risks in relation to WSA should be aligned with the growth of WSI under the Western Sydney Airport Plan, and analysed in a manner which is prescribed to the management of specific aviation safeguarding risks.	A risk assessment of environmental and rehabilitation issues is presented in Section 4.1 of the *Site Rehabilitation Management Plan* (VGT 2021). This includes risks to WSA and other surrounding land users. Details of environmental risk management are provided in Section 4.2 of the *Site Rehabilitation Management Plan* (VGT 2021).
Further information on the impacts of different filling approaches would assist (i.e. comparing impacts on timing of filling, net developable area, aviation safeguarding risks as a result of different rehabilitation strategies, etc). Further information should be provided relating to the potential settlement periods of different approaches, as well as the land management strategies which would be provided under each scenario.	This comment is no longer relevant as this Final Land Use Plan is now based on leaving the void unfilled.

2 Final land use

2.1 Final land use identification

The historical *Site Rehabilitation Plan* (Connacher Environmental Group 2009) and *Vegetation Management Plan* (UBM Ecological Consultants 2009) have been superseded by the *Site Rehabilitation Management Plan* (VGT 2021) and the *Biodiversity Management Plan* (EMM 2021), respectively. The *Biodiversity Management Plan* is provided in Appendix F of the *Site Rehabilitation Management Plan*.

The *Site Rehabilitation Management Plan* (VGT 2021) was approved by DPIE on 18 October 2021.

The final land uses will be consistent with the approved *Site Rehabilitation Management Plan* (VGT 2021):

- The part of the subject site containing the void will remain unfilled and will be left as a safe and non-polluting landform. The conceptual final landform for the void is shown in Figure 2.1. Water will accumulate in the void to a depth of around 10 m (ie 20 m below ground level).
- There will be no change to the land use in the biodiversity land use in the Oaky Creek riparian zone as prescribed in Condition 34 of the consent.
- The remainder of the site will left in a manner that allows the development of agribusiness/commercial/industrial final land uses.

2.2 Treatment methods

The treatment methods to achieve the final land uses are described in detail in the approved *Site Rehabilitation Management Plan* (VGT 2021).

2.3 Management measures to minimise risks to surrounding land uses

A risk assessment of environmental and rehabilitation issues is presented in Section 4.1 of the *Site Rehabilitation Management Plan* (VGT 2021). This includes risks to WSA and other surrounding land users.

Details of environmental risk management are provided in Section 4.2 of the *Site Rehabilitation Management Plan* (VGT 2021).

The management measures to minimise the short-, medium- and long-term risks to the construction and operation of the Western Sydney Airport and other surrounding land users are detailed in and Section 4.2.16 of based on the following timeframes:

- Short-term (now to December 2024): extraction of the quarry, construction of the airport and the start of the transition of other surrounding land-uses from residential/rural to agribusiness/commercial/industrial.
- Medium-term (January 2025 to about 2040): quarry rehabilitation, maintenance of the quarry void, completion of airport construction, airport operations and the continued transition of other surrounding land-uses from residential/rural to agribusiness/commercial/industrial.
- Long-term (from about 2041): maintenance of the quarry void, agribusiness/commercial/industrial use of the remainder of the site, airport operations and surrounding agribusiness/commercial/industrial land-uses.

2.3.1 Short-term management measures

The short-term management measures that will be implemented during the extraction of the quarry are summarised in the mitigation measures provided in Appendix D of the Luddenham Quarry, DA 315-7-2003 MOD5 Modification Report (EMM 2020a) as reproduced in Table 2.1 below. It is noted that the quarry will cease extraction in December 2024 prior to the commencement of WSA operations.

Table 2.1 Management and mitigation measures

Aspect	Measures
Air quality	Preparation and implementation of an air quality management plan, prepared following approval for the reactivation of the quarry, and including the below management and mitigation measures
	Water cart to operate on the internal unsealed haulage routes and sealing of the access road between Adams Road and the weighbridge
	Minimising drop heights when unloading from trucks
	Watering applied to the crushing plant as required to minimised dust emissions
	Sheltering factor applied for wind erosion within the established pit
	Avoiding the double handling of material wherever possible
	Site-wide vehicle speed limits will be applied (40 km/h limit on sealed and 20 km/h limit on unsealed roads);
	Avoiding disturbance of stabilised ground cover where possible
	Use of meteorological forecasts to predict when the risk of dust emissions may be high (due to adverse wind conditions), allowing procedures and preparatory measures to be implemented, as follows: • aim to have surfaces moist prior to the on-set of hot and windy conditions; • plan for additional water spraying during the day; • cease certain activities or reduce activity levels; and • re-schedule deliveries or product dispatch.
Noise	Construction – work practice methods:
	Noise monitoring during the initial stages of construction will be undertaken to determine if actual construction noise levels are above NMLs. Construction noise levels will be managed where exceedances of NMLs may occur as detailed in a construction noise management plan.
	• regular reinforcement of the need to minimise noise and vibration, such as through toolbox talks;
	• review and implementation of feasible and reasonable mitigation measures that reduce construction noise levels;
	• avoiding the use of portable radios, public address systems or other methods of site communication that may unnecessarily impact upon nearby residents;
	• develop routes for the delivery of materials and parking of vehicles to minimise noise;
	• where possible, avoid the use of equipment that generates impulsive noise; and
	• notify residents prior to the commencement of intensive works.
	Construction – plant and equipment:
	• where possible, choose quieter plant and equipment based on the optimal power and size to most efficiently perform he required tasks;
	• operate plant and equipment in the quietest and most efficient manner; and

Table 2.1 Management and mitigation measures

Aspect	Measures
	• regularly inspect and maintain plant and equipment to minimise noise and vibration level increases, to ensure that all noise and vibration reduction devices are operating effectively.
	The safe working distances for cosmetic damage from vibrations will be monitored throughout the construction process. If safe working distances need to be encroached, real time vibration monitoring with audible and visual alarms will be installed at vibration sensitive structures so actual vibration levels can be monitored and managed appropriately in real-time.
	Operation
	The quarry will be operated generally in accordance with the quarry as previously assessed and approved including: • hours of operation; • traffic movements (with a small increase); and • existing noise bunds. Following approval of the proposed modification, the quarry's noise management plan will be reviewed and updated if necessary.
Surface water	Following approval of the proposed modification, the water management plan for the site will be updated to include the new water management strategy for the quarry and to address any specific development consent or licence conditions. It will also include the following: • baseline monitoring data results; • objectives and performance criteria including trigger levels for investigating any potential adverse impacts associated with water management; • details of the monitoring, inspection and maintenance programs; • reporting procedures for the results of the monitoring program; and • plans to respond to any exceedances of the performance criteria.
	• Surface water quality monitoring will continue within Oaky Creek, upstream and downstream of the site, and within the quarry pit and Water Management Dam.
	All monitoring will be undertaken in accordance with Approved Methods for Sampling and Analysis of Water Pollutants in New South Wales (DEC 2004).
	Inspections of the water management system will be undertaken informally on a regular basis and formally on a quarterly basis. The water management structures will be visually inspected for capacity, structural integrity and effectiveness. Maintenance, such as the removal of excessive sediment accumulation or macrophyte growth from the Water Management Dam and drainage lines, will be implemented as required.
Groundwater	No additional groundwater mitigation measures are required as a result of the proposed modification. The quarry's water management plan will be updated to include the new water management strategy for the site and to address any specific development consent or licence conditions.
Land and soil	Existing management plans (including the site water management plan and relevant subplans including erosion and sediment control plan required under Condition 24 of the consent will also be updated to account for the proposed modification.
Traffic and transport	The northern section of Adams Road, between the subject property access road and Elizabeth Drive, will be upgraded by the applicant so that the pavement is suitable for use by heavy vehicles, up to B-doubles, and so that the lane and shoulder widths meet Austroads Guidelines. Upgrades to the northern section of Adams Road will include upgrades to the Adams Road/site access road intersection and the Elizabeth Drive/Adams Road intersection so that it is suitable for B-doubles.

Table 2.1 Management and mitigation measures

Aspect	Measures
	Quarry trucks will only travel on the section of Adams Road between Elizabeth Drive and the site access road. No quarry trucks will travel on Adams Road south of the quarry access road.
	The Road Transport Protocol, required by Schedule 4, Condition 42 of the consent, will be revised to reflect site access changes and new infrastructure layout.
	Existing quarry roads will be used. These tracks may receive improvements but will not encroach on areas of native vegetation.
Biodiversity	The proposed mitigation measures to mitigate indirect impacts to the biodiversity values on site will include: • operations will be carried out in accordance with the vegetation management plan which will be revised prior to the restart of quarrying operations; • a speed limit of 40 kilometres per hour (km/h) will apply on the sealed site access road and 20 km/h on unsealed internal roads; and • roads will regularly be maintained by managing vegetation on the shoulder to main visibility to prevent vehicle strike.
Rehabilitation	The Site Rehabilitation Plan (Connacher Environmental Group 2009) will be updated to include the changes relevant to the proposed modification and subsequently implemented in accordance with Schedule 4 Condition 33 of the consent.
Visual	The site vegetation management plan will be updated prior the restart of quarrying operations. This update will consider opportunities for further vegetation screening.
Heritage	The following mitigation measures will be applied: • AHIMS site #45-5-2280 will continue to be avoided and protected by fencing. • The corrected coordinates for AHIMS site #45-5-2280 will be entered in the AHIMS database. • The riparian corridor along the western bank of Oaky Creek will continue to be avoided by quarrying activities. • The work will proceed with caution and the following actions will be taken in accordance with the AHDD recommendations: – In the event that unexpected Aboriginal objects, sites or places are discovered, DPIE will be notified as soon as practicable after they are first identified. – In the event that known or suspected human skeletal remains are encountered, the following procedure will be followed: ▪ the immediate vicinity will be secured to protect the find and the find will be immediately reported to the work supervisor who will immediately advise the site supervisor or other nominated senior staff member; ▪ the environmental manager or other nominated senior staff member will notify the police and the state coroner on the same day of the find (as required for all human remains discoveries); ▪ the environmental manager or other nominated senior staff member will contact DPIE for advice on identification of the skeletal material as Aboriginal and if so, management of the material; ▪ if it is determined that the skeletal material is ancestral Aboriginal remains, the Aboriginal community will be contacted, and consultative arrangements will be made to discuss ongoing care of the remains; ▪ the site will be recorded in accordance with the NPW Act and DPIE guidelines; and ▪ if the remains are historical and not of Aboriginal origin, the Heritage Division of DPIE will be notified for further instruction.
Hazards	Oils and lubricants and any other hazardous materials (eg cleaning products) will be stored in designated bunded areas in accordance with the following Australian Standards:

Table 2.1 Management and mitigation measures

Aspect	Measures
	• Australian Standard 1940: 2004 The Storage and Handling of Flammable and Combustible Liquids; and • Australian Standard 1596: 2008 The Storage and Handling of LP Gas. Site management processes will periodically review conformance with these controls and standards.
Waste	To encourage the efficient use of resources and reduce potential environmental impacts from the quarry, all waste will be managed in accordance with the waste hierarchy: • reduce waste production; • recover resources; and • dispose of waste appropriately. General waste management measures on site will include: • working with suppliers to reduce overall packaging as much as possible; • storing cardboard packaging and recyclable containers until collection by a licensed recycling contractor, or dispatch to an appropriately licensed facility; and • storing general waste in vermin proof bins until a scheduled collection from a licensed contractor. General waste management measures on site will include: • working with suppliers to reduce overall packaging as much as possible; • storing cardboard packaging and recyclable containers until collection by a licensed recycling contractor or dispatch to an appropriately licensed facility; and • storage of general waste in vermin proof bins until a scheduled collection from a licensed contractor.

2.3.2 Medium-term management measures

i General

The following management measures will be implemented during the rehabilitation of the quarry void following the completion of extraction in December 2024 and following the completion of rehabilitation to minimise impacts on WSA and other surrounding land users:

- implementation of wildlife management measures (detailed below);
- dust emissions will be minimised though the stabilisation of finished faces;
- final slopes will be stabilised, as advised by a geotechnical engineer, and may include hydro-mulches, spray emulsions or other appropriate methods;
- soil testing will be carried out and soil ameliorants added if required to provide a suitable growth medium for revegetation with pasture species;
- following stabilisation of the void walls, the void will be fenced for the safety of the public who may be accessing future agribusiness/commercial/industrial development on other areas of the subject property;
- no equipment will be used that infringes on WSA's Prescribed Airspace which is approximately 110 m to 125.5 m AHD at the subject property; and
- regular inspections/monitoring to ensure that the void remains safe, stable and non-polluting.

ii Wildlife

The following bird species were observed during biodiversity surveys undertaken as for the Biodiversity Development Assessment Report:

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

A wildlife strike and birdstrike risk review has been prepared and is provided in Appendix B.

If infilling the quarry void is not approved, there is the potential for an ongoing wildlife hazard risk to WSA operations. The following management measures will be implemented to reduce the risk to associated with the void and surrounding area:

- bird deterrents will be used to seek to deter birds from using the water accumulating in the quarry void and the Water Management Dam;
- no new planting (eg for landscaping) will occur on the site that produces fruit or flowers that are likely to attract birds and wildlife;
- the existing water management dam and decommissioned sediment dam will be netted or have lines across it with moving flags to deter birds prior to the commencement of WSA operations;
- structures, fencing and lighting will minimise areas for wildlife, especially birds, to use for breeding, roosting, or perching. This will include: no eaves or ensuring no access to the roof cavity through the eaves; and using 'bird-spikes' on roof edges, fences and lighting;

- waste bins that contain food waste (eg from staff lunches) will be made inaccessible to birds and vermin; and
- should birds or other wildlife start using the site in numbers of concern, specialists will be engaged to survey/monitor the species utilising the site to remedy the situation.

The frequency that birds use the site, in particular the water in the void, will be observed over the first 12 months of re-activated quarry operations. At the end of this period, it will be determined, in consultation with an appropriately qualified biologist, whether the site is used more frequently by birds than the surrounding areas and dams. If the site is used more frequently by birds than surrounding areas, a wildlife management plan will be prepared as part in accordance with the NASF Guideline C: Managing the Risk of Wildlife Strikes in the Vicinity of Airports as part of the modification application to infill the void.

With the exception of the generation of very small quantities of food waste from quarry workers' lunches, which will be placed in inaccessible to birds and vermin, no quarrying activities have the potential to attract vermin.

2.3.3 Long-term management measures

The medium-term management measures described above may need to be implemented in the long-term if the void (and associated water) pose a risk to airport operations.

2.4 Contingency measures

A Trigger Action Response Plan (TARP) identifying proposed contingency strategies in the event of unexpected variations in rehabilitation outcomes is provided in Section 10.1 of the *Site Rehabilitation Management Plan* (VGT 2021).

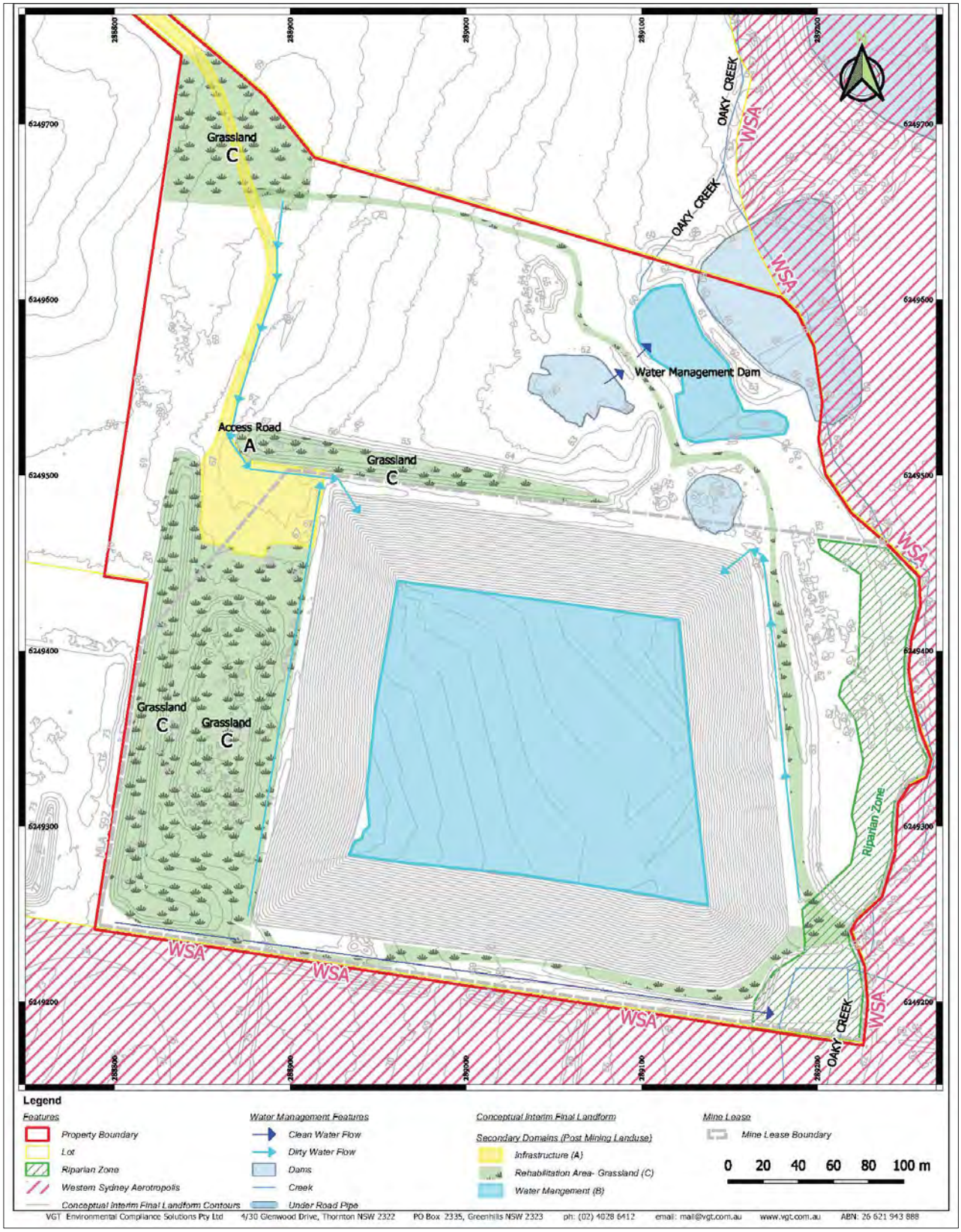

Figure 2.1 Final landform

3 Summary of changes to final land use strategy

A summary of the changes in rehabilitation and closure objectives, and proposed final land uses, for the Luddenham Quarry site are presented in Table 3.1.

Table 3.1 Summary of changes to final land use strategy

Aspect/objective	2003 EIS	2009 SRP	2009 VMP	Updated strategy (this Report)
Proposed final land use	• Rural/pasture • Biodiversity (Oaky Creek)	• Rural/pasture • Biodiversity (Oaky Creek)	• Biodiversity (Oaky Creek)	• Unfilled void left as a safe and non-polluting landform • Biodiversity (within Environment and Recreation zone) • Agribusiness/commercial /industrial (within remaining Agribusiness Zone)
Void treatment	• Backfill with inert material (Inert Waste Class 2)	• Leave as void (including re-contouring and stabilisation of void batters)	• N/A	• Unfilled void left as a safe and non-polluting landform
Overburden stockpiles	• Use in void backfill (final capping of deposited backfill material)	• Use to re-contour void batters	• N/A	• Overburden stockpiles will be used to batter void slopes and to rehabilitate the site
Noise bunds	• Fate of noise bunds not stated in EIS	• Fate of noise bunds not specifically defined in 2009 SRP other than re-use as “backfill material and topsoil material for revegetation”.	• Grassed – no further action	• Overburden and topsoil material stored in the northern and western bunds will be used to batter void slopes and to rehabilitate the site

4 Review and reporting

4.1 Plan review

This Final Land Use Plan will be reviewed, and if necessary revised to the satisfaction of the Secretary, within 3 months of a modification to DA 315-7-2004 or following the submission of an:

- annual review:
- incident report; or
- audit report

Revisions to this Final Land Use Plan will be distributed to the relevant internal and external stakeholders.

As required under Schedule 6 Condition 10, if necessary, to either improve the environmental performance of the quarry, cater for a future modification or comply with a direction, this EMS and supporting management plans will be revised, and submitted to DPIE for approval within 6 weeks of the review.

4.2 Reporting

Progress of rehabilitation activities towards meeting this Final Land Use Plan will be reported in the Annual Report which will be available on the project website.

References

Connacher Environmental Group 2009, *Site Rehabilitation Plan: Clay/Shale Quarry, Adams Road Luddenham*, prepared for Blue Sky Mining Pty Ltd by Connacher Environmental Group.

Douglas Nicolaisen & Associates 2003, *Environmental Impact Statement: Proposed Clay/Shale Extraction Operation, Lot 3 – 275 Adams Rd Luddenham NSW*. Prepared for Badger Mining Company Pty Ltd by Douglas Nicolaisen & Associates Pty Ltd.

DITRDC undated, *National Airports Safeguarding Framework - Principles and Guidelines*. Department of Infrastructure, Transport, Regional Development and Communications.

DPIE 2020, *Biodiversity Assessment Method*, NSW Department of Planning, Industry and Environment, Sydney.

EMM 2020, *Luddenham Quarry, DA 315-7-2003 MOD5 Modification Report*. Prepared for Coombes Property Group and KLF Holdings Pty Ltd by EMM Consulting Pty Limited.

EMM 2021, *Luddenham Quarry, Biodiversity Management Plan*. Prepared for Coombes Property Group and KLF Holdings Pty Ltd by EMM Consulting Pty Limited.

UBM Ecological Consultants 2009, *Vegetation Management Plan for a Clay Shale Quarry, Adams Road, Luddenham.* Prepared for Blue Sky Mining Pty Ltd by UBM Ecological Consultants Pty Ltd.

VGT 2021, Luddenham Quarry *Site Rehabilitation Management Plan.* Prepared for Luddenham Operations.

Appendix A

Agency correspondence

Janet Krick

From: Kieran Henry <Kieran.Henry@epa.nsw.gov.au>
Sent: Wednesday, 28 July 2021 2:33 PM
To: Janet Krick
Cc: Phil Towler
Subject: RE: Luddenham Quarry - DA 315-7-2003 - Management Plans

Hi Janet,

The EPA's position on post approval management plans (including the NMP, AQMP and SWMP) is to encourage the development of such plans to ensure that proponents have determined how they will meet their statutory obligations and designated environmental objectives.

However, we do not approve or endorse these documents as our role is to set environmental objectives for environmental management and not to be directly involved in the development of strategies to achieve those objectives. Therefore we will not be providing comments on the NMP, AQMP and SWMP.

These documents are important for our decision making, such as with the licence application, and ensure compliance with s45 of the POEO Act and to support those decisions.

I expect to send a draft EPL to Luddenham Operations Pty Ltd by the end of the week.

Regards,

Kieran

From: Janet Krick <jkrick@emmconsulting.com.au>
Sent: Wednesday, 28 July 2021 7:58 AM
To: Kieran Henry <Kieran.Henry@epa.nsw.gov.au>
Cc: Phil Towler <ptowler@emmconsulting.com.au>
Subject: RE: Luddenham Quarry - DA 315-7-2003 - Management Plans

Good morning Kieran,

Following up on my email below – are you able to provide an update on when we may expect EPA's comments on the draft management plans and status of the EPL application?

Many thanks

Janet Krick
Associate Environmental Planner

T 02 4907 4811
M 0456 664 212
www.emmconsulting.com.au

From: Janet Krick
Sent: Wednesday, 14 July 2021 2:39 PM
To: Kieran Henry <Kieran.Henry@epa.nsw.gov.au>

Cc: Phil Towler <ptowler@emmconsulting.com.au>
Subject: RE: Luddenham Quarry - DA 315-7-2003 - Management Plans

Hi Kieran,

Thank you very much for your update below. Have there been any further developments in the last week?

Please let me know if there is anything we can do at our end to assist.

Thanks again

Janet Krick
Associate Environmental Planner

T 02 4907 4811
M 0456 664 212
www.emmconsulting.com.au

From: Kieran Henry <Kieran.Henry@epa.nsw.gov.au>
Sent: Monday, 5 July 2021 1:59 PM
To: Janet Krick <jkrick@emmconsulting.com.au>
Cc: Phil Towler <ptowler@emmconsulting.com.au>
Subject: RE: Luddenham Quarry - DA 315-7-2003 - Management Plans

Hi Janet,

Confirming that I have been able to access these plans, thanks for sending them through.

We are in the process of reviewing the supporting documents as part of our assessment of the licence application by Luddenham Operations Pty Ltd. Once our review is complete I will be able to update you.

Regards,

Kieran

From: Janet Krick <jkrick@emmconsulting.com.au>
Sent: Friday, 2 July 2021 11:13 AM
To: Kieran Henry <Kieran.Henry@epa.nsw.gov.au>
Cc: Phil Towler <ptowler@emmconsulting.com.au>
Subject: RE: Luddenham Quarry - DA 315-7-2003 - Management Plans

Thanks Kieren,

Further to the management plans sent through on Monday, the draft Mining Operations Plan/Site Rehabilitation Management Plan inclusive of the Biodiversity Management Plan as well as the Final Land-use Plan are now ready for your review and comment. I've shared to the OneDrive link below.

Luddenham Quarry

Please let me know if you have any issues accessing.

Also following up on the EPL application for the site submitted via email to poeo.licensing@epa.nsw.gov.au on Friday June 4 2021 by Harry Scarlis – Director of Luddenham Operations Pty Ltd. Are you able to provide any update regarding the progress of this application?

Janet Krick
Associate Environmental Planner

T 02 4907 4811
M 0456 664 212
www.emmconsulting.com.au

From: Kieran Henry <Kieran.Henry@epa.nsw.gov.au>
Sent: Monday, 28 June 2021 1:15 PM
To: Janet Krick <jkrick@emmconsulting.com.au>
Subject: RE: Luddenham Quarry - DA 315-7-2003 - Management Plans

Thanks Janet, I've received all the management plans and will begin reviewing.

Regards,

Kieran

From: Janet Krick <jkrick@emmconsulting.com.au>
Sent: Monday, 28 June 2021 10:24 AM
To: Kieran Henry <Kieran.Henry@epa.nsw.gov.au>
Subject: RE: Luddenham Quarry - DA 315-7-2003 - Management Plans

Hi Kieran,

I've sent the SWMP through however it is 11MB in size. Please let me know if it doesn't arrive.

Thanks again

Janet Krick
Associate Environmental Planner

T 02 4907 4811
M 0456 664 212
www.emmconsulting.com.au

From: Kieran Henry <Kieran.Henry@epa.nsw.gov.au>
Sent: Monday, 28 June 2021 10:11 AM
To: Janet Krick <jkrick@emmconsulting.com.au>
Cc: INFOEnvironment <info@environment.nsw.gov.au>; Phil Towler <ptowler@emmconsulting.com.au>
Subject: RE: Luddenham Quarry - DA 315-7-2003 - Management Plans

Hi Janet,

Thanks for your email.

Unfortunately I'm unable to access the files in the below link, are you able to send the plans via Dropbox?

Regards,

Kieran Henry
Operations Officer
Regulatory Operations Metropolitan
NSW Environment Protection Authority
D 02 8837 6000

www.epa.nsw.gov.au @NSW_EPA

The EPA acknowledges the traditional custodians of the land and waters where we work. As part of the world's oldest surviving culture, we pay our respect to Aboriginal elders past, present and emerging.

Report pollution and environmental incidents 131 555 or +61 2 9995 5555

From: Janet Krick <jkrick@emmconsulting.com.au>
Sent: Monday, 28 June 2021 8:25 AM
To: Kieran Henry <Kieran.Henry@epa.nsw.gov.au>
Cc: INFOEnvironment <info@environment.nsw.gov.au>; Phil Towler <ptowler@emmconsulting.com.au>
Subject: Luddenham Quarry - DA 315-7-2003 - Management Plans

Good Morning Kieran,

As you may be aware, Modification 5 (MOD 5) of DA 315-7-2003 to allow for the reactivation of quarrying at Luddenham Quarry was approved on 24 May 2021.

As part of the revised conditions of consent (CoC), Luddenham Operations Pty Ltd (Luddenham Operations), a joint venture between Coombes Property Group and KLF Recycling must prepare updated management plans prior to the recommencement of quarrying operations. The CoC require the following management plans to be prepared in consultation with the EPA:

- Air Quality Management Plan (AQMP);
- Noise Management Plan (NMP);
- Soil and Water Management Plan (SWMP);
- Biodiversity Management Plan;
- Site Rehabilitation Management Plan; and
- Final Land use plan.

Accordingly please find link below to AQMP, NMP and SWMP for your review and comment. The remaining plans will be forwarded for comment in the near future. Any comments would be appreciated by 12 July 2021. Please do not hesitate to give me a call with any questions/comments you may have.

https://spaces.hightail.com/receive/TwCs21uVFF

Many thanks in advance

Janet Krick
Associate Environmental Planner

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M 0456 664 212
D 02 4907 4811
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Please note my working days are Monday to Thursday

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PLEASE CONSIDER THE ENVIRONMENT BEFORE PRINTING THIS EMAIL

Janet Krick

From: Kirk Osborne <kosborne@wsaco.com.au>
Sent: Friday, 16 July 2021 7:22 PM
To: Janet Krick
Cc: Tim Smith; Scott Ifield
Subject: [SEC=OFFICIAL] RE: Luddenham Quarry - draft management plans for comment

Follow Up Flag: FollowUp
Flag Status: Completed

OFFICIAL

Janet

Thank you for providing the plans to WSA to review and comment.

We note the following general comments in relation to the Final Land Use Plan:

- The report has a significant emphasis on filling of the void, with limited information available on the final land uses contemplated at the site and the timing/ staging of development, or consideration of various different alternative outcomes to rehabilitate the site. Further information on the final land use outcomes alongside various different filling outcomes (i.e. filling with construction waste / filling with VENM ENM / not filling the void) would assist.
- The report includes references that the future ARRC application needs to be approved. As far as WSA is aware, the original EIS did not contemplate the infilling of the quarry void with unrecyclable construction and demolition waste from such a facility. The original EIS noted there was uncertainty about the type and sourcing of filling materials due to the timeframe in which filling would occur. The proposed filling of the void with unrecyclable construction and demolition waste has only been proposed due to the recent application for the ARRC (and we note that this application is undetermined).
- It would be more appropriate to identify that approvals for filling the void would be subject to a future development consent.
- This report should be updated following determination of the ARRC application, or drafted in such a manner that it does not rely on the ARRC application (i.e. with adequate contingencies that would allow the report to still be considered in the instance that the ARRC application is not approved, given the final land use concept would need to amended in this scenario).
- As discussed in the Mine Operation and Site Rehabilitation Management Plan comments below, short, medium and long term risks in relation to WSA should be aligned with the growth of WSI under the Western Sydney Airport Plan, and analysed in a manner which is prescribed to the management of specific aviation safeguarding risks. See below comments in relation to this matter (under Section 4.1.1.6 of the Mine Operation and Site Rehabilitation Management Plan comments).
- Further information on the impacts of different filling approaches would assist (i.e. comparing impacts on timing of filling, net developable area, aviation safeguarding risks as a result of different rehabilitation strategies, etc).
- Further information should be provided relating to the potential settlement periods of different approaches, as well as the land management strategies which would be provided under each scenario.

Mine Operation and Site Rehabilitation Management Plan

- **Section 3.3.6** – this should reference Condition 40 of the Mod 5 Quarry approval, noting the maximum length of heavy vehicles allowed and the restriction on movements at the intersection of Elizabeth Drive and Adams Road.

- **Section 3.3.11** – Additional measures here are to include wildlife mitigation measures associated with the risk to WSI.
- **Page 21** – Minor typo – *"while WSA is still under construction"*.
- **Section 4.2.2.2,** First bullet point – Given the reference on 3.3.11 that *"progressive rehabilitation opportunities are limited until the resource is exhausted"*, the first point here should be explored further detailing the situations in which progressive rehabilitation would be able to occur.
- **Section 4.2.13** – Note that in addition to the waste management measures here, measures to specifically reduce waste management risk to WSA (i.e. wildlife management) measures should be included here as well. This section should include an additional subheading to this effect.
- **Section 4.2.16** – Note that the risks identified here in relation to WSA are insufficient in analysis depth or detail. The risks here need to be:
    - identified in accordance with the short, medium and long term growth of WSI, as prescribed by the Western Sydney Airport Plan;
    - analysed in accordance with the aviation safeguarding risks identified under the *National Airports Safeguarding Framework* (National Airports Safeguarding Framework Principles and Guidelines (infrastructure.gov.au)); and
    - communicated in this plan such that specific risks are aligned to specific mitigation measures.

Whilst we have reviewed the plans, this should not be considered as an endorsement of the plans as currently drafted.

If you would like to discuss the above comments please call or email.

Regards

Kirk Osborne
Executive Manager, Land Use Planning and Approvals

+61 424 081 638
kosborne@wsaco.com.au
PO Box 397 Liverpool NSW 1871

Western Sydney Airport

OFFICIAL

From: Janet Krick <jkrick@emmconsulting.com.au>
Sent: Friday, 2 July 2021 11:25 AM
To: Kirk Osborne <kosborne@wsaco.com.au>
Cc: Phil Towler <ptowler@emmconsulting.com.au>; John Scarlis <john@klfholdings.com.au>; Pascal Bobillier <pascal@coombesgroup.com.au>; Michael Coombes <michael@coombesgroup.com.au>
Subject: Luddenham Quarry - draft management plans for comment

Good Morning Kirk,

As you may be aware, Modification 5 (MOD 5) of DA 315-7-2003 to allow for the reactivation of quarrying at Luddenham Quarry was approved on 24 May 2021.

As part of the revised conditions of consent (CoC), Luddenham Operations Pty Ltd (Luddenham Operations), a joint venture between Coombes Property Group and KLF Recycling must prepare updated management plans prior to the recommencement of quarrying operations. The CoC require the following management plans to be prepared in

consultation with the EPA, Western Sydney Airport (WSA) and Department of Infrastructure, Transport, Regional Development and Cities (DITRDC).

- Site Rehabilitation Plan inclusive of a Biodiversity Management Plan (this plan has been prepared in conjunction with the Mining Operation Plan)
- Final Land Use Plan – an earlier version of this plan was appended to the MOD 5 Modification Report. The plan has now been updated to reflect the revised CoC

Accordingly please find link below to the above draft plans for your review and comment. Any comments would be appreciated by 16 July 2021. Please do not hesitate to give me a call with any questions/comments you may have or if you have any issues accessing the draft plans.

Luddenham Quarry

Many thanks in advance

Janet Krick
Associate Environmental Planner
EMM creating opportunities
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Please note my working days are Monday to Thursday

Janet Krick

From: SMITH Mike <Mike.Smith@infrastructure.gov.au>
Sent: Monday, 2 August 2021 10:03 AM
To: Janet Krick
Cc: Phil Towler; John Scarlis; michael@coombesgroup.com.au; Pascal Bobillier; DANIEL Grace; Kirk Osborne
Subject: Luddenham Quarry - draft management plans for comment [SEC=OFFICIAL]

Hi Janet

Thank you for your email of 2 July 2021 seeking comments from the Department of Infrastructure, Transport, Regional Development and Communications (the Department) on the *Mine Operation Plan and Site Rehabilitation Plan* and *Land Use Plan* for DA 315-7-2003 Modification 5 (Mod 5) conditions of consent for the Luddenham Quarry located at 275 Adams Road, Luddenham NSW (subject site), adjacent to the Western Sydney International (Nancy-Bird Walton) Airport (the Airport) boundary. I apologise for the delay in responding. The Department's comments are included below.

Site Rehabilitation Plan
I note your email specifies the Site Rehabilitation Plan (SRP) inclusive of a Biodiversity Management Plan (BMP) has been prepared in conjunction with the Mining Operation Plan. However, a BMP was not included in the documents provided for consultation with the Department.

Schedule 4 condition 33 of the conditions of consent for Mod 5 specifies that the SRP must include a BMP and schedule 4 condition 34(i) specifies that the BMP must include measures for minimising the attraction of wildlife, in consultation with the Department and WSA. The Department reiterates the need for information on, and comprehensive assessment of, the risks of wildlife attraction as a result of the quarry, quarrying operations, waste being disposed into the quarry at the subject site, and the cumulative impact of the subject site alongside other wildlife-attracting land uses that are located within the vicinity of the subject site. This information and assessment, in accordance with the National Airports Safeguarding Framework's (NASF) Guideline C, is necessary to inform consideration and appropriate application of wildlife mitigation and/or management measures.

While some information regarding mitigation and/or management of wildlife attraction risks have been included in the Land Use Plan (LUP) and SRP, in the absence of a comprehensive analysis of the risks, it remains unclear whether the proposed measures are suitable and would safeguard the long-term operations of the airport. Therefore, the Department requests this information and assessment be provided to ourselves and WSA.

Further information on NASF Guideline C is available via https://www.infrastructure.gov.au/aviation/environmental/airport_safeguarding/nasf/nasf_principles_guidelines.aspx.

Land Use Plan
As set out above, there is very little detail at this stage as to how the potential risk of wildlife attraction will be mitigated and/or managed. A Wildlife Hazard Assessment should be conducted to identify potential risks and a 'live' Wildlife Management Plan, should be developed and reviewed regularly in line with growth of airport operations for ongoing effectiveness.

The Department also notes that a species survey has yet to be conducted for the subject site. Such a survey would confirm species that regularly or seasonally use the subject site for breeding/shelter purposes or visit as part of foraging activities. This survey information is an important tool in assessing whether the proposed development will impact on habitat and also informs the development of a Wildlife Hazard Assessment or Management Plan.

The LUP purports "little or no organic content" will be used, however, in the second paragraph on page 46 of the pdf states "garden waste, wood waste and vegetative waste will be chipped, mulched and converted to compost…". Depending on storage time, methods, etc, these types of waste may provide suitable habitats for insects and vermin, which in themselves are a potential food attractant for birds. They may also provide habitat for breeding and nesting.

Additional comments on the LUP

- The forecast size of the void and/or the water management dam does not appear to be specified. If these are substantial areas the proposed netting mitigation might not be practicable.
- Regarding the existing/proposed infrastructure on the subject site, there does not appear to be discussion about potential nesting/roosting risks or vermin habitat and associated mitigation.
- Regarding the long-term management measures at section 3.1.3(iii) (page 21 of the pdf), while the LUP proposes to implement measures that will be common to all of the agribusiness/commercial/industrial sites, specific details of the proposed measures should be provided to determine if they are suitable in the context of WSI's long-term operations.
- Regarding 4.1.1 paragraph six, a better approach might be to undertake an assessment of the potential wildlife hazard risks for the activities outlined. A follow on to this would be the development of a Wildlife Management Plan encompassing all of the timeframes mentioned.
- Regarding 4.1.2(ii) dot-point one, this information appears to contradict other related text within the document. If the deterrent refers to the netting, the size of the water body will influence if this is a suitable mitigation.
- Please note, putrescible items as a source of food is not the only issue in wildlife hazard management. Introduction of desirable habitat for shelter and breeding is also a risk.
- Regarding dot-point two of page 46 of the pdf, this appears to contradict the previous text. Also, is organic matter not considered putrescible?
- The list of references at section 8 should make reference to the NASF Guidelines.

Other

The plans appear to be reliant on the approval of the infilling of the quarry void that is subject to a future and separate development application and the approval of the Luddenham Advanced Resource Recovery Centre (ARRC) (SSD-10446) that is currently under consideration by the NSW Department of Planning, Industry and Environment. The plans also include a number of references that the SSD application for the ARRC 'needs to be approved'. Noting that the ARRC is a separate application that has yet to be finalised and the infilling of the quarry void is subject to a future and separate application, the Department considers it would be more appropriate for the SRP and LUP to be prepared in a manner that is independent of the outcomes of these applications.

In addition to the above, the Department is informed that WSA has also provided comments on the SRP and LUP. The Department recommends that all items raised by WSA be addressed and that the Proponent continue to consult with WSA where appropriate.

Thank you for the opportunity to provide comments on the SRP and LUP. If you require any further information, please contact me via the details below.

Cheers,
Mike

Mike Smith
Director • Environment Policy Section/Western Sydney Airport Regulatory Policy Branch • International Aviation, Technology and Services Division
mike.smith@infrastructure.gov.au
P +61 2 6274 6566 • **M** +61 448 590 477
GPO Box 594 Canberra, ACT 2601

Department of Infrastructure, Transport, Regional Development and Communications
CONNECTING AUSTRALIANS • ENRICHING COMMUNITIES • EMPOWERING REGIONS

infrastructure.gov.au

I would like to acknowledge the traditional custodians of this land on which we meet, work and live.
I recognise and respect their continuing connection to the land, waters and communities.
I pay my respects to Elders past and present and to all Aboriginal and Torres Strait Islanders.

Appendix B

Wildlife strike and birdstrike risk review

Level 1, 87 Wickham Terrace
Spring Hill QLD 4000

T 07 3648 1200
E info@emmconsulting.com.au

www.emmconsulting.com.au

15 June 2020

Michael Coombes
Director
Coombes Property Group
sent by email

Re: Luddenham Quarry - Wildlife strike and Birdstrike Risk Review

Dear Sirs,

1 Background

CFT No 13 Pty Ltd, a member of Coombes Property Group (CPG), has recently acquired 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). CPG has the following staged vision for the long-term development of the subject property:

- Stage 1 Quarry Reactivation: Solving a problem. CPG intends to responsibly avoid the sterilisation of the remaining natural resource by completing the extraction of shale which is important to the local construction industry as raw material used by brick manufacturers in Western Sydney. Following the completion of approved extraction activities, the void will be prepared for rehabilitation.

- Stage 2 Advanced Resource Recovery Centre (ARRC) and Quarry Rehabilitation: A smart way to fill the void: CPG in partnership with KLF Holdings Pty Ltd (KLF) and in collaboration with the circular economy industry and the material science research sector, intends to establish a technology-led approach to resource recovery, management, and reuse of Western Sydney's construction waste, and repurposing those materials that cannot be recovered for use to rehabilitate (ie fill) the quarry void. This will provide a sustainable and economically viable method of rehabilitating the void for development.

- Stage 3 High Value Employment Generating Development: Transform the land to deliver high value agribusiness jobs. CPG intends to develop the rehabilitated quarry site into a sustainable and high-tech agribusiness hub supporting food production, processing, freight transport, warehousing, and distribution, whilst continuing to invest in the resource recovery research and development (R&D) initiatives. This will deliver the vision of a technology-led agribusiness precinct as part of the Aerotropolis that balances its valuable assets including proximity to the future Western Sydney Airport (WSA) and Outer Sydney Orbital.

This Wildlife Strike and Birdstrike Risk Review informs the Aeronautical Impact Assessment relating to the establishment of the ARRC in Stage 2 described above.

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.

2 Purpose and context of this letter

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 (Australian Airports Association,2016):

- 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, 120 aircraft have been destroyed due to birdstrike[1] incidents with 60 of these leading to fatalities (297 people in total). Approximately USD $1.2 billion is spent repairing aircraft engines and frames on an annual basis.

This letter reviews the potential wildlife strike and birdstrike risks posed by the approved and proposed future operations on the subject property (stage 1 and 2 set out above) to the new Western Sydney Airport (WSA). Construction of the airport is underway and on track to begin operations in 2026. The subject site is situated immediately adjacent to the north-west corner of the airport's boundary next to the Hubertus Country Club.

3 Study approach

The following information and data were used in this desktop assessment:

- *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);
- *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/).

[1] References to 'birdstrike' in this letter include of bat strike.

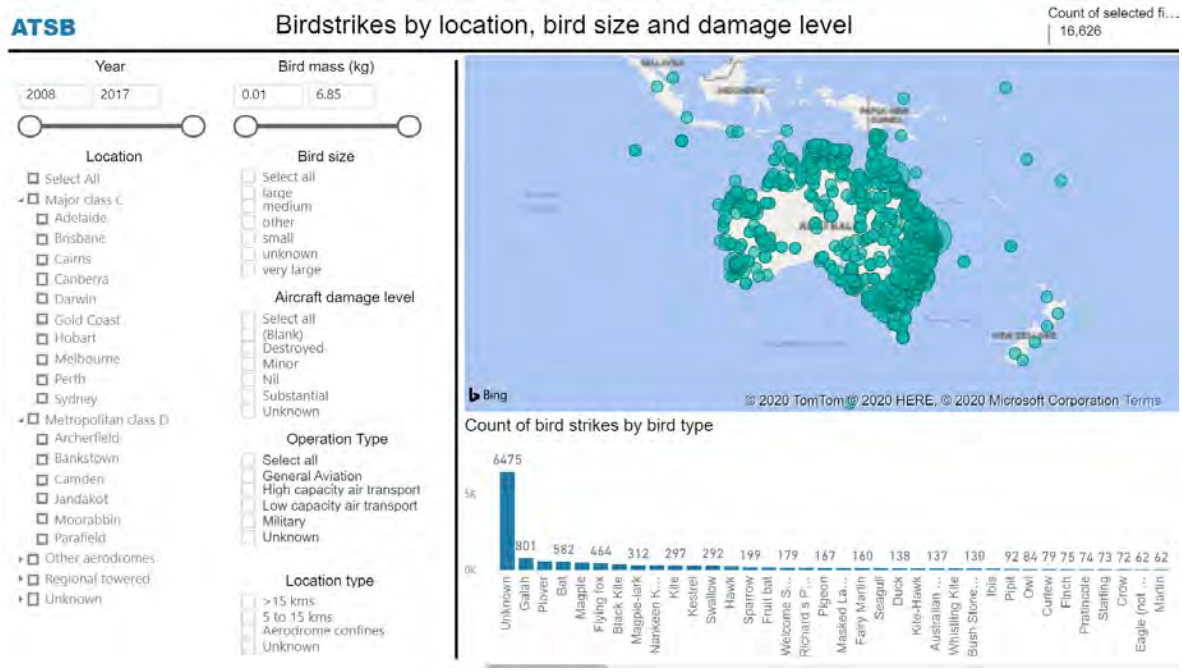
4 The current assessed risk at the Western Sydney Airport

4.1 National context

The 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 4.1. It should be noted that 6,475 (about 39%) of strikes we not found or not identifiable after the collision.



Source: ATSB

Figure 4.1 Birdstrikes by species across Australia (2008–2017)

4.2 Birdstrikes by location across Australia

The ATSB examines data by location and by the frequency of strikes per 10,000 flights. 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 4.2).

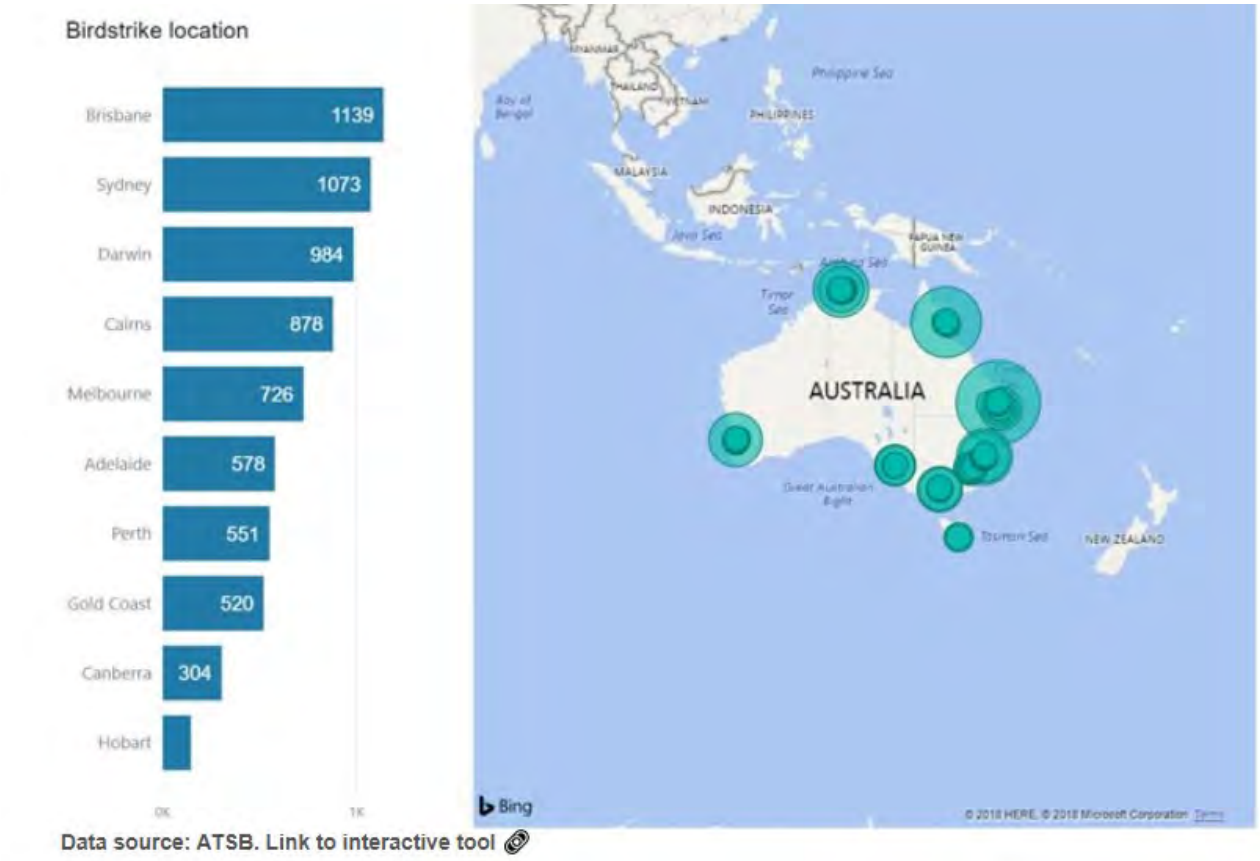
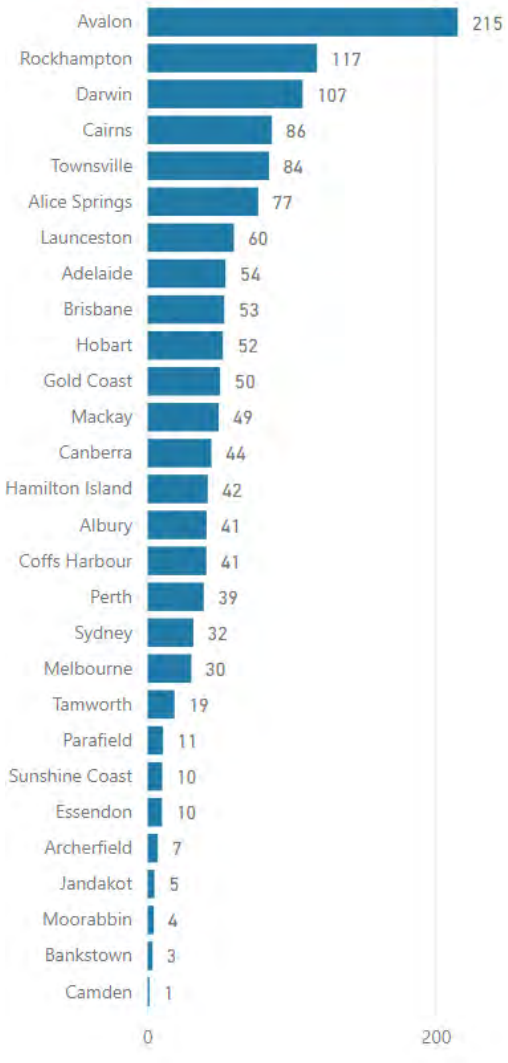


Figure 4.2 Primary birdstrike locations across Australia 2008–2017

However, of more relevance is the frequency of incidents per 10,000 flights. Avalon Airport has the highest frequency at 215 incidents per 10,000 flights. Avalon is followed by four airports in the tropics which are all on or near the coast: Rockhampton (117), Darwin (107), Cairns (86) and Townsville (84). Brisbane Airport has the 9th highest with 53 and Sydney sits at 18th with only 32 incidents per 10,000 flights (Figure 4.3). Avalon and Brisbane Airports are coastal and surrounded by wetlands, which explains their higher rates per 10,000 movements. Whilst Sydney Airport is coastal, the surrounding land uses are less conducive to attracting birds (open coast water and with surrounding urban and industrial land uses).

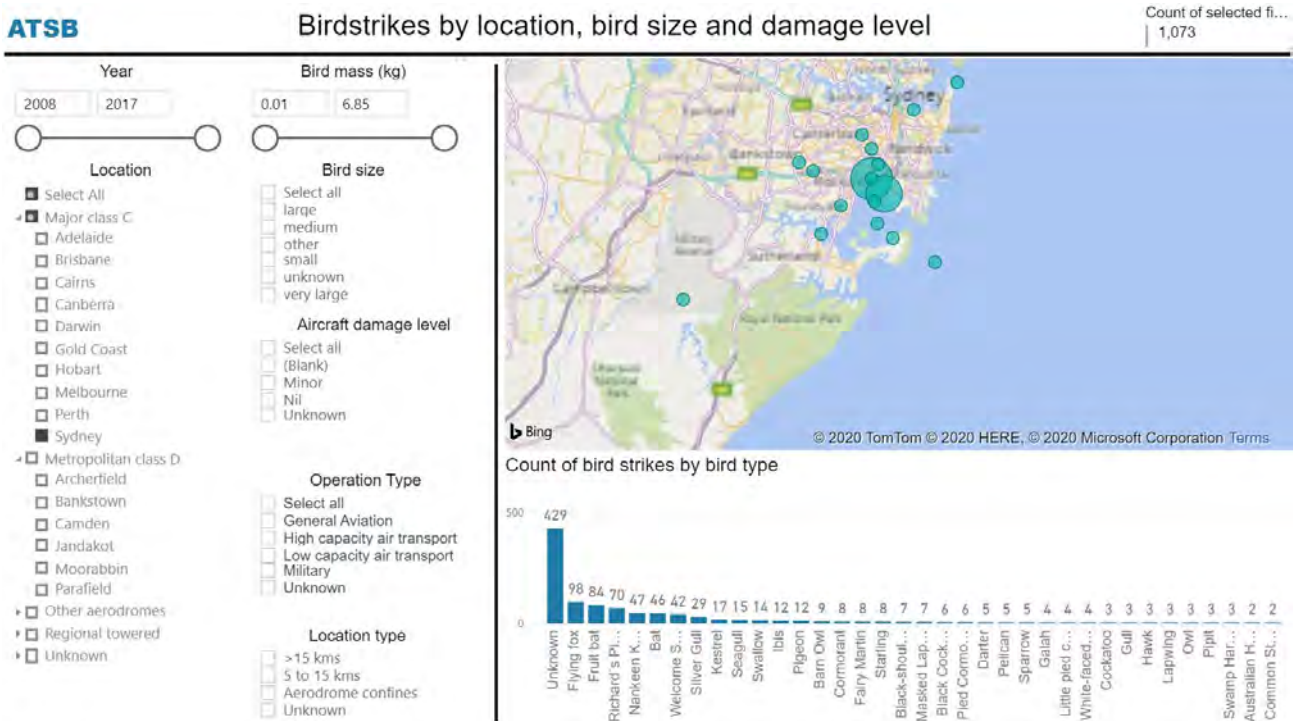


Source: ATSB

Figure 4.3 Rates if birdstrike per 10,000 movements

4.3 Sydney Airport

The current Sydney Airport has significant existing birdstrike data, and is the closest airport 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 4.4.



Source: ATSB

Figure 4.4 Birdstrike species data from Sydney Airport 2008-2017

4.4 Western Sydney Airport site

4.4.1 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:

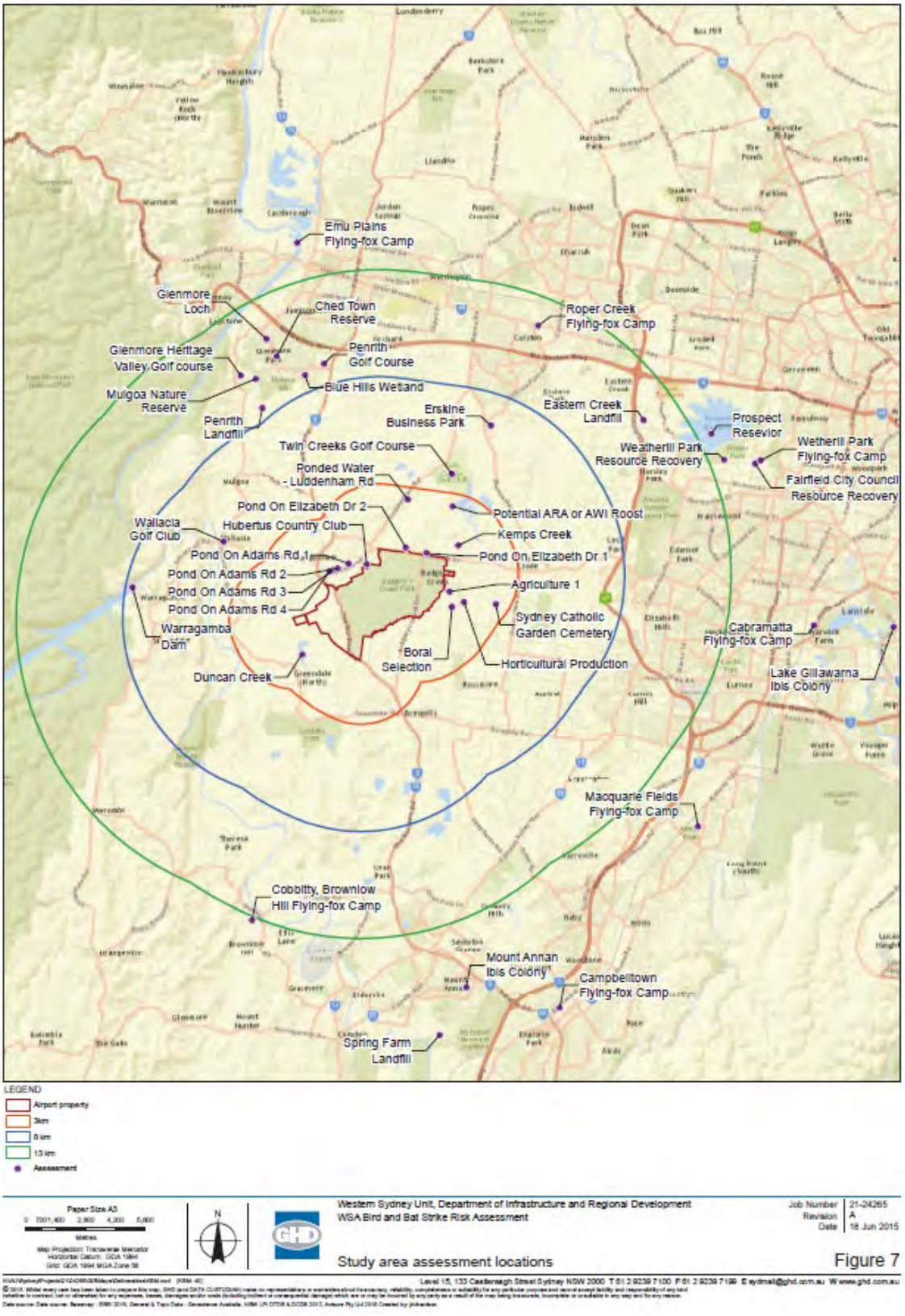
> The assessment was based on a desktop review of relevant literature and a three-day site visit conducted in March 2015. The visit included investigations within the airport site and study area. The study area included the area within a 25 km radius of the airport site centre point. The justification 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 4.5. This figure also shows the study area assessment locations. The study area's dams considered to be of concern are shown in Figure 4.6. 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 4.5 The Preliminary Birdstrike Assessment (Avisure 2015) survey area

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

Figure 4.6 Farm dams within 3 km of the Western Sydney Airport boundary

4.4.2 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 4.7.

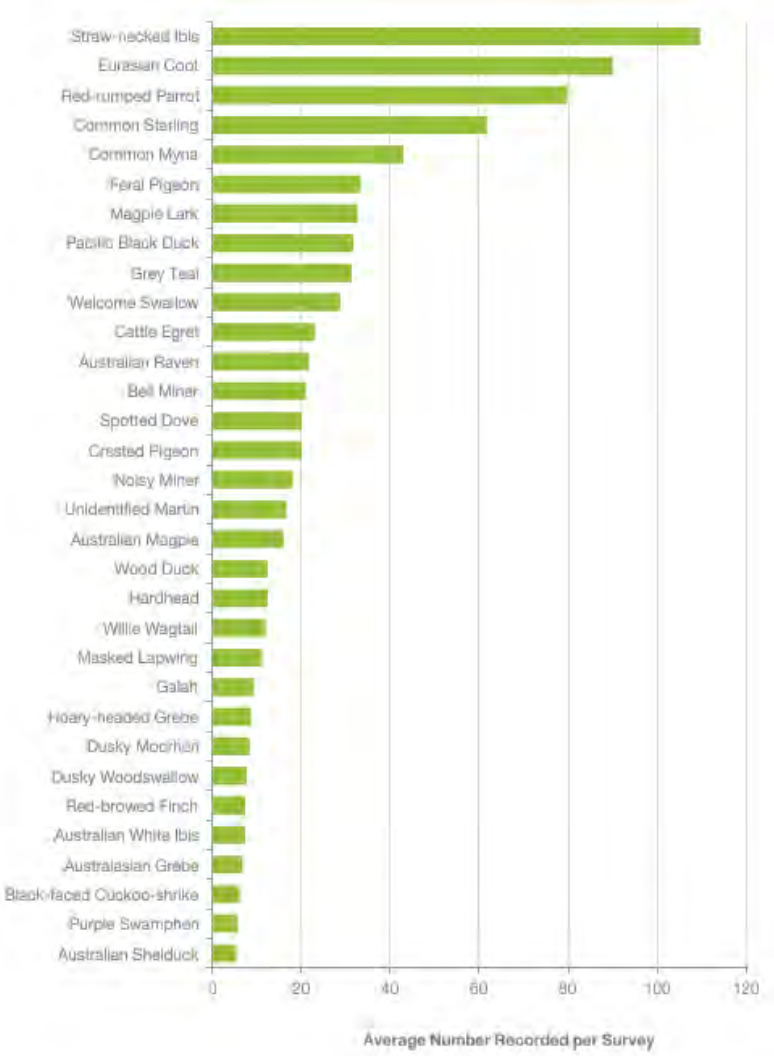


Figure 4. Species and average numbers observed per survey, site for the Western Sydney Airport, March 2015. Note: includes only species with an average number of individuals per survey greater than 5. An additional twenty-eight species were recorded, but had an average less than 5 per survey.

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

Figure 4.7 Bird species and average numbers observed around Western Sydney Airport boundary (2015)

5 Subject site's past (theoretical) and current birdstrike risk profile (to the Western Sydney Airport)

The following assessment of the subject property's risk to cause wildlife and birdstrike risk to the Western Sydney Airport is based on the species recorded around the site, and those which are known to cause risk at Sydney Airport and nationally.

5.1 Birdstrike 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. It was not identified as an area of concern by the Avisure (2015) assessment.

Source: Nearmap

Figure 5.1 The subject site and surrounds in March 2015

The very disturbed, actively worked environment across the subject property would not have acted as an attractant to any of the birds or bats (flying-foxes) in question. Most of these species are attracted to grasslands, agricultural areas and vegetated wetlands. For example, the subject site would not provide food, safe roosting areas or attractive habitats, particularly in the context of the surrounding rural landscape and number of relatively undisturbed farm dams around it. The site is shown in Figure 5.1 below).

Overall, it is considered that the subject property would not have contributed to birdstrike risk should the airport been operational in 2015.

5.2 Birdstrike risk in 2020

As of 2020, the quarry has been inactive for about two years .The primary change to the site (from 2015) is that water has accumulated in the floor of the quarry (red circle in Figure 5.2). Whilst this could potentially attract water birds, the environment is still relatively sterile and unlikely to provide foraging.

Source: Nearmap

Figure 5.2 The subject site and surrounds in April 2020

The very disturbed site would still not act as an attractant to any of the birds or bats (flying-foxes) in question, particularly in the context of the surrounding rural landscape and number of relatively undisturbed farm dams around it. Whilst the risk profile would be very slightly elevated by the water ponding on site in the quarry, overall, it is considered that the subject property would not contribute to birdstrike risk, should the airport be currently operational.

6 Future birdstrike risk should the proposed development proceed

6.1 Overview of the proposed development

In summary, the proposed development activity at the subject property considered by this assessment includes:

- re-opening and operating the clay/shale quarry;
- upgrading and using the access road to the Adams Road;
- developing a fully enclosed ARRC 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;
- an onsite water detention basin adjacent to the ARRC;
- the ongoing use of the existing water management dam; and
- future infilling of the quarry void with inert waste allowing rehabilitation for future land uses in accordance with the Aerotropolis State Environmental Planning Policy.

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.

6.2 Changes to birdstrike risk

As outlined above in Section 5, the subject property currently poses minimal birdstrike risk to the airport, compared to the surrounding environment. The proposed development set out above will cause the following changes to the site:

- the site will become active with human disturbance and vehicles using the area of the quarry and the ARRC;
- the quarry will become active including water being drained from the quarry floor, quarrying taking place and future infilling occurring to rehabilitate the site;
- the ARRC will cover most of the paddock north of the existing quarry;
- an onsite water detention basin will be constructed adjacent to the ARRC; and
- the existing water management dam will be used.

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;
- removing water from the quarry floor, active quarrying, and future infilling of the void with inert waste is also likely to reduce the site's attractiveness for wildlife and birds;
- the removal of the grassland paddock for the development of the covered ARRC north of the quarry 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; and
- with suitable management, the risks associated with the onsite water detention basins and dams could be reduced, even though these would be minor risks to begin with due to their small size.

The current site poses very low birdstrike risk to the airport's operation. It is largely disturbed and sterile 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 proposed development, the site will be even less attractive to wildlife and birds with the removal of open water from the quarry, removal of the paddock, and the general activity that will occur on site. The development of this site will reduce the likelihood of wildlife and birdstrikes occurring at the airport, albeit by a very small fraction given the site's scale and surrounding environment. The small risk posed by the subject site would be further reduced by the implementation of the mitigation and management measures described in Section 7.

7 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 site's attractiveness for wildlife. The following measures are recommended:

- No new planting (eg for landscaping) should occur on the subject property that produces fruit or flowers that are likely to attract birds and wildlife.

- 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 existing water management dam should be netted or have lines for flags across it to deter birds from utilising 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.
- Waste management on site must include careful management of any food waste from employees, for example by providing waste bins which are inaccessible to birds and vermin.
- Documenting the above measures in a management plan as part of the site's overall environmental management plan to define roles, responsibilities, and actions to ensure the above are implemented, managed, and maintained.
- Should birds or other wildlife start using the site, particularly in numbers of concern, the operator of the ARRC and/or quarry should engage specialists to survey/monitor the species utilising the site to remedy the situation.

8 Conclusions

The subject property at 275 Adams Road, Luddenham New South Wales poses an extremely low wildlife and birdstrike risk to the new Western Sydney Airport. The proposed development of the property is likely to further reduce this risk by reducing access to standing water on the site, developing a grass paddock into the ARRC and operating, and rehabilitating the quarry. 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 proposed development absolutely minimises its risks, a number of additional management and mitigation measures are recommended.

Yours sincerely

Rob Morris
Associate Director
rmorris@emmconsulting.com.au

Attached:
Curriculum vitae, Robert 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.)