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3 July 2020

Department of Planning, Industry and Environment
GPO Box 39
SYDNEY NSW 2001

Attention: Ania Dorocinska – ania.dorocinska@planning.nsw.gov.au

Dear Ania,

RE: BAIADA INTEGRATED POULTRY PROCESSING FACILITY (SSD 9394) – RESPONSE TO SUBMISSIONS

I refer to your correspondence dated 2 September 2019 regarding the submissions received by Department of Planning, Industry and Environment (DPE) during the Exhibition Period. A detailed response to each of the submissions has been provided in the attached table.

1. REVISIONS TO THE DEVELOPMENT PLANS

Since lodgement of the EIS and receipt of submissions, the Applicant proceeded with further detailed design and planning of the facility which has resulted an amended the development layout. Plans showing the revised processing plant are included as **Attachment 1** of this response and GFA changes are summarised in **Table 1**.

Table 1: Gross Floor Area Summary

COMPONENT	GFA (m2)	GFA (m2)
Existing Rendering Plant, Boilers and Maintenance Shed	5,482	5,482
Proposed Poultry Processing Plant	30,273	35,145
Proposed Administration, Amenities, Child Care	5,194	3,791
Proposed Ancillary Structures and WWTP	4,343	2,930
TOTAL	**45,292m2**	**47,348m^2**

A brief overview of the proposed changes is provided in Table 1 below. It is important to note that, while the design of the proposed processing plant has bene amended, there is no change to:

- The core objectives of the proposal;
- The production volumes (3 million birds / week and 1,680 tonnes of finished rendering products / week);
- The hours of operation (24 hours, 7 days);
- The number of staff (1176 positions);
- The number of forecast light and heavy vehicle movements and car parking spaces; and
- The access road to the site from Armstrong Street via Workshop Lane.

Table 2: Summary of Design Changes

COMPONENT	PROPOSED AMENDMENTS AND RATIONALE
BUILDING DESIGN AND FUNCTION	• A more compact and efficient building layout with a reduction in total GFA from 47,348m^2 to 45,292m^2. • Improvements to internal processing operations and enhanced food safety outcomes due to increased separation between primary processing and finished products. • Improvements to logistical operations including truck manoeuvring (minimising travel distances and reversing) and worker safety. • Improvements in fire safety design features. • Greater physical separation between the processing operations and the administration building. • Reduced visual prominence to the Oxley Highway. • Staging to ensure existing operations are able to continue during the construction phase.
ADVANCED WASTEWATER TREATMENT PLANT	• Inclusion of an improved Advanced Waste Water Treatment Facility with the ability to recycle up to 90% of the waste water from the processing plant for re-use. • Rendering plant waste water to be treated by the existing WWTP in accordance with additional approvals. • Accelerated evaporation ponds included to reduce the volume of brine by 90% to 80kl/day. • No waste water from the processing plant is to be discharged as trade waste.
CHILDCARE BUILDING	• Increased separation of the child care from processing areas. • Additional internal and outdoor space provided. • Improved access and car parking arrangements for parents.
ADMINISTRATION BUILDING	• More efficient building design with separate entrances to primary processing and finished processing areas. • Greater physical separation between the processing operations and the administration building. • Enhanced landscaping around the administration building.
TRUCK MARSHALLING	• Addition of a truck marshalling area to reduce the risk of internal traffic, enhance traffic control, manage peak periods and provide safe, on-site waiting areas for drivers.
DIRECT ECOLOGICAL IMPACTS	• A reduction in the direct impact on the naturally occurring Box Gum Woodland TEC occurring on the site (0.83 ha to 0.31) has reduced.
LANDSCAPING	• Species from the PCT 599 will used within screen planting to replace the planted vegetation to be removed.
MANAGEMENT AND MITIGATION MEASURES	• In response to the amended design and updated technical assessments, the summary of management and mitigation measures has been updated and is provided in Attachment 12.

2. RESPONSE TO SUBMISSIONS

A detailed response to each of the submissions has been provided in the attached table. This response is also supported by revision to the relevant supporting documents which have been amended in response to the submission and to reflect the revised development plans.

Attachment 1 – Development Plans

Attachment 2 – Landscape Plans

Attachment 3 – Revised Waste Water Treatment Report

Attachment 4 – Windshear and Wake Turbulence Impacts

Attachment 5 – Revised Hazard Assessment

Attachment 6 – Revised Acoustic Report

Attachment 7 – Revised Air Quality Report

Attachment 8 – Revised Stormwater Management Report

Attachment 9 – Revised Biodiversity Development Assessment Report

Attachment 10 – Revised Traffic Impact Assessment

Attachment 11 – Revised CIV Assessment

Attachment 12 – Updated Management and Mitigation Measures

3. SUMMARY

This information provides a detailed response to all items raised in the received submissions. Amendments to the supporting reports and development plans have been made as required. The amendments made in response to the submissions and shown on the attached plans have improved the operations and environmental performance of the proposed processing plant.

The revised material included in this response as well as the submitted Environmental Impact Statement have been prepared in accordance with the requirements of the relevant State and Local statutory planning requirements and consider all relevant impacts of the proposed development. Where impacts have been identified, appropriate management and mitigation measures have been prescribed. Provided that the management and mitigation measures described in this EIS are adhered to, the proposed development is not predicted to result in unacceptable impacts on the receiving environment or local community. Accordingly, the development is recommended for Approval, subject to relevant and reasonable conditions.

If you wish to discuss, please do not hesitate to contact me on telephone number (07) 3220 0288 or email david@psaconsult.com.au.

Regards,

David Ireland
Director - Planning
PSA Consulting (Australia) Pty Ltd

VERSION	DATE	DETAILS	AUTHOR	AUTHORISATION
V2	3 July 2020	FINAL	NICOLE BOULTON	 DAVID IRELAND

RESPONSE TO SUBMISSIONS

SUBMISSION DETAILS	APPLICANT'S RESPONSE
DEPARTMENT OF PLANNING	
Surrender of consents and approvals 1. *It is requested that you surrender all existing consents and development approvals to consolidate all existing and proposed operations on site into a single consent.*	Upon receipt of the Occupation Certificate and commencement of operations in accordance with a Development Consent, the applicant will surrender all consents which have been superseded.
Child care centre 2. *The EIS states (in Section 4.1.4.4, page 73) that the centre will provide enough indoor and outdoor space to accommodate 62 children (in accordance with requirements of the Education and Care Services National Regulations), please confirm that the intention is to provide capacity for up to 62 children, or whether the proposal seeks to provide for an alternate capacity of children.*	As part of the redesign of the proposed poultry plant, the location of the child care centre has shifted. The child care space has also increased from approximately 260m^2 to 360m^2. Of the 360m^2 of child care space, 80m^2 of this space is proposed to be used for storage, toilets, changing rooms, staff amenities and administration. This will allow approximately 280m2 of indoor child care space for play and learning. The *SEPP (Educational Establishments and Child Care Facilities) 2017* requires compliance with the *Education and Care Services National Regulation* Section 107 for indoor space and section 108 for outdoor space. Section 107 requires 3.25m^2 of unencumbered indoor space per child at the centre and section 108 requires 7m^2 of outdoor space. As a result, the proposed child care centre will be able to accommodate a maximum of 85 children (~3.29m2 / child of indoor space for play and learning). A minimum of 595m^2 of Outdoor play space will also be provided to meet the minimum of 7m^2 / child.
3. *Please confirm the operating hours proposed for the child care centre.*	The Child Care Centre will provide services between (7am – 6pm).
4. *The Department raises concerns with the proposed co-location of the child care centre with the proposed processing facility. Can you please provide examples of developments where similar arrangements have operated successfully.*	Co-location of child care centres in industrial estates are common and provide convenience for parents and guardians working within industrial facilities within the immediate areas. Some recent examples that member of the project team have been involved in include: • Menangle Street Child care, Campbelltown - to be co-located with a car wash. • Wests Cardiff Child Care - co-located with a registered club in an industrial estate.

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	• Broadmeadow child care - located adjacent to a light industrial development within an industrial estate. • Coffs Harbour Child Care - proposed to be located in an industrial estate. • Good Start Early Learning, Murarrie (QLD) – located in the metroplex Industrial estate. While it is acknowledged that co-location on the site of an industrial use is less common, the proposed model is intended to provide convenience to Baiada's workers and provide employment opportunities for people who otherwise may be restricted from joining the workforce. The improve the amenity of the proposed child care centre, it has been relocated to southern side of the building, adjoining the administration building and with greater separation to the live bird shed, processing, truck manoeuvring, and rendering activities on the site. Compliance with the applicable odour and noise requirements is demonstrated in the revised assessments include as **Attachment 6** and **Attachment 4** respectively.
Construction phase *5. Please provide a timeline for the construction of the development, including any staging if proposed.*	A Preliminary Staging Plan has been prepared by Richard Crookes Constructions and is included in **Attachment 1.** As shown in the plans, the development is expected to be constructed in 3 Stages as follows: 1. Site Compound, Workshop Lane extension, Internal Access Roads connecting to the existing Rendering Plant. 2. Bulk Earthworks, **s**ite preparation, detention basins, perimeter landscaping, screening mounds and planting. 3. Processing Building, car park and roads, office building, maintenance , waste water treatment, plant buildings, evaporation ponds. Depending on the final development schedule, components of each of the above Stages may be taken concurrently.
Transfer of by-products *6. The EIS states (in Section 2.3, page 34) that by-products generated by the processing facility will be pumped to the rendering plant, please*	A By-Products Transfer Line is shown on the revised Site Plan in **Attachment 1**.

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provide detail on how the by-products will be moved across facilities and what necessary infrastructure will be required for this process.	Blood, Offal and Feathers will be pumped from the processing plant via sealed, pipelines to the rendering plant. Please note that these pipelines may be underground on overhead gantries, subject to detailed design consideration.
National Airports Safeguarding Framework (NASF) 7. *The facility is required to comply with the NASF Guidelines particularly as the facility is proposed to be located within 13 km of the airport. A written report from a consultant who is competent and qualified in assessments for the NASF guidelines should be obtained to satisfy the requirement that the development will not add or enhance hazards to the airport.* *https://www.infrastructure.gov.au/aviation/environmental/airport_safeguarding/nasf/framework* *_factsheet.aspx* *An assessment is to be undertaken considering the requirements of Airservices Australia for airspace and air navigation effects, and safety of aircraft as required by the Civil Aviation Safety Authority.*	A Windshear and Wake Turbulence Impacts Report has been prepared by SLR Consulting Australia is included as **Attachment 4**. In relation to wind conditions experienced by aircraft landing from the northwest on Runway 12L, the assessment confirms: • The proposed development will have minimal/negligible impact in relation to the NASF-B mean wind speed deficit criteria, essentially no impact at wind speeds of practical interest. • NASF-B 4 kt turbulence level event exceedances are of the order of once per year with the proposed development – essentially the same as for existing conditions at the airport. This is attributed to the low profile of the proposed development buildings and low probability of occurrence of crosswinds of interest to this study (ie from the NE). Again, the proposed development will have minimal/negligible impact at wind speeds of practical interest on runway turbulence levels. It is noted that the Assessment was undertaken based on the previous building design. However, SLR Consulting were consulted and have confirmed that a revised assessment is not required for the proposed reduction in height / footprint associated with the re-design, noting the following: ***Note Regarding Building Envelope Changes*** *It is understood that the final design of the proposed development is currently being reviewed. Based on extensive studies undertaken by SLR and other Wind Engineering consultancies, the impacts identified in the present study would be an upper bound of expected changes to windshear and wake turbulence if any proposed changes to the development result in a decrease of bulk envelope (especially height-wise) in the main operational building.*
Hazard Assessment 8. *Please confirm the actual gas medium used on site for the rendering plant boiler house and other:* *a) is it natural gas supplied via a pipeline from the gas network?*	Natural gas is currently provided to the site via the reticulated gas supply located in the Oxley Highway road reserve. The internal pipeline runs from the street to the Boiler House at the northern end of the Existing Rendering Plant. However, as a result of the unreliability of current reticulated natural gas

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b) is it Liquefied Natural Gas (LNG) (as referred to throughout the EIS and as shown on drawing number SK01 Rev 2, dated 20 June 2019) or *c) is it Liquefied Petroleum Gas (LPG)? And where are the LPG tanks located?*	supply, this is supplemented by LNG which is trucked the site. The LNG is stored within 3 x 80,000L tanks (240,000L) next to the boiler house equating to 122.4 tonnes or 64,8000m^3. A small amount of LPG is used on site for forklift fuel. The forklifts for the existing rendering plant require 3 x 40kg LPG tanks. The forklifts for the future processing plant will require 12 x 40kg LPG tanks. 80% of these will be stored in a secured enclosure inside the live bird shed, for exchange/use in the forklifts used in that area. The remaining 20% will be in the workshop for exchange/use in the general grounds. An amended Hazard Assessment is provided in **Attachment 5.**
9. Section 4.15 of the EIS refers to LNG, however Table 3.3 of the EIS refers to LPG. Please confirm and show on a site plan the: location, distances from buildings, size and quantity of bulk storage tanks for the dangerous goods Class 2.1 that is currently on site.	An amended Hazard Assessment is provided in **Attachment 5** which includes a plan showing the location of the relevant storages.
10. Table 33 of the EIS: 'Indicative Chemical Storage Volumes based on Hanwood Processing Plant' should include and list dangerous goods that will be relevant for the Oakburn Processing Plant.	An amended Hazard Assessment is provided in **Attachment 5** and lists the dangerous goods that are relevant for the Oakburn Processing Plant.
11. Is the new processing plant to be built over an existing Gas Supply Valve and underground gas main, refer to approved 20/06/2018 Tamworth Regional Council drawing number 17426-CAL Rev 7 for the Baiada Oakburn Rendering Plant? If not, please indicate relocation of gas line and gas supply valve.	As outlined above, natural gas is supplied via the reticulated gas network located in the Oxley Highway road reserve. The internal pipeline runs from the street to the Boiler House at the northern end of the Existing Rendering Plant. As part of this proposed development, this private connection will be relocated. Reticulated gas and other services will be accommodated in an underground service corridor, which is proposed along the eastern property boundary. The corridor will then turn west and run between the proposed processing building and the existing rendering plant providing necessary connections to the various components of the operation. In additional to the gas, the corridor will contain the mains water supply, HV power, data cables, sewer connection etc. The final location of this corridor will be confirmed as part of the detailed design and construction certificate process.
12. Please confirm the quantities listed in Table 33 of the EIS for Ammonia Anhydrous, Class 2.3 in particular those pertaining to the enclosed refrigeration systems. The EIS states 1,200L each with a conversion to	There was a typographic error in Table 33. The weight of anhydrous ammonia has been amended to 0.82T.

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0.0009T which may be an error and may need to be corrected. To assess the aggregate storage of anhydrous ammonia for the processing facility, please provide further detail regarding the enclosed refrigeration systems, and whether they are separate systems or part of one unit.	Ammonia fuelled appliances will be positioned thought out the facility, located specifically refrigeration plant (primary and secondary) two air chillers, the distribution chiller and freezer areas with pipe work connecting the appliances to these plant rooms. An amended Hazard Assessment is provided in **Attachment 5** which includes a plan showing the location of the relevant storages.
Biodiversity & Conservation Division – NSW Planning, Industry & Environment	
Aboriginal cultural heritage *BCD note that a search of the Aboriginal Heritage Information Management System (AHIMS) recorded three Aboriginal sites within the boundary of the project area and a further six sites in close proximity. The three sites within the project area were stone artefacts that were removed for analysis in 1998 under a consent permit.* *The cultural heritage assessment for the proposal found no Aboriginal heritage sites or objects on the development site.*	A Cultural Heritage Assessment has been undertaken by Everick Heritage Consultants to support the proposed new processing plant at Oakburn. The methods used for this assessment comply with the Office of Environment and Heritage (OEH) 'Code of Practice for Archaeological Investigation of Aboriginal objects in New South Wales' (2010) and the relevant legislation. As identified within the submitted EIS, there were no items or sites of Indigenous cultural heritage or historic heritage found during the site inspection. No items or places of potential historic heritage significates were located within the Project Area and as such, it was deemed that an historic cultural heritage significance assessment was not warranted. Regardless, the assessment provided a number of recommendations for the management of cultural heritage (if encountered) during construction of the processing plant, which will be implemented.
Biodiversity offset *The Biodiversity Development Assessment Report (BDAR) has been prepared in accordance with the Biodiversity Assessment Method.* *The proposed facility would require clearing of a total of 1.34 hectares of Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion (PCT 599). Two condition states for PCT 599 were identified:* *1. Remnant patches – a total of 0.83 hectares would be impacted by the proposal. This community conforms to the threatened ecological community (TEC) White Box – Yellow Box – Blakely's Red Gum.* *2. Planted trees – a total of 0.51 hectares would be impacted by the proposal. This community does not conform to the TEC.*	In response to the revised design, an amended Biodiversity Development Assessment Report (BDAR) has been prepared. The revised BDAR is attached in **Attachment 9.** The revised development plans will have a direct impact on: • Approximately 0.31ha of the 1.19 ha of the Box Gum Woodland TEC; and • Approximately 0.68 ha of the 1.45ha of the planted natives (screening buffer) on the site. The remaining ~0.88 ha and ~0.77 ha, respectively, will be retained on site. As shown in the following Table, the direct impacts on the TEC been reduced as a result of the revised building footprint, while there has been a slightly greater

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<tr><th>SUBMISSION DETAILS</th><th>APPLICANT'S RESPONSE</th></tr>
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The BDAR concludes that the proposal will generate an offset credit requirement of 20 ecosystem credits.
Targeted surveys for all but three species credit species have been conducted, with no threatened species being recorded on the site. Three species have been discounted; Regent Honeyeater and Swift Parrot only generate species credits if the site is within a mapped important area, and Glossy Black-Cockatoo requires feed trees to be present on the site. This is in accordance with the BAM. As a result, no species credits were generated for the project.
The BDAR and environmental impact statement identify that ecosystem offsets are required. While both documents state that a suite of PCTs other than PCT 599 could be utilised to offset this PCT under the offset rules, there is no offset strategy presented for the proposal.
Recommendation
The proponent is required to offset 20 ecosystem credits of PCT 599 in accordance with the Biodiversity Conservation Act 2016.
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impact on the native screening buffer vegetation which was planted by the Applicant in 2011.
<table>
<tr><th></th><th>Previous design</th><th>Current design</th></tr>
<tr><td>Impact on Box Gum Woodland TEC</td><td>0.83 ha of Box Gum Woodland TEC</td><td>0.31 ha of Box Gum Woodland TEC</td></tr>
<tr><td>Impact on Planted Natives</td><td>0.51 ha of the 1.45 ha Planted Natives</td><td>0.68 ha of the ~1.45 ha of the Planted Natives</td></tr>
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As a result of the removal of native vegetation, offsets are required to be paid in the form of ecosystem credits. The revised BDAR assessment indicates that the development requires a total of 15 ecosystem credits for PCT 599. A suite of other PCTs could be utilised to offset this PCT under the offset rules.
The BDAR confirms that 10 of the 15 ecosystems credits are triggered due to removal of the vegetation that has been planted by Baiada in 2011. Five (5) of the credits are due to the removal of the naturally occurring vegetation.
Since the first version of the BDAR was prepared, the new Biodiversity Offsets Payment Calculator has been released by the NSW Department of Planning, Industry and Environment.
Despite the reduced impact on the naturally occurring Box Gum Woodland TEC, as a result of the new Biodiversity Offsets Payment Calculator the offsets which are payable have increased.
The BDAR states "It is noted that DPIE published a revised version of the BAM that was on public exhibition until 16 October 2019, which included a module to assess planted native vegetation. Application of this module to the planted vegetation within the subject land would result in the vegetation being assessed for species credits only (i.e. no calculation of ecosystem credits). As the revised version of the BAM is not finalised, this BDAR has been based on the current advice for planted vegetation, which is to assign to a best-fit PCT. The consent authority may waive the requirement for offsetting the planted native vegetation based on this future adjustment, which would be deemed appropriate in this case and should be considered."
As shown on the attached Landscape Plans (Attachment 2), the screening buffer is to be replaced with a new planted buffer also using vegetation species
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	commensurate with PCT 599. As the vegetation was planted as part of a private initiative by Baiada and will be effectively replaced, it is considered unreasonable that offsets would apply to its removal and we request that DPIE waive the requirement for offsetting for this component.
Landscaping *The EIS states that significant landscaping is proposed to be implemented. This will consist of formal plantings and gardens in and around the processing plant and screening vegetation along access roads, internal manoeuvring areas and along the Oxley Highway frontage.* *The landscaping concept plan (appendix 5) shows an intent to landscape with exotic and non-indigenous species. BCD recommends that species used for landscaping and screening be commensurate with PCT 599 and be germinated from locally sourced seed.* ***Recommendation*** *Plant species used for landscaping and screening be commensurate with PCT 599 and be germinated from locally sourced seed.*	As shown on the attached Landscape Plans (**Attachment 2**), the screening buffer is to be replaced with a new planted buffer also using vegetation species commensurate with PCT 599.
Borg Manufacturing	
As a landowner in the vicinity of the proposed development we have no objections to the proposal and support the increased economic activity in the Tamworth region. We would like to be kept informed about the progression of the SSD.	Noted.
CASA Aviation Group Submission	
The proponent has, in accordance with the advice provided on 20 August 2018, considered the information included in the National Airports Safeguarding Framework. *CASA has reviewed Section 3.2, Section 3.3.1 and Section 4.18 of the Environmental Impact Statement.* *Section 4.18 (Table 35) includes an Assessment against the National Airports Safety Framework Guidelines.*	Noted. See below responses.

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Guideline A *– CASA has no regulatory responsibilities regarding aircraft noise. Noise issues are a matter for the Tamworth Regional Council and Airservices Australia.*	Noted. Noise issues and their management have been addressed in the EIS.
Guideline B *– Managing the Risk of Building Generated Windshear and Turbulence at Airports. The Site Plan shows that the Processing Plant is approximately 310m from the centreline of Runway 12L/32R. The EIS assessment refers to the Obstacle Limitation Surfaces and concludes that no buildings which would create unsafe windshear or turbulence impacts are proposed. The conclusion is erroneous as the criteria in Guideline B are independent of the Obstacle Limitation Surfaces. Buildings that are under the OLS can cause wind effects (as described in Guideline B para 88). The Guideline B wind effects assessment criteria are the 1:35 rule (paras 15 and 54) and the rectangular 'assessment trigger area' (para 49). It is noted that a Wind Rose was provided in the EIS and the prevailing winds are from the South East.*	A Windshear and Wake Turbulence Impacts Report has been prepared by SLR Consulting Australia is included as **Attachment 4**. In relation to wind conditions experienced by aircraft landing from the northwest on Runway 12L, the assessment confirms: • The proposed development will have minimal/negligible impact in relation to the NASF-B mean wind speed deficit criteria, essentially no impact at wind speeds of practical interest. • NASF-B 4 kt turbulence level event exceedances are of the order of once per year with the proposed development – essentially the same as for existing conditions at the airport. This is attributed to the low profile of the proposed development buildings and low probability of occurrence of crosswinds of interest to this study (ie from the NE). Again, the proposed development will have minimal/negligible impact at wind speeds of practical interest on runway turbulence levels.
Guideline C *– Managing the Risk of Wildlife Strikes in the Vicinity of Airports. CASA notes the advice provided by the Tamworth Regional Council in Section 3.2 of the EIS under 'ODOUR AND BIRD ATTRACTANT'. CASA notes that the EIS advises that "there are no product, by-products or wastes stored externally on the site in a manner that would attract birds and other wildlife". It is assumed that 'product' includes feed. It is important that bird feed is contained and there is no exposed feed. The EIS assessment also advises: "While the clear wells are not expected to result in significant risks to aircraft operations, they can be covered with bird netting if requested by CASA". The clear wells should be wildlife monitored as part of a site wide monitoring program. CASA recommends that the decision whether to net the clear wells be referred to the Aerodrome Operator (Tamworth Regional Council). The Aerodrome Operator would have better local (wildlife) knowledge and situational awareness than CASA. If it is decided not to net the clear wells, and it turns out that the clear wells attract birds, the decision should be reviewed. Advice on monitoring of wildlife (and management of wildlife) can be found in CASA Advisory Circular AC 139-26 (0) 'WILDLIFE HAZARD*	The proposed development does not involve production or use of bird feeds on the site. As outlined in the EIS, the no product, by-products or wastes are stored externally on the site in a manner that would attract birds. The clear wells / evaporation ponds proposed on site can be covered with bird netting if considered necessary.

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MANAGEMENT AT AERODROMES' https://www.casa.gov.au/files/139c26pdf. The Advisory Circular includes the advice: *'Operators of Certified Aerodromes are required to monitor and record the presence of wildlife on or in the vicinity of the aerodrome. Where this monitoring confirms the existence of a wildlife hazard, the aerodrome operator must develop a WHMP' (Wildlife Hazard Management Plan). Wildlife monitoring will involve collaboration between the proponent and the Aerodrome Operator.*	
Guideline E *– Managing the Risk of Distractions to Pilots from Lighting in the Vicinity of Airports. The assessment should include reference to compliance with the CASA Manual of Standards Part 139 Section 9.21 'Lighting in the Vicinity of Aerodromes'. The proposed facility should comply with Section 9.21. Also, it is preferable, within reason, that roofing materials (including solar panels if they are installed) should be non-reflective.*	Noted. The subject site is not located within areas A, B, C or D on the Maximum Lighting intensities from the CASA Standards, although it is within 6km of the runway. As the facility will operate 24 hours a day, lighting will be required, both internally within the building and externally within the car park and truck manoeuvring areas. No lasers, searchlights, or high intensity lights are proposed. All external lights are able to be appropriately designed and implemented in accordance with the *CASA Manual of Standards Part 139 Section 9.21 'Lighting in the Vicinity of Aerodromes'* and can be conditioned accordingly. Roofing materials including solar panels (if installed) will be non-reflective and again can be conditioned accordingly.
Guideline F *– Managing the Risk of Intrusions into the Protected Airspace of Airports has been addressed. However, the reference to windshear or turbulence impacts in this section is extraneous. Most of the buildings that other aerodromes have assessed for wind effects, have been under the OLS.*	A Windshear and Wake Turbulence Impacts Report has been prepared by SLR Consulting Australia is included as **Attachment 4**. In relation to wind conditions experienced by aircraft landing from the northwest on Runway 12L, the assessment confirms: • The proposed development will have minimal/negligible impact in relation to the NASF-B mean wind speed deficit criteria, essentially no impact at wind speeds of practical interest. • NASF-B 4 kt turbulence level event exceedances are of the order of once per year with the proposed development – essentially the same as for existing conditions at the airport. This is attributed to the low profile of the proposed development buildings and low probability of occurrence of crosswinds of interest to this study (ie from the NE).

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	Again, the proposed development will have minimal/negligible impact at wind speeds of practical interest on runway turbulence levels.
Guideline G *– Protecting Aviation Facilities – Communication, Navigation and Surveillance has been addressed. However, the reference to the Obstacle Limitation Surfaces is irrelevant. Guideline H – Protecting Strategically Important Helicopter Landing Sites has been addressed.* *Note that CASA could not open the Appendix 8 Consultation Report or Appendix 3 Development Plans on the web page.*	Noted.
DPI Advice	
DPI advises that this proposal appears likely to have potential implications for food safety and biosecurity from the recycled wastewater generated from the poultry processing facility and has the following comments.	See responses below.
Compliance and Integrity Systems (Food Safety) *In relation to the food safety components of these operations, all water used in the production of food for human consumption must be potable. This standard would need to be supported by mandated testing requirements, for both town supplied water and water treated/recycled by the facility to be compliant.*	All water used in the production of food products on site (including reticulated and recycled supply) is potable. A revised Waste Water Treatment Report is included as **Attachment 3** which demonstrates the advance waste water treatment system to be used to recycle water to a potable standard. As outlined in the report, the system will be tested to ensure that the water for re-use within the facility meets the necessary food safety standards.
NSW Food Authority *In the absence of the Hunter & New England Health comments, and further to comments made by Compliance and Integrity Systems:* • *NSW Food Authority supports in principle the development of water saving technologies* • *The operation of the water recycling plant must be included in the site's food safety program,* • *Baiada must confirm that the recycled water will be suitable if proposed to be used in the spin wash and spin chill stages of the Oakburn plant's process.*	A revised Waste Water Treatment Report is included as **Attachment 3** which demonstrates the advance waste water treatment system to be used to recycle water to a potable standard. This system will be designed to meet and exceed the re-use water quality standards including the log reduction values (LVR) of pathogens, as laid out in: • NSW Food Authority – Water Reuse Guideline – May 2008 • NSW Government – Management of private recycle water schemes – May 2008 • NSW Department of Primary Industries – Recycled Water Management Systems – May 2015

SUBMISSION DETAILS	APPLICANT'S RESPONSE
	• Australian Government – NHMRC – NRMMC – Australian Drinking Water Guidelines 6 - 2011 The operation and management of the Advanced Water Treatment Plant will be included in the food safety program developed for the site.
Animal Biosecurity *There are a number of notifiable bacteria and viruses in poultry that can be isolated from the respiratory excretions, faeces or organs of affected birds. These include highly pathogenic avian influenza virus, virulent Newcastle Disease virus, Salmonella enteritidis, Salmonella gallinarum and Salmonella pullorum. Many of the notifiable diseases of poultry in NSW have zoonotic potential and can potentially be spread to humans via contaminated poultry products.* *DPI strongly recommends that the proponent address the risk of spreading the causative agents of notifiable diseases of poultry through the use of the proposed wastewater treatments at the planned Baiada Oakburn Poultry Processing Facility.* *1. Will the processing plant be producing poultry meat for human consumption? If so, what is the maximum risk vs the residual risk of spreading zoonotic pathogens to human consumers?* *2. Will the recycled water be used to wash poultry transport vehicles? If so, what is the maximum risk vs residual risk of contaminating these vehicles and spreading notifiable pathogens to farms where broiler chickens are grown?*	A revised Waste Water Treatment Report is included as **Attachment 3** which demonstrates the advance waste water treatment system to be used to recycle water to a potable standard. This system will be designed to meet and exceed the re-use water quality standards including the log reduction values (LVR) of pathogens, as laid out in: • NSW Food Authority – Water Reuse Guideline – May 2008 • NSW Government – Management of private recycle water schemes – May 2008 • NSW Department of Primary Industries – Recycled Water Management Systems – May 2015 • Australian Government – NHMRC – NRMMC – Australian Drinking Water Guidelines 6 - 2011 The operation and management of the Advanced Water Treatment Plant will be included in the food safety program developed for the site. As the recycled water will be treated to a potable standard, will meet or exceed the standards identified above, the water is also considered suitable for washing of poultry transport vehicles.
NSW EPA	

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1. NOISE IMPACT ASSESSMENT *The EPA has reviewed the noise assessment provided with the EIS documents on the planning portal (https://www.planningportal.nsw.gov.au/major-projects/project/10536) for the Baiada Oakburn Poultry Processing Facility, SSD9394. The acoustic report included in the EIS generally addresses the SEARs noise requirements for the application.* ***However, further information is required from the applicant before we can recommend conditions.***	A revised Noise Impact Assessment has been prepared and is attached as **Attachment 6**. A response is provided to the matters raised below.
• *Additional information is needed on the background noise monitoring. Noise logger graphs for each location and a description of the existing ambient noise environment at each monitoring location is needed for the EPA to complete its assessment. Demonstration that noise measurement and the derivations of rating background levels (RBL) have been collected and calculated in accordance with the Noise Policy for Industry (NPfI) is also required.*	Section 2.2 of the Acoustic Report has been amended to clarify the logger locations. The Acoustic Report confirms the above background (L90) noise levels (i.e. those in Table 2.2 of the report) "*are below the minimum assumed RBL's specified in Table 2.1 of the NPfI. Therefore, for the assessment purposes, the minimum RBL's have been adopted in all receiver areas for assessment purposes, i.e. 35dB(A),L90 for day (7am-6pm) and 30dB(A) for the evening and night (6pm-10pm and 10pm-7am).*"
• *Additional information is needed on the calculation methodology presented for the adverse meteorological conditions in Section 3.1.3 of the acoustic report to validate the noise model assumptions and outcomes. The assessment was undertaken under adverse weather conditions stipulated in the (superseded) Industrial Noise Policy. However, the procedure described in Fact Sheet D of the NPfI should be applied, and information provided to evaluate whether predictions made using the NPfI methods would result in different predicted noise level outcomes compared to those presented in the acoustic report.*	As outlined in Section 3.1.3 of the Revised Acoustic Report, calculations of the adverse meteorological conditions have been undertaken in in accordance with the NPfI.
• *Clarification is required on how Equation 2 within the acoustic report (Section 3.1.2) has been incorporated into the ENM model. Equation 2 contains a standard correction for distance loss, however the EPA expects this algorithm is applied by the ENM model. If source noise levels have been included into a model that already includes a distance*	Equation 2 has been deleted from the revised Acoustic Report. The revised report confirms that *"All noise sources at the site were input into our model as point sources using the point calculation mode to determine the noise level at each receiver".*

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loss correction, then predicted noise levels at the residential receiver locations may be underestimated.	
• *The acoustic report has not considered the possibility of tonal aspects from the mechanical plant and equipment which has the potential to add a 5 dBA penalty to the noise level at the receiver. If tonal characteristics are present this would likely result in non-compliance with the Project Noise Trigger Levels at most locations during the evening and night periods. As such, any potential tonal or low frequency adjustments must be made addressed in accordance with Fact Sheet C of the NPfI.*	Section 2.3.5 if the revised report presents the tonality criteria from the NPfi. Section 3.4.2 of the revised report concludes that "*Noise emissions at the nearest receivers are not expected to contain any significant tonal components, in accordance with the requirements of Fact Sheet C of the NPfI. No further adjustments or penalties are therefore required for noise predictions at residential receivers*".
• *The report makes no reference to Section 3.4.5 of the NPfI "Noise mitigation for the night-time collection of poultry". The proponent is requested to take this into account as appropriate/applicable.*	Section 3.4.5 of the NPfI, relates to the night time collection of poultry on the farm. As such, this is not relevant for the delivery of poultry to the processing plant.
• *The vibration aspects of both the operation and construction of the development have not been included as required under SEARs. However, given the distance of the development to the nearest affected receiver locations this is unlikely to be an issue.*	As noted in the submitted EIS, given the distance from the development to the nearest affected receiver, the submission of vibration assessment is not considered necessary for this project.
2. WATER IMPACT ASSESSMENT ***<u>Process Effluent Management</u>*** *There are no proposed operational process discharges to water as 75% of the water treatment plant effluent will be reused within the plant and Baiada is negotiating a discharge to sewer through a trade waste agreement for the brine stream. The treatment process includes a Waste Water Treatment Plant (WWTP) and an Advanced Water Treatment Plant, including filtration and low-pressure Reverse Osmosis (RO). The system will be designed to meet and exceed the relevant industrial re-use water quality standards which are not regulated by the EPA.* *A RO concentrate stream will be produced. This stream will have a high concentration of dissolved salts and is intended to be discharged to the municipal sewer where it will be shandied with other reticulated sewer and treated water at the Westdale Sewer Treatment Plant (STP). This discharge is proposed to be subject to a Trade Waste Agreement (TWA) with Tamworth Regional Council.*	The Advanced Wastewater Treatment Plan (AWTP) has been redesigned and is documented in the revised Waste Water Treatment Report included as **Attachment 3.** As well making 90% of the water suitable for re-use on site, the AWTP will also negate the need to discharge trade waste to Council's wastewater treatment plant. Following the treatment process, the AWTP will generate a concentrated brine stream which is held on site in accelerated evaporation ponds, before being dried out and periodically taken offsite to a licensed disposal facility. Efforts will be made to mine the remaining material for minerals as the technology becomes available. The advanced waste water system and evaporation ponds are shown on the revised development plans included as **Attachment 1.**

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The EIS states that the applicant has met with Council with respect to the terms of the TWA who have advised that, while having concerns with receiving inflows with a higher than normal concentration of dissolved salts, the Council is committed to working with Baiada on a workable solution. The Environmental Impact Statement (EIS) notes that Baiada is researching the use of peracetic acid as an alternative to chlorination which may reduce the TDS in the concentrated stream. *It is noted that if a TWA is accepted there are some potential risks, including:* • *saline wastewater can damage STP assets and affect the treatment process* • *salinity is generally not effectively treated in STPs and any increased salinity in STP effluent could impact receiving waters or reduce potential for reuse.* *If a TWA is not in place there would be a waste stream requiring management with limited options due to its high salinity, e.g. disposal as crystallised salt which would require an additional treatment step and an appropriately designed landfill. These potential risks should be considered as part of the development assessment process.* ***It is recommended that the fate of brine waste stream is considered as part of the development assessment process.***	
<u>Pond Linings</u> *The EIS indicates there will be adequate liners for processing and treatment systems used on site such as the Covered Anaerobic Lagoons. It is noted that part of the WWTP is currently under construction as Baiada has recently obtained consent from Council for construction of that part of the plant. This part of the plant consists of the series of Sequence Batch Reactors, Coverer Anaerobic Lagoons and maturation ponds which is aimed at improving the quality of the existing wastewater generated by the rendering plant.* ***The proponent needs to confirm the adequacy of liners for processing and treatment systems for both the existing and proposed development.***	The Advanced Wastewater Treatment Plan (AWTP) has been redesigned and is documented in the revised Waste Water Treatment Report included as **Attachment 3.** The revised waste water treatment will see all wastewater from the rendering facility treated separately at the existing wastewater treatment plant which is operational, and has been designed to accommodate additional volumes requested in this EIS. Treated wastewater from the rendering plant wastewater treatment plant will continue to be discharged to sewer in accordance with a trade waste agreement with Council. Water from the proposed processing plant will be treated by the AWTP treat 90% of the water to a potable standard, suitable for re-use within the processing plant. The AWTP will also negate the need for additional SBR and CAL Lagoons to be constructed on site.

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	Following the treatment process, the AWTP will generate a concentrated brine stream which is held on site in accelerated evaporation ponds, before being dried out and periodically taken offsite to a licensed disposal facility. Three 10,000 m2 evaporation lagoons, with a minimum depth of 1.5m are proposed to be constructed on site to accommodate the concentrated brine discharged from the AWTP. The ponds will include a minimum freeboard of 500mm in order to accommodate the 7-day RDRD (rare design rainfall depth) for a 1 in 2000-year event, of approximately 480mm. The ponds will require raised banks to avoid ingress of stormwaters which fall outside the pond footprint. The ponds will be lined with HDP Plastic or clay to ensure that no leakage occurs. With respect to the adequacy of the liners, Australia does not have specific standards which need to be met. The Applicant's preferred supplier uses industry GRI-GM Standards from the United States of America. The supplier is also an active member of the "International Association of Geosynthetic Installers (IAGI) which means that they follow the GRI-GM standards. The supplier ensures that for all Baiada projects, the relevant materials are subject to on-site destructive testing and off site independent testing through an approved NATA laboratory. The advanced waste water system and evaporation ponds are shown on the revised development plans included as **Attachment 1.** Further details are provided in the revised Waste Water Treatment Report included as **Attachment 3.**
WTP Sludge Management *It is unclear how sludge not returned to the treatment process will be managed.* ***The proponent needs to identify and described management measures of any sludge that is not returned into the treatment process.***	Sludge from the DAF and Membrane bioreactor will be dewatered and collected on site before being transported in a sealed trailer (daily) for composting at a licensed facility. At full operation, it is estimated the sludge produced will be approximately 40 Tonnes (1 -2 truck loads) per day.
Stormwater and Discharges to Waters *Stormwater risks are limited to construction stage erosion and sediment control and then general site runoff from rooves, car parks, access roads, surrounds and truck wash. These activities (except for the truck wash, see below) should be able to be managed with standard stormwater management techniques. It appears that live bird receivals are indoors and therefore bird handling should not affect*	Noted. It is correct that the live birds will be unloaded inside the plant and as such will not affect stormwater quality. A Revised Stormwater Management Report has been prepared and is included as **Attachment 8**.

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stormwater quality. The EIS states that unloading of live birds will occur on the western side of the building with the facilities designed for trucks to reverse and deliver live bird modules before processing occurs.	
Truck wash *The EIS states that if car or truck washing occurs on site it will be within a bunded area where surfactants will be captured and treated prior to discharging into the stormwater network. There are no details provided on the extent or type of truck wash facilities.* *The proponent needs to clarify whether the insides of trucks, that may contain feathers and manure, will be washed and treated in a system that discharges offsite.*	As shown on the Revised Plans included as **Attachment 1**, there are 2 Truck Washes proposed as part of this development. **1. Live bird trailer washing** The truck wash is located within the Live Bird Receival area where trucks will be washed using high pressure hot water to remove remnant, dirt and manure. The run off from this activity will be directed to trade waste treatment via screens and baskets to collect larger debris. The large debris will collected on site before disposal to a licensed facility. The washdown water will be directed to the advanced waste water treatment plant. **2. Distribution** This activity will take place within a building at the entrance to the Distribution Area. The washing activity will be limited to the internals of the refrigerated vans using primarily high pressure hot water, followed by a detergent and surfactant to sanitise the surfaces. Any run off will be collected by a floor drain, screened to catch large debris. The large debris will collected on site before disposal to a licensed facility. The washdown water will be directed to the advanced waste water treatment plant.
3. AIR QUALITY IMPACT ASSESSMENT ***Analysis of issues*** *The EPA has reviewed the Air Quality Report: Odour Impact Assessment (AQR1) submitted for the proposal as Appendix 9 of the Environmental Impact Statement (EIS2). There is insufficient information in the AQR to assess the odour impacts from the proposed facility based on the proposed bird capacity and operating hours.* *The AQR provides a quantitative assessment of predicted odour impact utilising CALPUFF. The odour assessment includes odour from the proposed upgraded waste water treatment plant, the poultry processing facility (PPF) and the existing protein recovery plant (PRP) but does not include odour from the existing poultry farms.*	A revised Air Quality Impact Assessment, including an Odour Management Plan has been prepared by The Odour Unit and is included as **Attachment 7**. The revised Odour Impact Assessment addresses the cumulative odour effects of the proposed Poultry Processing Facility, existing Protein Recovery Plant and Waste Water Treatment Plant. It is important to note "*In TOU's experience, multiple odour plumes of distinctly different odour characters do not combine in the atmosphere and tend to be observed as individually identifiable odour characters in the field, even well downwind of the sources. Furthermore, treated odour emissions from an effective biofilter remove almost all process odour, having an earthy, vegetative odour character. In TOU's opinion, odour impacts from biofilters and other proven odour control systems should be modelled as a non-cumulative impact.*

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The AQR includes adequate worst-case emission scenarios for the waste water treatment plant (WWTP) -assuming daytime filling for sequencing batch reactor (SBR)- but not for the PPF and PRP. *The odour at the childcare centre exceeds the project impact assessment criteria (IAC) for 24-hour operation. During day time operation (6am-6pm) of the childcare centre, odour is not predicted to exceed the IAC. Mitigation strategies (carbon filters, landscaping and remaining indoors at night) are suggested but not proposed.* *The AQR does not include an air quality assessment for the boilers at the PRP, including an assessment of meeting the Clean Air Regulations emission limits.* ***The following issues need to be addressed by the proponent to enable to EPA to complete its assessment.***	*Cumulative odour effects from the proposed PPF with three poultry farms located to the northwest have been considered in the form of a sensitivity test."*
<u>PPF Live Bird Ventilation Emission Rate Factors are not Adequately Explained and Justified</u> *The proposal is seeking to increase the maximum processing for the PPF from 1 million birds/week to 3 million birds/week (~430,000 birds/day). The proposal is also seeking approval for operation of all aspects of the site facility 24 hours/day, 7 days/week with no restrictions. The existing Out Street facility is licenced for 120,000 birds/day. The PPF live bird storage ventilation ducts (AQR1 section 2.1.1.2) were modelled using an odour emission factor of 0.35 OU/m2/s (measured at the Out Street facility) and a ventilation rate of 900,000 m3/h based on a maximum capacity of 90,000 birds (present 2am – 9pm).* *The odour emission inventory for the live bird storage ventilation ducts is based on data from a facility licenced for 120,000 birds/day. As the proposal is seeking to process ~430,000 birds/day, it is unclear if the assumed odour emission rate for live bird ventilation adequately reflects the proposal.* ***The AQR needs to be revised to include information on:*** • ***Actual maximum live bird storage capacity at proposed PPF*** • ***Duration live birds are present at the proposed PPF and*** • ***Justification for using a ventilation rate based on 90,000 birds when the proposed PPF will process 3 million birds/week.***	Section 3.1.2 of the revised OIA Report addresses Live bird reception ventilation and has assumed: • Maximum live bird reception capacity is 90,000 birds per hour and not exceeded in any modelled hour of the day. • Actual numbers are likely to be lower and fluctuate as trucks arrive and birds are processed. • Birds are to be present between 1am to 9pm. Three million birds a week equates to approximately 21,500 birds per hour over 20 hours per day, seven days per week. Therefore, a ventilation rate based upon a peak capacity of 90,000 birds is considered conservative and worst-case under normal operations.

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1 Baiada Poultry Pty. Ltd. Proposed Poultry Processing Facility Odour Impact Assessment, Final Report, June 2019, The Odour Unit *2 Environmental Impact Statement, Oakburn Poultry Processing Plant – Tamworth NSW, July 2019, PSA Consulting Australia*	
<u>PPF live bird ventilation worst-case scenario not based on maximum bird processing</u> *A worst-case scenario was performed by multiplying the live bird emission factor by three. It is unclear why this scenario was considered worst-case. A factor of three does not account for the greater capacity at Oakburn compared to the Out Street facility.* *The worst-case scenario provided in the AQR is inadequate as it does not account for the greater capacity at Oakburn compared to Out Street. Further, the worst-case scenario was not included in the cumulative odour emissions modelling (Figure 3.1).* ***The AQR needs to be revised to include:*** • ***a scenario which reflects the proposed maximum bird capacity of the PPF and include this scenario in the cumulative odour assessment and*** • ***a descriptive and justified analysis of the worst-case scenario of odour emissions for the live bird storage facility. This worst-case scenario should then be modelled and included in a cumulative odour assessment.***	Section 3.1.2 of the revised Odour Impact Assessment Report addresses Live bird reception ventilation. The Odour Impact Assessment was intended to demonstrate the effectiveness of vertical dispersion of odour through mechanical ventilation by applying a nominal multiplication factor to the emission rates as a form of sensitivity test and abnormal worst-case scenario to provide further confidence in the recommended mitigation measures. The worst case scenario under normal operations has been addressed through the assumption of 90,000 birds within the live bird receiving area.
<u>PPF Ventilation rate not representative of proposed facility processing capacity</u> *The ventilation rate for the PPF Ventilation Ducts (section 2.1.1.3) was based on nominally increasing the value measured at another poultry processing facility (Baiada Hanwood) by 50%. There is no justification of how this nominal increase of 50 % relates to the capacity of the two facilities.* ***The AQR needs to be revised to provide realistic and justified ventilation rates for the proposed PPF ventilation ducts.***	Section 3.1.3 of the revised Odour Impact Assessment Report addresses PPF ventilation. PPF ventilation rates have been revised by multiplying the volume of each process room by a nominal 15 air changes per hour. The discharge odour concentration used was the mean measured value of 220 ou based upon measurements from the Hanwood Processing Plant roof vents. Discharge points have increased from 6 to 17 in the modelling, some that ventilate rooms with negligible odour in practice but have been included for conservatism to address inherent uncertainties.

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<u>PRP impact assessment of air impurity emissions from boilers not included in AQIA</u> *The proposal includes an additional boiler for the PRP2. The AQR does not include any information about emissions from the existing and proposed boilers at the PRP facility and whether the additional boiler has been included as either an existing or proposed upgraded source as part of the assessment of the facility.* ***The AQR needs to be revised to include an air quality impact assessment for the existing and proposed boilers at the PRP. This is to include information about both the existing and proposed boilers at the PRP such as:*** • ***Size of boiler*** • ***Fuel type*** • ***Emissions performance*** • ***Compliance with the POEO (Clean Air) Regulation 2010, Group 6 emission standards***	Section 2.5 of the Odour Impact Assessment Report addresses the potential for air quality impact from boilers. Two compliant existing 10 megawatt and one compliant 15 megawatt natural gas fired boilers will be employed. Any new boiler acquired for the new processing will also be natural gas fired, sized similarly and will comply with POEO (Clean Air) Regulation 2010, Group 6 emissions standards.
<u>PRP facility increased production assessment</u> *The proposal is seeking to increase the production rate from an average of 160 tonnes/day to a maximum of 240 tonnes/day. The AQR is unclear if this increased production has been accounted for in the assessment and if it will be achieved through increased operating hours and/or increased throughput. The odour emissions from the PRP have been modelled in the AQR based on 24 hours/7 days a week operation:* *"As a conservative measure, the theoretical maximum production rates have been used (i.e. 24 hours, 7 days per week)." (Section 2.1.3.1)* *However, these operating hours are not likely to be conservative, but are actual operating hours if this is how the proposed increase in production is to be achieved.* *Possible errors in the emission inventory have been identified and include:* 1. *Table 2.4 Low Temperature – Storage odour emission rates (84 OU.m3/s) do not match test data provided in Appendix B (page 43 of AQR) which shows 100 OU.m3/s*	The volume sources from the Protein Recovery Plant are addressed in section 3.3.1 of the revised Odour Impact Assessment. The revised report has deleted the phrase "as a conservative measure…" and has revised table 3.4 (previously table 2.4). A more realistic OER estimate and justification for the raw materials loading bay has been provided consistent with measurements and observations made by TOU in August 2018 reflecting the excellent odour capture at the Protein Recovery Plant. The former estimate represented a highly conservative approach to the loading bay with consideration to superseded reports by MWH.

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2. *Table 2.4 Raw Materials/Loading Bay peak emission rates (10,493 OU.m3/s) do not match the table in Appendix C which shows 25,169 OU.m3/s* *Additionally, a sampling report is not provided for raw materials received at the PRP.* ***The AQR needs to be revised to provide more information on how the PRP facility will achieve the maximum processing capacity and the operating hours for the PRP. The odour emission modelling of odour impacts must be revised, if necessary, to include the maximum processing capacity and the correct odour emission rates for the loading bay and low temperature storage.***	
<u>Odour criteria has not been determined properly</u> *The AQR has not adequately demonstrated that is has used the correct odour assessment criteria for the potential affected population, including the childcare centre and Tamworth Regional Airport.* ***The AQR needs to be revised to include a 2 OU contour. The odour assessment criteria must then be based on the population within that 2 OU contour, including maximum capacity of the childcare centre. The maximum capacity of the Tamworth Regional Airport should be considered if it falls within the 2 OU contour.***	The Odour Impact Assessment addresses the procedure prescribed by NSW EPA during the notification phase of the proposed Poultry Processing Facility development to calculate the Odour Impact Assessment Criteria has been considered in section 5.1 of the Odour Impact Assessment Report.
<u>Cumulative odour effects from poultry farm not included in odour assessment</u> *The AQR has not considered or included the odour from the poultry farms located to the north-west of the proposed development (Figure 1.1). The cumulative effect of the odour resulting from the existing poultry farms and the proposed poultry processing facility may result in a cumulative odour impact over the IAC of 5 OU at a sensitive receptor located between the two sites.* ***The AQR needs to be revised to include a cumulative odour assessment of the proposal and all poultry facilities in the vicinity of sensitive receptors.***	The cumulative odour effects from the proposed Poultry Processing Facility have been considered, along with the cumulative odour effects from the three poultry farms along Bowlers Lane in the form of a sensitivity test. The prediction of cumulative effects shown in Figure 5.2 of the Odour Impact Assessment is almost certainly overstated as it considers all Oakburn sources including treated odours (e.g. biofilter) and odours of different characters (e.g. rendering, wastewater, etc) that do not combine in the atmosphere and tend to be observed as individually identifiable odour characters in the field. A more realistic analysis more in line with TOU's expectation of odour impact risk would consider the cumulative effect of the poultry farm (orange) contour with the Live Bird Reception (dashed yellow) contour that has a similar live bird odour character.

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<u>Childcare centre operational hours and odour exceedance</u> *A child care centre on site for children of staff is included in the proposal. The AQR demonstrates the odour impact assessment criteria adopted for this proposal (5 OU) is predicted to be exceeded for a 24-hour operation (7.8 OU, 99 %, P/M60). The AQR considers a 12-hour operation (6am – 6pm) which eliminates odours resulting from poor dispersion during night-time condition and predicts the odour concentration at the childcare centre is below the odour impact assessment criteria (4.7 OU, 99 %, P/M60). Further mitigation strategies that could be considered are proposed to reduce odour at the childcare centre. These mitigation strategies include activated carbon filters, boundary landscaping and keeping the children indoors during adverse odour events.* ***The proponent needs to clarify the actual hours of operation of the childcare facility. If the childcare centre will be operational for 24 hours, as the proposed facility is seeking 24 hour/7 days a week operation, then the odour exceeds the criteria. The AQR must then be revised to incorporate mitigation strategies to reduce odour over the full operational hours of the childcare centre.***	The Child Care Centre is addressed in section 4.2.9 and 5.2. For the ancillary child care centre, both 24 hours per day operation and 14 hours per day operation (nominally from 5am to 7pm) were considered. The actual child care operating hours will be 7am-6pm.The results shown in Table 5.1 consider recommended odour risk reduction as part of an Odour Management Plan, which is not quantifiable by odour dispersion modelling. The following will be adopted as part of the Odour Management Plan with respect to the on-site child care centre: - *Adaption of a hybrid high efficiency particulate air and carbon filter system to protect the indoor airspace environment of the child care activities during atypical or upset conditions. During normal operating conditions, odour impact risks are very unlikely under the odour management protocol adopted for the PPF operations; and* - *Vegetative landscaping for the outdoor areas to provide a level of screening attenuation and visual disconnection for the PPF operations.*
<u>Clarification of time period for SBR filling</u> *The AQR states "The results show that the predicted odour impact for Stage Two upgraded WWTP is below the NSW EPA odour IAC under the assumption that SBR night-time filling would be avoided" (page 35). While the EIS repeats this in section 4.7.4 (page 100), it also states in section 5 Management and Mitigation Measures Table 36 (page 122) "Filling of the SBR is to be programmed to take place outside of daylight hours where practical."* ***The time period for the SBR filling should be clarified between the AQR and EIS as this would impact the odour assessment of the WWTP.***	The SBR filling time period is noted in section 3.2.1, which states "*The proposed phasing of the SBR cycles was modelled under the assumption that filling during night time hours would be avoided. As a worst case scenario, the SBR was set at the fill emission rate for daytime hours between 8am and 5pm with the aeration and settling emission rates set overnight*".
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I object to the proposed development on the following grounds; *1. **Odour**. This proposed development will produce offensive and annoying odours. If the odours that are currently produced by Baiada's rendering plant*	A revised Air Quality Impact Assessment, including an Odour Management Plan has been prepared by The Odour Unit and is included as **Attachment 7**.

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that operates on this site are any indication, it certainly doesn't bode well for the odours that will be produced by this processing facility. *Everybody that drives along the Oxley Highway past the proposed development site can tell you how much the rendering plant stinks. This pungent smell is certainly not a very nice welcome or good bye to the travelling public using the Oxley Highway when they visit Tamworth.*	The subject site is located within a livestock and food processing hub identified by Council for the purpose of locating businesses such as poultry production at the edge of Tamworth. The EIS is supported by an Odour Impact Assessment which has identified the addition of the Poultry Processing Facility modelled along shows the predicted odour impact does not largely exceed the NSW EPA odour criteria of 5 odour units beyond the site boundary. The results are below the odour criteria at the nearest sensitive receptor and that the proposed Poultry Processing Facility is unlikely to cause adverse odour impacts under normal conditions within the assumptions made. Furthermore, the modelling is almost certainly overstated as it considers all proposed and existing odour sources including treated odours and odours of different characters that do not combine in the atmosphere and tend to be observed individually.
2. ***Visual Impact****. This very large structure will have a significant visual impact on the local area. This massive unattractive building will be the first or last impression the travelling public using the Oxley Highway will have of Tamworth.* *Not only will the road users be visually impacted by this development all people flying in and out of Tamworth via the airport will be impacted.* *The operators of the airport would also be concerned about the height (26 metres) of the proposed development.*	The subject site is located within an established food processing hub, which has been identified by Council as an industry that is to be supported and encouraged. As such, the construction of a large processing plant in the site is consistent with community expectations for development on the site. The existing rendering plant is a high quality industrial food processing facility and presents as a neat, clean and modern industrial site. The visual form of the proposed processing plan will adopt a similar style and quality as it and will present as a modern industrial building, with a modern administration centre at the front of the building. While the site will present as high quality, modern building to the surrounding public vantage points, significant landscaping and screening vegetation has also been utilised to soften built form and add visual interest to the site. The visual impact of the processing plant be most prominent from the Oxley Highway, which is not a pedestrianised environment and the traffic utilising this road travels at 100km/hr. Views of the facility will be broken up by the proposed landscaping treatments, including buffering vegetation along the site boundary. Based on the maximum height of the processing plant and the distance from the highway, screening trees with a height of ~5m will screen the vast majority of the elevation to ensure the building will not dominate the landscape. As such, the proposed building is not expected to have an unacceptable impact in terms of visual impacts.

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	A Revised Landscape Plan has been prepared and is included as **Attachment 2**. It is noted the screening vegetation will utilise species consistent with the Box Gum Woodland TEC to ensure the planting provide visual and ecological benefits to the site. A Windshear and Wake Turbulence Impacts Report has been prepared by SLR Consulting Australia is included as **Attachment 4**. In relation to wind conditions experienced by aircraft landing from the northwest on Runway 12L, the assessment confirms: • The proposed development will have minimal/negligible impact in relation to the NASF-B mean wind speed deficit criteria, essentially no impact at wind speeds of practical interest. • NASF-B 4 kt turbulence level event exceedances are of the order of once per year with the proposed development – essentially the same as for existing conditions at the airport. This is attributed to the low profile of the proposed development buildings and low probability of occurrence of crosswinds of interest to this study (ie from the NE). Again, the proposed development will have minimal/negligible impact at wind speeds of practical interest on runway turbulence levels.
3. ***Water****. The availability of water is very limited, where will this development source its water. There is not enough water to meet the demands of this development. Tamworth is currently looking down the barrel of going onto level 5 water restrictions due to the present drought. Tamworth is currently growing and needs to be able to guarantee a continued supply of water for residential use and future residential expansion.*	Based on current estimates, at full operation, the Oakburn processing plant will consume up to 8ML of potable water per processing day. As the processing plant will result in closure of operations at Out Street, the overall increase in potable water demand will be approximately 6ML per processing day. Recognising sustainability, climate change, seasonal variability and the development's dependence on potable water, Baiada is proposing to use advanced water treatment technology to treat the wastewater and allow up to 90% to be re-used by the facility. This will mean that the overall water use at the facility will be approximately 800KL per processing day which is less than the existing processing plant.
4. ***Flow on effects****. This development if approved will have very significant adverse impacts on the Tamworth region. The EIS prepared by the proponent states that the processing facility will need an additional 300 broiler sheds (Section 4.11.7) to supply the plant once it is operational. In addition to this*	The proposed development will aim to meet not only future, but existing increases in poultry production in the region as a result of growth in demand for poultry meat products in Australia. In addition to this, the proposed development is intended to centralise Baiada's Tamworth poultry slaughtering and processing operations onto a single, integrated and efficient site, which

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one would assume that there will also be a large number of parent and breeder sheds needed to supply the meat chicks to the broiler farms. *The very large number of sheds needed to supply this processing plant is going to have a very significant detrimental impact on the Tamworth region. The day to day lives of a very large number of people is going to be impacted by all these poultry sheds that will be constructed in the region.* *In addition to new sheds it also expected that the existing poultry farms in the Tamworth area will be expanding and ramping up production to meet the requirements of the proposed processing facility. This will further impact the day to day lives of the existing residents of the area.*	includes the ultimate decommissioning of the current Out Street Processing Facility in Tamworth's town centre. Any further development of poultry operations within the Tamworth Region would be subject to the legislative requirements and provisions under NSW's planning legislation, the *Environmental Planning and Assessment Act 1979*. Potential impacts associated with these developments would be assessed as part of the relevant assessment processes, prior to approvals being issued.

Some of the issues that will occur as a result of the massive expansion in the number of poultry sheds in the Tamworth region needed to supply the proposed processing facility at Oakburn are as follows; • ***Odour**. It is well known and documented that the main reason for complaints about poultry farms is in relation to the odour they produce and emit. Every year the Environmental Protection Authority receives a large number of complaints about poultry farms in relation to odour issues. The poultry industry itself openly admits that it is simply unworkable to expect a chicken farming operation to operate with no offensive odours.* • ***Visual Impacts**. The visual amenity that the existing residents of the area currently have and enjoy will be lost forever when all these sheds are built. The rural views of traditional grazing and cropping areas will be replaced by a large number of unsightly factory farms.* • ***Water**. Water is a very scarce and valuable resource. Poultry farms need water, any new farms and increased demand for water at existing poultry farms will take water and water entitlements away from the existing traditional farming operations. It is very doubtful if the water supply needs of so many proposed new poultry sheds and farms could be met.* • ***Traffic**. If all the sheds needed are constructed there is going to be a very significant increase in the amount of traffic (mostly heavy vehicles) on the regions roads. Some of the local roads in the region are not up to a good enough standard to carry the large volumes of heavy traffic that all these poultry farms will generate. The local residents who use these roads will be greatly impacted by all this additional heavy traffic.* • ***Noise**. The people who have the misfortune to live close to these poultry farms and those people with homes along the haulage routes of the trucks servicing these farms are going to be greatly impacted by the large amount of noise produced by these farms. Broiler farms are a 24 hour a day operation so there will be no respite from the noise that is produced by these farms. Even the poultry industry itself admits that it is simply unworkable to expect a chicken farming operation to operate with no noise.* • ***Dust**. The dust (particulate matter) that will be produced by all these poultry farms will have a detrimental effect on the air quality of the local area. The adjoining properties to these poultry developments will be impacted the most. The cumulative impacts of odour and dust produced by all these poultry farm*	Any further development of poultry operations within the Tamworth Region would be subject to the legislative requirements and provisions under NSW's planning legislation, the *Environmental Planning and Assessment Act 1979*. Potential impacts associated with these developments would be assessed as part of the relevant assessment processes, prior to approvals being issued.

developments will have a very significant detrimental effect on the region's air quality.

- ***Health Impacts**. The quality of life of the region's population will be impacted by all these poultry developments. Local residents will have to breathe in the air contaminated by the offensive odours and dust produced by all these developments on a daily basis. Scientific studies have shown that Air Pollution produced by odour and dust can have serious health impacts such as heart attacks and increased rates of asthma. Local residents will be impacted by the noise that these developments produce, and as a result will suffer from sleep disturbance.*
- ***Lights**. The people who live in close proximity to poultry farms or live along the haulage routes that service these farms will be subjected a significant amount of headlight intrusion as a result of the large increase in the volume of traffic coming and going to the farms at night.*
- ***Property Devaluations**. The adjoining landowners to these poultry developments (some of which will be very large operations) will have the value of their properties significantly impacted as a result of the adverse impacts these developments will have on them. People with properties along the haulage routes to and from these developments will potentially have the value of their properties adversely impacted.*
- ***Land Use Conflict**. It is well known and documented that the poultry industry causes land use conflicts. The impacts of odour, dust, traffic, noise, visual amenity and property devaluations are the main forms of conflict. Every year the Environmental Protection Authority receives a large number of complaints about poultry farms, especially in relation to odour issues. The Department of Primary Industries advises that land use conflict arising from odour from the poultry industry is a significant issue that has the potential to inflame community tensions.*

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• ***Biosecurity Risk****. This very large concentration of poultry developments in the region has the potential to be a major biosecurity risk. Should there be a pollution incident or a contamination issue at any of the poultry developments in the area the entire region could be impacted. With all the vehicle movements to and from the poultry developments on a daily basis there is a very high risk of the spread of disease and pests. All these vehicle movements have the potential to carry with them and spread diseases, insect pests and invasive weeds.*	Baiada adheres to best practice biosecurity to prevent the introduction and dissemination of disease. Maintaining meat chickens and breeding flocks in sound health, and free of disease is required to achieve good animal welfare outcomes as well as optimal performance and productivity. Therefore, maintaining biosecurity is fundamental to the success of the business. For this reason, Baiada's Policies, Standards, farm infrastructure requirements and all operational activities are underpinned by a solid understanding of the biosecurity risks and the measures that need to be consistently implemented and monitored to ensure risks are appropriately mitigated. Biosecurity practices are in accordance with the *National Farm Biosecurity Manual for Chicken Growers* and Baiada's *National Quarantine Policy* and *National Animal Welfare and Biosecurity Manual*. Implementing the requirements outlined in the meat chicken industry's Manual is contractually enforced on all farms raising chickens for Baiada. Routine farm visits by Baiada personnel and a rigorous internal biosecurity auditing program ensures that compliance is optimal at all times. Furthermore, the vertically integrated nature of the business enables biosecurity and disease prevention strategies to be managed and implemented through-chain with close attention to the management and health status of each farm and facility within the operation. Baiada employs a team of people who are responsible for visiting farms on a regular basis throughout each batch and are competent at assessing farm management and the health status of meat chicken and breeder flocks. All farms are required to record daily mortality and monitor a range of other parameters that provide a detailed assessment of flock health, management and performance. If set trigger levels are exceeded, the reporting system generates an automatic alert and sends this to the Baiada representative responsible for supervising the farm. This system, in addition to proactive reporting by farm personnel, enables timely investigation to occur in the event of any mild increase in mortality. Regular training in biosecurity, signs of ill-health and farm management is provided by Baiada and third party certified. The Tamworth region also has a full-time poultry veterinarian who is also responsible for routinely visiting farms and assessing the health status of flocks. The focus of a poultry veterinarian is on disease prevention rather than disease investigation. The veterinarian is responsible for developing the vaccination

SUBMISSION DETAILS	APPLICANT'S RESPONSE
	program for the region, monitoring response to vaccination and reviewing quarantine and biosecurity protocols. In the event of any flock health or biosecurity issues, the veterinarian develops a tailored response plan and thoroughly monitors the implementation of this plan. Furthermore, the majority of diseases affecting meat chickens are species specific. They do not pose a risk to the health of other livestock species or humans. Therefore, if there was a disease outbreak affecting meat chickens was to occur, this would affect the operation of Baiada's business in the region primarily. In this circumstance, it would be in the best interests of Baiada to minimise the risk and prevent the spread. Therefore, ensuring optimal preventative quarantine and biosecurity procedures are in place to prevent such an outbreak is considered critical. Baiada has set trigger levels and indicators for determining when exotic or emergency disease investigation must occur. This protocol would enable rapid and early detection and subsequent on-farm flock depopulation to minimise the risk to farms in the surrounding area. A detailed biosecurity prevention strategy and documented movement protocols are outlined in Baiada's *National Animal Welfare and Biosecurity Manual*. Waterfowl and wild bird risk mitigation procedures also form part of this plan. Chlorination of surface water used for drinking and cooling systems is strictly monitored with automatic alerts generated for any daily readings that do not meet stipulated minimum requirements. With respect to insect pests, the only risk would be posed by flies. This is not considered to be a significant issue on poultry farms relative to other livestock farms. Fly populations can be successfully managed. Poultry lice, fleas and mites are very rarely ever encountered on commercial farms. Again, these poultry parasites are species specific and can be identified and treated on farm if they are identified at any stage. Rodent control is routine on all poultry farms with logs kept of rodent activity and bait replenishment. Dead bird disposal protocols, including the requirement for freezers for storage prior to regular collection, ensure that flies and other pest species are kept to a minimum and farm hygiene is optimal. Furthermore, chicken meat and chicken meat breeder farms are operated as all-in-all-out facilities with full depopulation, cleaning and disinfection occurring between flocks. Strict

SUBMISSION DETAILS	APPLICANT'S RESPONSE
	protocols around cleaning and disinfection between flocks minimises the risk of carryover of pathogens and maintains the health status of farms in the region. Baiada's biosecurity, hygiene, management and health monitoring protocols are sophisticated and are in accordance with industry best practice. They are developed by a veterinary team and monitored by Baiada veterinarians and livestock personnel. The systems that are in place are designed to safeguard animal welfare, performance and productivity and ensure the success of the business into the future.
• ***Environmental Concerns***. *What are the* ***potential*** *environmental ramifications as a result of all these poultry developments? Every poultry development within the region has the potential to have a pollution incident or a contamination issue, what effects would this have on the local environment? There is potential for the local streams and rivers being polluted by these developments as well as the air pollution these developments will emit on a daily basis.*	Any further development of poultry operations within the Tamworth Region would be subject to the legislative requirements and provisions under NSW's planning legislation, the *Environmental Planning and Assessment Act 1979*. Potential impacts associated with these developments would be assessed as part of the relevant assessment processes, prior to approvals being issued.
There has been considerable concern and opposition expressed towards proposed large scale broiler farms in the region. *Baiada has development approval for a 70 shed broiler farm on the property known as "Strathfield", Namoi River Road, Manilla. This development proposal caused considerable angst in the local community, and its approval was challenged in the Land and Environment Court. It was ultimately approved with stringent conditions.* *Another major poultry development has been proposed at Rushes Creek (SSD 7704). This development has yet to be determined by the Department of Planning. The proponents of this development are having difficulty in meeting the requirements of the NSW Environment and Protection Authority and the NSW Department of Primary Industries. There is also considerable local opposition to this development proposal.*	Any further development of poultry operations within the Tamworth Region would be subject to the legislative requirements and provisions under NSW's planning legislation, the *Environmental Planning and Assessment Act 1979*. Potential impacts associated with these developments would be assessed as part of the relevant assessment processes, prior to approvals being issued.
NRAR & Water Response	

SUBMISSION DETAILS	APPLICANT'S RESPONSE
DPIE – Water and Natural Resources Access Regulator ***Pre-approval Recommendations*** *It is recommended that, as part of the EIS, the proponent should:* • *Develop a groundwater monitoring plan to manage the risk of leakage from the lagoons and resulting contamination.*	The Advanced Wastewater Treatment Plan (AWTP) has been redesigned and is documented in the revised Waste Water Treatment Report included as **Attachment 3.** The revised waste water treatment plans will see all wastewater from the rendering facility treated separately at the existing wastewater treatment plant which is operational, and has been designed to accommodate additional volumes requested in this EIS. Operation and monitoring of the existing waste water treatment ponds will continue in accordance with existing approval requirements. The AWTP which will treat the waste water from the proposed processing plant no longer requires additional SBR / CAL ponds to be constructed. Following the treatment process, the AWTP will generate a concentrated brine stream which is held on site in accelerated evaporation ponds, before being dried out and periodically taken offsite to a licensed disposal facility. Three 10,000 m2 evaporation lagoons, with a minimum depth of 1.5m are proposed to be constructed on site to accommodate the concentrated brine discharged from the AWTP. The ponds will include a minimum freeboard of 500mm in order to accommodate the 7-day RDRD (rare design rainfall depth) for a 1 in 2000-year event, of approximately 480mm. The ponds will require raised banks to avoid ingress of stormwaters which fall outside the pond footprint. The ponds will be lined with HDP Plastic or clay to ensure that no leakage occurs. The advanced waste water system and evaporation ponds are shown on the revised development plans included as **Attachment 1.** Further details are provided in the revised Waste Water Treatment Report included as **Attachment 3.** No groundwater will be used within the processing plant.
• *Include a map of surrounding bores and borehole logs to support the findings on groundwater (as determined in the EIS).*	The Contaminated Site Assessment provides the commentary within the EIS with respect to groundwater. The onsite groundwater bore log is included as an Appendix 3 of that report. The location of the onsite groundwater bore is Latitude 31º04'05.3"S and Longitude 150º50'21.1"E.

SUBMISSION DETAILS	APPLICANT'S RESPONSE
• *Confirm the maximum annual water volumes to be accessed and the proposed water sources. Confirm the ability to access this volume e.g. via agreement with council or via purchase of water entitlement if groundwater is proposed.* ○ *If groundwater is required, the proponent will need to assess impacts of any proposed bore on the water source and adjacent users.* • *Provide confirmation by the water supply authority that the volume of water required for the proposal is adequately serviced at the proposed location.*	Based on current estimates, at full operation, the Oakburn processing plant will consume up to 8ML of potable water per processing day. As the processing plant will result in closure of operations at Out Street, the overall increase in potable water demand will be approximately 6ML per processing day. Recognising sustainability, climate change, seasonal variability and the development's dependence on potable water, Baiada is proposing to use advanced water treatment technology to treat the wastewater and allow up to 90% to be re-used by the facility. This will mean that the overall water use at the facility will be approximately 800KL per processing day which is less than the existing processing plant. Water will initially be sourced from Tamworth Regional Council's potable water supply (up to 8ML). However, with the operation of the Advanced Water Treatment Plant, 100% of the water will be treated and approximately 90% (7.2ML) will be treated to a potable standard and will be reused within the processing plant. As such, overall the water consumption of the facility will be less than the existing water usage at the Out Street facility. No groundwater will be used by the processing plant.
• *Reassess the storm water rainfall runoff model using the complete rainfall record.*	A revised Stormwater Management Plan is provided as **Attachment 8**. The rainfall model that runs from 1958-1992 relates to the MUSIC modelling for stormwater treatment analysis, and not the detention assessment. The rainfall station at Tamworth Airport only has pluviograph rainfall data from 1958-1992 which is why this time period was selected for modelling purposes. The use of this rainfall station for the MUSIC modelling for the development was agreed with Council officers as part of the Stage 1 development. The detention basins are sized based on the site rainfall intensities under ARR1987.
Water Source and Retention *It is noted that based on current estimates at full operation, the proposed Oakburn Processing Plant will consume up to 8ML per day. It is noted within the EIS, that the existing Out Street plant uses 2ML per day (which will be closed) which results in a net increase in potable water demand of 6ML per day. Given*	Water will initially be sourced from Tamworth Regional Council's potable water supply (up to 8ML). However, with the operation of the Advanced Water Treatment Plant, 100% of the water will be treated and approximately 90% (7.2ML) will be treated to a potable standard and will be reused within the

SUBMISSION DETAILS	APPLICANT'S RESPONSE
the proposed Advanced Water Treatment Plant, the overall water make-up requirement is expected to be 2ML per day. The source and security of this volume is yet to be confirmed. *The size of the storm water retention basins do not appear to be large enough to contain all the storm water in a 1:100 year event. The model run from 16 August 1958 to 31 December 1992 is not sufficient. It does not include the storm event of 29/11/2008 where 164.2 mm of rain fell in one 24 hr period. The model appears to have only used the rainfall station that closed in 1992 and did not include the new station that commenced in 1993.* *The proposed ponds for stormwater detention on minor streams are considered exempt from harvestable rights calculations, provided they are solely to prevent the contamination of a water source. If this is not the case the dams must be considered in calculating the Maximum Harvestable Right Dam Capacity.*	processing plant. As such, overall the water consumption of the facility will be less than the existing water usage at the Out Street facility. The stormwater basins are for detention, not retention, and will completely drain following storm events. The rainfall model that runs from 1958-1992 relates to the MUSIC modelling for stormwater treatment analysis, and not the detention assessment. The rainfall station at Tamworth Airport only has pluviograph rainfall data from 1958-1992 which is why this time period was selected for modelling purposes. The use of this rainfall station for the MUSIC modelling was agreed with Council officers as part of the Stage 1 development. The detention basins are sized based on the site rainfall intensities under ARR1987. It is confirmed that the proposed stormwater detention basins are solely to prevent the contamination of a water source, and therefore exempt from harvestable rights calculations.
Groundwater Monitoring *The proposal will not be extracting groundwater as part of its water requirements. Water will be sourced from the town water supply and a treatment plant shall return 75% of the water used back to the plant for reuse. The proposed treatment plant will be installing two Covered Anaerobic Lagoons to a depth of about six metres below the surface. Monitoring bores will be required to determine if the lagoons leak. Groundwater monitoring bores and a groundwater monitoring plan have not been considered in the EIS.*	The Advanced Wastewater Treatment Plan (AWTP) has been redesigned and is documented in the revised Waste Water Treatment Report included as **Attachment 3.** The revised waste water treatment will see all wastewater from the rendering facility treated separately at the existing wastewater treatment plant which is operational, and has been designed to accommodate additional volumes requested in this EIS. Operation and monitoring of the existing waste water treatment ponds will continue in accordance with existing approval requirements. The AWTP which will treat the waste water from the proposed processing plant no longer requires additional SBR / CAL ponds to be constructed. Following the treatment process, the AWTP will generate a concentrated brine stream which is held on site in accelerated evaporation ponds, before being dried out and periodically taken offsite to a licensed disposal facility. Three 10,000 m2 evaporation lagoons, with a minimum depth of 1.5m are proposed to be constructed on site to accommodate the concentrated brine discharged from the AWTP. The ponds will include a minimum freeboard of 500mm in order to accommodate the 7-day RDRD (rare design rainfall depth)

SUBMISSION DETAILS	APPLICANT'S RESPONSE
	for a 1 in 2000-year event, of approximately 480mm. The ponds will require raised banks to avoid ingress of stormwaters which fall outside the pond footprint. The ponds will be lined with HDP Plastic or clay to ensure that no leakage occurs. The advanced waste water system and evaporation ponds are shown on the revised development plans included as **Attachment 1.** Further details are provided in the revised Waste Water Treatment Report included as **Attachment 3.** No groundwater will be used within the processing plant.
Post-approval Recommendations *Should the project be approved, the following is recommended:* • *Preparation of an erosion and sediment control plan which refers to the guidelines, Managing Urban Stormwater: Soils and Construction (Landcom 2004) to manage sediment loads during the construction period.* • *Groundwater monitoring bores be installed around the Covered Anaerobic Lagoons and a Water Management Plan be developed (in consultation with DPIE) as a condition of consent. Further detail is contained in Attachment A. This should also include:* *a. An incident response plan with triggers for the National Water Quality Management Strategy (NWQMS) guidelines (ANZECC/ARMCANZ latest issue) should the lagoons be found to be leaking.* *b. Revision of the size of the retention basins if the reassessment of the storm water rainfall runoff model shows that they are not large enough.* *c. Undertaking adequate groundwater sampling (e.g. including routine and event based).* *d. Scheduling of ongoing reporting in the plan.*	These recommendations can be included as conditions of approval.
NSW Health	
It is noted that the proponents intend to consider "a concept design for a Wastewater Treatment Plant (WWTP) followed by Advanced Water Treatment Plant (AWTP) on the proposed site.	A revised Waste Water Treatment Report is included as **Attachment 3** which demonstrates the advance waste water treatment system to be used to recycle water to a potable standard.

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The system is designed based on the staged production and processing up to 3 million birds per week. • *Based on current estimates and processing technology, the facility will require up to 8 million litres of potable water per day.* • *The Advanced Water Treatment Plant is designed to treat up to 8 million litres of water per day and allow recovery of up to 6 million litres (75%) for reuse.* • *Reuse of wastewater will have a significant impact on the water supply.* • *The AWTP will generate a concentrate stream produced by the final process stages of disinfection and salt reduction.* • *The Total Dissolved Solids (TDS) concentration at maximum recovery of water (i.e. 75%) will be approximately 5500mg/L, which at the maximum design flow (8 ML/day), equates to 11,000 kg TDS per day in 2ML of water.* • *The TDS mass discharged from the site will be same regardless of the flow treated in the AWTP.* • *The advanced water treatment plant (AWTP) process has been operating successfully at two poultry processing plants in Australia for over 10 years. We would recommend the proponent address the following issues in particular:* *Hunter New England Local Health District Population Health recommends that the proponents adhere to, amongst other relevant legislation and guidelines, the Australian Guidelines for Water Recycling: Managing Health and Environment Risks (Phase 1).* *System analysis and management;* 1. *Assessment of the recycled water system* 2. *Preventative measures for recycled water management* 3. *Operational procedures and process control* 4. *Verification of recycled water quality and environmental performance* 5. *Management of incidents and emergencies* *These guidelines set out a preventative risk-based approach to managing health and environmental risks associated with water recycling. The approach involves systematically assessing where and how hazards or hazardous events may arise*	This system will be designed to meet and exceed the re-use water quality standards including the log reduction values (LVR) of pathogens, as laid out in: • NSW Food Authority – Water Reuse Guideline – May 2008 • NSW Government – Management of private recycle water schemes – May 2008 • NSW Department of Primary Industries – Recycled Water Management Systems – May 2015 • Australian Government – NHMRC – NRMMC – Australian Drinking Water Guidelines 6 - 2011 The operation and management of the Advanced Water Treatment Plant will be included in the food safety program developed for the entire processing plant site. Furthermore, Critical Control Points for the processing plant will ne critical limits set. During operation of the AWTP, the proponent will undertake operational monitoring and corrections, calibrations and operation and maintenance. Prior to use of recycled water, the AWTP, will be operational for 12 weeks generating potable water supply for validation and testing. The initial start-up phase will consist of the following: **Week 1 –** Pre-validation **Week 2 –** Initial validation stage 1 **Weeks 3-6 –** Initial validation stage 2 **Weeks 7-11 –** Further validation **Week 12** – HACCP Verification and ongoing The water quality will exceed guidelines stipulated by NSW Food Authority and ADWG using a multi-barrier approach. The system and framework implemented from concept through operation will comply with *NSW Food Authority Water Reuse Guideline 2008*. The development of a comprehensive food safety program for the site (including the AWTP) will be prepared and approved by the relevant food safety authorities prior to commencement of operations and can be conditioned accordingly.

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and find their way to the point of use and how to protect consumers and the environment. *Recycled water comes from an inherently unsafe source, sewage, therefore prevention is an essential feature of effective recycled water quality management. Preventative measures, in the context of managing recycled water schemes, are the actions, activities and processes used to prevent significant hazards from being present in recycled water schemes or to reduce any hazards to acceptable levels.* *The identification and planning of preventive measures should always be based on system specific hazard identification and risk assessment, to ensure that the level of protection to control a hazard is proportional to the associated risk. When identifying existing preventative measures, or developing new measures, the following aspects must be considered:* • *The entire recycled water system, including the water source, its characteristics and proposed end uses;* • *Existing preventive measures, from source(s) to the user of recycled water, for each significant hazard or hazardous event;* • *Increased risk due to inadvertent or unauthorised actions;* • *Spatial aspects (these need to be considered when identifying preventive measures for environmental risks, because the sensitivity of receiving environments can vary over space);* • *Areas where the use or discharge of recycled water is not appropriate, due to, for example, environmental sensitivity or soil type or topography.* *Maximum risk (the risk with no preventive measures in place) and residual risk (the risk with the preventive measures in place) should be assessed for public health and environmental impacts e.g. assessment of harmful nutrient, salinity or sodicity build-up in any resource impacted by recycled water use and how this will be prevented, monitored and/or rectified.* *The risk assessment should identify actions for improvement such as introducing or enhancing preventive measures, as well as investigations to reduce uncertainties and further characterise risks. Actions identified in the risk assessment should be transferred to the Improvement Plan, prioritised and followed up.*	

SUBMISSION DETAILS	APPLICANT'S RESPONSE
The outcomes of the Risk Assessment should be prepared in a report that must include: – *Listing of the team involved in the risk assessment;* – *A process flow diagram and description of the recycled water scheme (from source to end use) identifying the critical control points and monitoring points;* – *A risk register.* *As the proposed development will recycle wastewater generated from the poultry processing plant, there may be potential implications for food safety and biosecurity. NSW Health strongly recommends that DPIE Major Projects seek input on these risks from the Department of Primary Industries.*	
NSW Rural Fire Service	
The NSW RFS has received and reviewed the Environmental Impact Statement (EIS) and understands the development proposal is for an Integrated Poultry Processing Plant. *The subject land is not mapped bush fire prone land by Tamworth Regional Council.* *The NSW RFS has no objection and no recommendations for any consent granted.*	Noted.
NSW Roads & Maritime Services	
Roles and responsibilities *The key interests for Roads and Maritime are the safety and efficiency of the road network, traffic management, the integrity of infrastructure assets and the integration of land use and transport.* *It is noted that the subject land has frontage to the Oxley Highway, and that roads accessing the site will intersect with that road. The Oxley Highway is a classified (State) road under the Roads Act 1993 (Roads Act). Tamworth Regional Council (Council) is the roads authority for all public roads (other than freeways or Crown roads) in the local government area pursuant to Section 7 of the Roads Act.*	Noted.

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Roads and Maritime can exercise roads authority functions for classified roads in accordance with the Roads Act. Any proposed works on a classified (State) road will require the consent of Roads and Maritime and consent is provided under the terms of a Works Authorisation Deed (WAD). *In accordance with the State Environmental Planning Policy (Infrastructure) 2007 (ISEPP), the Consent Authority is to be satisfied that the development is appropriately located and designed or includes measures to ameliorate traffic noise or vehicle emissions within the site of the development arising front he adjacent classified road. The proposed use meets the triggers contained in Schedule 3 of the ISEPP, and as such clauses 101 and 104 of the ISEPP apply.* ***Comments*** *Roads and Maritime has reviewed the EIS and submits the following comments to assist in the decision-making process:*	
1. *Roads and Maritime supports provision of the main access to the new facility from roads other than the Oxley Highway. However, it is noted that some restricted access is to be available to visitors and emergency vehicles directly from the Highway. It is requested that management measures be put in place to ensure that only those vehicles intended to access at that point (ie: visitors and emergency vehicles) can do so; particularly as the entry appears to lead directly to the large staff carpark.*	The existing access to Oxley Highway will be secured with a gate and signposted to ensure that this access is note available for general use. All staff, delivery drivers and contractors will be required to use the Workshop Lane access way as part of their respective agreements / contracts with the operator. An intercom and computerised gate will be utilised to permit occasional access by visitors or emergency personal as required. These restrictions can be conditioned as part of any Development Approval.
2. *The traffic data and outputs in the TIA are very general with no details of the impacts from the turning movements of large vehicles at key junctions. The determining authority should be satisfied that such movements can safely take place and will meet the Austroads warrants for turning traffic.*	The determining authority should be satisfied that such movements can safely take place and meet the Austroads warrants for turning traffic." The access roads for the site are those of the purpose-built West Tamworth Glen Artney industrial subdivision, which are approved for use by 25/26m B-doubles1 hence further assessment of their suitability to accommodate the heavy vehicles expected to be generated by the processing plant is not justified. With regard to Austroads warrants, it is noted that the intersections of Oxley Highway with Goddard Lane and Wallamore Road with Goddard Lane have both recently been upgraded and include channelised treatments in the major road for right turns, and auxiliary turn lanes in the major road for left turns. These current treatments represent those warranted by the highest combinations of turning and through traffic, and meet or exceed the treatments warranted by the long term peak hour forecast turning movements at those intersections

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	(TTPP, 2019). Similarly, the long term peak hour forecast turning movements at the intersection of Goddard Lane with Armstrong Street would warrant the minimum left and right turn treatments in Goddard Lane, which is consistent with its current layout.
3. Given that the proposal is for a 24/7 operation, Council should be asked to consider appropriate street lighting and way-finding for users of the site.	Noted. Appropriate lighting will be provided along the access driveway connecting to Workshop Lane, internal roads, car parking and pedestrian areas. These recommendations can be conditioned as part of any development approval.
4. Roads and Maritime has detected residue levels of PFAS adjacent to the Oxley Highway. It is noted that the EIS has also identified residue levels on the subject land. Council and the determining authority should be satisfied that roadworks and building works necessary to facilitate the new use can be safely undertaken and managed.	A Site Contamination report was prepared and submitted as part of the Environmental Impact Statement. As outlined in Section 4.6.5.3 of submitted EIS: *"PFAS was detected within the watercourse sediment of Lot 101 to the east of the processing site. The PFAS was identified at a concentration below adopted investigation threshold levels for human health or ecological screening. The PFAS chemicals are considered at trace levels in the sediment retained in a small gully dam within the adjoining Council land. This trace PFAS concentration is considered most likely to occur onsite because of lateral migration from the upstream registered PFAS contaminated site, mainly the Tamworth Regional Airport. This migration pathway is not expected to impact directly upon the proposed poultry plant development site. No physical contact pathways are present between the gully and the development site, other than during a period where the proposed access road would be constructed.* *Based on the methodology adopted for this investigation, the development site does not contain contaminated land that would impact construction of the Oakburn Processing Plant or pose an unacceptable risk to human health or the surrounding environment."*
5. Roads and Maritime is currently working with Council to investigate appropriate heavy vehicle access from the Oxley Highway into the industrial area, with work undertaken to date focused around Goddard Lane. Further information will be available in the coming months in respect to enabling heavy vehicle access in and around this area.	Noted.

SUBMISSION DETAILS	APPLICANT'S RESPONSE
6. *It should be noted that Workshop Lane is not an approved B-double route, and this should be rectified before use of that road is needed for larger design vehicles.*	Workshop Lane is currently a road stub only, and as such is not identified as a B-double route. However, Workshop Lane is constructed to a similar standard to Armstrong Street, is currently used by heavy vehicles, and is appropriate for the future use of heavy vehicles travelling to and from the Oakburn processing plant. An application will be made to RMS / Council to formally list Workshop Lane as an approved B-double route prior to commencement of the use and can be conditioned accordingly.
Tamworth Regional Council – Major Projects -	
The facility needs to comply with the NASF Guidelines in particular Guideline in relation to a facility located within 13 km of the airport. A written report from a consultant who is competent and qualified in assessments for the NASF guidelines should be obtained to satisfy the requirement that the development will not add or enhance hazards to the airport. *https://www.infrastructure.gov.au/aviation/environmental/airport_safeguarding/nasf/framework_factsheet.aspx* *An assessment by both Airservices Australia for airspace and air navigation effects, and with CASA in regards to safety of aircraft near the proposed facility.*	A Windshear and Wake Turbulence Impacts Report has been prepared by SLR Consulting Australia is included as **Attachment 4**. In relation to wind conditions experienced by aircraft landing from the northwest on Runway 12L, the assessment confirms: • The proposed development will have minimal/negligible impact in relation to the NASF-B mean wind speed deficit criteria, essentially no impact at wind speeds of practical interest. • NASF-B 4 kt turbulence level event exceedances are of the order of once per year with the proposed development – essentially the same as for existing conditions at the airport. This is attributed to the low profile of the proposed development buildings and low probability of occurrence of crosswinds of interest to this study (ie from the NE). Again, the proposed development will have minimal/negligible impact at wind speeds of practical interest on runway turbulence levels. It is noted that the Assessment was undertaken based on the previous building design. However, SLR Consulting were consulted and have confirmed that a revised assessment is not required for the proposed reduction in height / footprint associated with the re-design, noting the following: ***Note Regarding Building Envelope Changes*** *It is understood that the final design of the proposed development is currently being reviewed. Based on extensive studies undertaken by SLR and other Wind Engineering consultancies, the impacts identified in the present study would be an upper bound of expected changes to windshear and wake turbulence if any*

SUBMISSION DETAILS	APPLICANT'S RESPONSE
	proposed changes to the development result in a decrease of bulk envelope (especially height-wise) in the main operational building.
Tamworth Regional Council	
Water • *Baiada has recognised that water scarcity in the region is a significant issue and sought to reduce the impact of the proposed development through the inclusion of a water recycling system which would reduce the demand on the town water supply from 8ML/day to 2ML/day.* *For clarity, Council notes that it has not made provision within its existing reticulation network to deliver 8ML/day to the site of the Baiada Integrated Processing Facility (the proposed development). Consequently, it should not be assumed that 8ML/day would be available at the site without significant augmentation of the water reticulation network. In addition, Baiada should investigate contingency arrangements for the provision of water for the development in the event that there is a failure in the water recycling system.*	Based on current estimates, at full operation, the Oakburn processing plant will consume up to 8ML of potable water per processing day. As the processing plant will result in closure of operations at Out Street, the overall increase in potable water demand will be approximately 6ML per processing day. Recognising sustainability, climate change, seasonal variability and the development's dependence on potable water, Baiada is proposing to use advanced water treatment technology to treat the wastewater and allow up to 90% to be re-used by the facility. This will mean that the overall water use at the facility will be approximately 800KL per processing day which is less than the existing processing plant. Water will initially be sourced from Tamworth Regional Council's potable water supply (up to 8ML). However, with the operation of the Advanced Water Treatment Plant, 100% of the water will be treated and approximately 90% (7.2ML) will be treated to a potable standard and will be reused within the processing plant. With respect to contingencies: • The AWTP is split into two parallel process trains for operational redundancy to allow maintenance of operations in the event of breakdown or scheduled maintenance; • Following treatment by the AWTP, potable water is retained in potable water storage tanks capacity for 3 processing days (24 ML); and • The facility has a reticulated supply which could be used in emergency situations (subject to agreement with Tamworth water).
Wastewater - Reverse Osmosis Concentrate • *The Environmental Impact Statement (EIS) states, in a number of locations, that the reverse osmosis concentrate stream "will have a high concentration of dissolved salts" and "is intended to be discharged to the municipal sewer."*	The Advanced Wastewater Treatment Plan (AWTP) has been redesigned and is documented in the revised Waste Water Treatment Report included as **Attachment 3.** As well making 90% of the water suitable for re-use on site, the

SUBMISSION DETAILS	APPLICANT'S RESPONSE
Figure 16 of the EIS (page 87) states that the volumetric flow of the Reverse Osmosis (RO) Concentrate will be 2000m3/day, with Total Dissolved Solids (TDS) in the order of 5450mg/L. As noted in the EIS, a trade waste approval will be required before any trade waste, such as the concentrate stream, can be discharged to Council owned sewers and then for further treatment. The NSW Government's Department of Planning, Industry and Environment must grant concurrence to any trade waste application before Council can issue an agreement. Council's Environment Protection Licence (EPL) for the discharge of effluent to its 100% Effluent Reuse Farm has a TDS limit of 600mg/L and the proposed discharge of the RO Concentrate to TRC's sewerage system will result in TRC not being able to comply with its EPL limit for TDS. As a result, a Trade Waste Approval could not be issued under the proposed arrangements. *Council will continue to work with Baiada in relation to this issue however as the RO Concentrate cannot be accommodated within TRC's sewerage system under existing arrangements, the environmental assessment should include alternative methods for the disposal of the RO Concentrate.*	AWTP will also negate the need to discharge trade waste to Council's wastewater treatment plant. Following the treatment process, the AWTP will generate a concentrated brine stream which is held on site in accelerated evaporation ponds, before being dried out and periodically taken offsite to a licensed disposal facility. Efforts will be made to mine the remaining material for minerals as the technology becomes available. The advanced waste water system and evaporation ponds are shown on the revised development plans included as **Attachment 1.**
Wastewater - Secondary Effluent Discharge • *The Environmental Impact Statement states that "Up to 50% of Influent Flow", or 4 ML/day, of Secondary Effluent may be discharged, depending on the volume of wastewater intended to be recovered for re-use. However, there is no indication of where this Secondary Effluent is to be discharged to.* *Council advises that it has not made provision for this discharge in either its sewerage reticulation system, its wastewater treatment system, or its effluent disposal system. To make provision for an additional 4ML/day of trade waste, significant augmentation of Council's sewerage system, including treatment and disposal components, would be required. Additionally, as with the limitations which would need to be in place for the RO Concentrate, limitations may be needed on the Secondary Effluent to ensure that Council could meet its EPL limits.* *In order to fully assess the environmental effects of the proposed development, the Environmental Impact Statement should identify the end point for the disposal of the 4ML/day discharge and assess the impact of such a discharge on the receiving environment.*	The Advanced Wastewater Treatment Plan (AWTP) has been redesigned and is documented in the revised Waste Water Treatment Report included as **Attachment 3.** The revised waste water treatment will see all wastewater from the rendering facility treated separately at the existing wastewater treatment plant which is operational, and has been designed to accommodate additional volumes requested in this EIS. Treated wastewater from the rendering plant wastewater treatment plant will continue to be discharged to sewer in accordance with a trade waste agreement with Council. Water from the proposed processing plant will be treated by the AWTP treat 90% of the water to a potable standard, suitable for re-use within the processing plant. The AWTP will also negate the need for additional SBR and CAL Lagoons to be constructed on site. Following the treatment process, the AWTP will generate a concentrated brine stream which is held on site in accelerated evaporation ponds, before being dried out and periodically taken offsite to a licensed disposal facility.

SUBMISSION DETAILS	APPLICANT'S RESPONSE
	Three 10,000 m2 evaporation lagoons, with a minimum depth of 1.5m are proposed to be constructed on site to accommodate the concentrated brine discharged from the AWTP. The ponds will include a minimum freeboard of 500mm in order to accommodate the 7-day RDRD (rare design rainfall depth) for a 1 in 2000-year event, of approximately 480mm. The ponds will require raised banks to avoid ingress of stormwaters which fall outside the pond footprint. The ponds will be lined with HDP Plastic or clay to ensure that no leakage occurs. The advanced waste water system and evaporation ponds are shown on the revised development plans included as **Attachment 1.** Further details are provided in the revised Waste Water Treatment Report included as **Attachment 3.**
Wastewater - Sludge • *The process flow diagrams provided for the wastewater treatment system in the EIS indicate that there will be sludge from the Covered Anaerobic Lagoon, the Sequencing Batch Reactors, and the Secondary Solids Removal DAF. Section 4.14.3 indicates that the wastewater treatment system generates "a very small amount of solid material" and this "solid material is biological in nature, with some trade elements (mostly phosphorus) and is suitable for the beneficial application to land." Although the EIS states that this waste stream is "suitable" for beneficial land application, it does not specifically advise where the waste sludge streams will be disposed of, nor does it make a commitment to disposing of this waste by beneficial application to land.* *Currently, a significant amount of DAF sludge from existing Baiada facilities is disposed of to Council's Forest Road Landfill each year.* *The environmental assessment should identify each of the sludge streams, provide expected volumes produced by each, and nominate the final disposal points for each stream, so that the impact of the proposed disposal may be properly understood and assessed.*	Sludge from the DAF and Membrane bioreactor will be dewatered and collected on site before being transported (daily) for composting at a licensed facility. At full operation, it is estimated the sludge produced will be approximately 40 Tonnes (1 -2 truck loads).
Wastewater - Domestic Sewage • *The Environmental Impact Statement should confirm that the trade waste and the domestic sewage wastewater streams from the development are to*	The revised waste water treatment plan will see all wastewater from the rendering facility treated separately at the existing wastewater treatment plant which is operational, and has been designed to accommodate additional volumes requested in this EIS. Operation and monitoring of the existing waste

SUBMISSION DETAILS	APPLICANT'S RESPONSE
be kept separate, and nominate the volume, flowrate, method and location of the disposal of the domestic sewage to Council's sewer.	water treatment ponds will continue in accordance with existing approvals and trade waste agreements. Domestic sewage from staff amenities (estimated to be 1,176 on-site staff at full operation) will be discharged directly into Council's reticulated sewerage system via the services corridor nominated along the southern boundary of the site.
Waste • *Baiada currently contributes 10 - 15% of waste landfilled at Forest Road Landfill each year. Consequently, a three-fold increase in Baiada's processing capacity is of particular concern to Council. Baiada's three largest categories of waste in descending order of volume are Offal, DAF Sludge, and Commercial Non-recyclable. DAF Sludge has been discussed in the Wastewater comments above.*	Noted. Please see responses to the other matters raised.

SUBMISSION DETAILS	APPLICANT'S RESPONSE
Solid and Packaging Waste • *The anticipated annual volumes of recyclable and non-recyclable waste should be provided.*	**<u>EXISTING OPERATIONS</u>:** **Out Street Processing Plant:** Analysis of the current operations at Out Street Processing Plant (18/19 Financial Year) has shown that the current processing operation generates a yearly volume of: • 450T non-recyclable waste to of landfill (~8T per week); • 72T of recyclable materials (primarily packaging); and • 3,078T of DAF sludge (which is compostable). Total landfill percentage diversion was 87% (with DAF sludge) or 14% (without sludge). Currently, Out Street generates 8.5 Tonnes/week commercial waste, however the vast majority of this is plastic liners from bones (from Ipswich / Pendle Hill). These are transferred at Out Street prior to being sent to rendering. This process will cease as with the new processing plant. **Oakburn Rendering:** Analysis of the current operations at Oakburn Rendering has shown that the current processing operation generates: • 2,340T of DAF sludge each year. In the past, 100% of the DAF Sludge was sent to landfill. With the de-commissioning of the existing DAF, DAF Sludge will reduce from 45 Tonnes per week to ~3 Tonnes per week (i.e. SBR biomass sludge with remain at 3T/week). Baiada will be seeking an exemption to apply to land for beneficial re-use or compost, effectively negating the need for land fill. This strategy will be maintained in the future. **<u>PROPOSED OPERATIONS</u>:** **Oakburn Processing Plant / Rendering Plant:** It is currently projected that the Oakburn processing plant will generate the following yearly volumes of wastes and recyclables: • 520T non-recyclable waste to of landfill (~10T per week); • 78T of recyclable materials (primarily packaging); and • 10,556T of DAFF sludge which us compostable. As outlined above, Baiada will be seeking an exemption to apply the Rendering Sludge (~3t / week) to land for beneficial re-use or composting.

SUBMISSION DETAILS	APPLICANT'S RESPONSE
	With respect to the AWTP DAF and bioreactor sludges, it is intended to be will be dewatered and collected on site before either being used for beneficial reuse (which would require an exemption) or transported (daily) for composting at a licensed facility.
Processing Wastes • *The Environmental Impact Statement implies in section 4.14.2 that solid waste, such as offal, will be fully recycled, as there is discussion of this recycling and no indication that any of this waste would remain to be disposed of. The EIS should provide more detail on the types of solid waste generated on site, the amounts generated, the amount, if any, of this waste that will be disposed of offsite, and the method for disposal.* *Council recognises the economic development potential of this development for the City of Tamworth and will work with the developer to find solutions for the water, wastewater and waste issues identified.*	The onsite Rendering Plant currently processes and will continue to process all poultry "waste" materials including offal, blood and feathers from the processing plant as well as farms in the region (mortalities). Material is transported in sealed containers to the site where it is weighed before being unloaded within the internal raw material handling area. The different raw material streams are unloaded into different collection bins and will be processed on separate rendering lines to create different products. The Rendering Plant will continue to operate as per current arrangements, with the exception of the material being transported via pipe from the proposed processing plant to the Rendering Plant. Other recyclable and non-recyclable waste streams are discussed above.
Section 7.12 (Indirect) Development Contributions • *Contributions pursuant to section 7.12 of the Environmental Planning and Assessment Act 1979 should be levied in accordance with the Tamworth Regional Council Section 94A (Indirect) Development Contributions Plan 2013. It is noted on page 35 of the EIS that "For the purposes of calculating any contributions payable under the Tamworth Regional Council Section 94A (lndirect) Development Contributions Plan 2013, a levy of 1% of development costs (the costs of erecting a building) would be payable based on $132,947,020 which excludes equipment costs and consultant fees.* *As the total cost of the development is $208,545,901, a cost breakdown demonstrating how the $132,947,020 figure was calculated in relation to the Tamworth Regional Council Section 94A (lndirect) Development Contributions Plan 2013 is requested.*	An Amended Capital Investment Value Report has been prepared and is included as Attachment 11. The Capital Investment Value (CIV) of the above is $221,808,742 (Excl. GST) comprised of $215,980,752 of works and equipment plus an allowance for consultant's fees of $5,827,990.
Section 64 Water and Sewer Headworks	Noted.

SUBMISSION DETAILS	APPLICANT'S RESPONSE
• *Contributions pursuant to Section 64 of the Local Government Act 1993 would be levied, based upon water usage and wastewater discharge.* *Water and Sewer Headwork's contributions would be calculated based on adopted rates under Councils Annual Operation Plan. Revised rates adopted in subsequent Annual Operation Plans will apply to Headworks Contributions paid in later financial years.*	
Teys Tamworth	
Teys support the proposed development, as the proposed use does not conflict with that which already exists in this industrial area. Westdale is an established and thriving industrial hub, responsible for major contribution to the regional economy. There continues to be investment into industrial purpose within Westdale from mostly private industry and it is on that basis that Teys welcomes further industrial development. *Teys is committed to taking a role as a sustainability leader; continually improving energy and water productivity and creating sustained value for our customers and shareholders including the communities in which we operate.* *Teys understands that the proposed development may generate some undesirable impact, and increased burden on environmental aspects such as Odour Nuisance and Potable Water Availability. Notably:-*	Noted.
1. The odour generated by the proposed process may cumulate with impacts from existing nearby livestock intensive industries and this can have a detrimental impact on residential experience; and,	The subject site is located within a livestock and food processing hub identified by Council for the purpose of locating businesses such as poultry production at the edge of Tamworth. The EIS is supported by an Odour Impact Assessment which has identified the addition of the Poultry Processing Facility modelled along shows the predicted odour impact does not largely exceed the NSW EPA odour criteria of 5 odour units beyond the site boundary. The results are below the odour criteria at the nearest sensitive receptor and that the proposed Poultry Processing Facility is unlikely to cause adverse odour impacts under normal conditions within the assumptions made. Furthermore, the modelling is almost certainly overstated as it considers all proposed and existing odour sources including treated odours

SUBMISSION DETAILS	APPLICANT'S RESPONSE
	and odours of different characters that do not combine in the atmosphere and tend to be observed individually.
2. *The net increase of 6ML of potable water per day places undue burden on already impacted water availability – Tamworth LGA have recently implemented Level 4 water restriction for existing usage and have advised this is likely to worsen based on forecast weather and water scarcity. It is noted that Baiada proposed implementation of an advanced water treatment system however this will not impact the net daily demand on potable, town water.*	Based on current estimates, at full operation, the Oakburn processing plant will consume up to 8ML of potable water per processing day. As the processing plant will result in closure of operations at Out Street, the overall increase in potable water demand will be approximately 6ML per processing day. Recognising sustainability, climate change, seasonal variability and the development's dependence on potable water, Baiada is proposing to use advanced water treatment technology to treat the wastewater and allow up to 90% to be re-used by the facility. This will mean that the overall water use at the facility will be approximately 800KL per processing day which is less than the existing processing plant.
Teys understand these concerns are shared by other key industrial facility operators within Westdale, as the proposed impact on these aspects may constrain future growth of existing industrial use and investment within the Westdale area. Teys makes supplication to the Department for careful consideration of these aspects when preparing development consent.	Noted.
Transport for NSW	
TfNSW has reviewed the relevant documentation within the exhibited Environmental Impact Statement (EIS) and has no comments on the subject development application.	Noted.
WaterNSW – Major Projects	
The proposal is not located near any WaterNSW land, assets or infrastructure, therefore we have no particular comments or requirements regarding the proposal. WaterNSW requests the Department continues to consult with WaterNSW for any development that may impact on our assets, infrastructure or land.	Noted.

SUBMISSION DETAILS	APPLICANT'S RESPONSE
People for the Ethical Treatment of Animals (PETA)	
It is proposed that up to 3 million birds would be slaughtered at this facility every week, triple the number currently killed at the Out Street plant. As noted in the environmental impact statement (EIS), the existing facility uses an average of 2 megalitres of water per processing day, and it is estimated that the proposed facility would consume up to 8 megalitres of potable water per processing day when operating at full capacity. Like much of New South Wales, Tamworth is in drought, and much of the area is currently subject to water restrictions. In December 2019, the state government cut off the Peel River, which supplies water to Tamworth, in order to prevent the entire river from running dry. This left five chicken farms – which supply the vast majority of poultry to Baiada's processing plants – without water, and judging by media reports, the issue seems to be as yet unresolved. Meanwhile, the EIS prepared by the applicant states that an additional 300 broiler sheds would be required in order to supply the new processing facility. Like all forms of animal agriculture, poultry farming is a thirsty industry, and planning to expand such operations in a town that's already so dry is senseless. Water is essential to life – eating chicken is not.	Based on current estimates, at full operation, the Oakburn processing plant will consume up to 8ML of potable water per processing day. As the processing plant will result in closure of operations at Out Street, the overall increase in potable water demand will be approximately 6ML per processing day. Recognising sustainability, climate change, seasonal variability and the development's dependence on potable water, Baiada is proposing to use advanced water treatment technology to treat the wastewater and allow up to 90% to be re-used by the facility. This will mean that the overall water use at the facility will be approximately 800KL per processing day which is less than the existing processing plant. Any further development of poultry operations within the Tamworth Region would be subject to the legislative requirements and provisions under NSW's planning legislation, the *Environmental Planning and Assessment Act 1979*. Potential impacts associated with these developments would be assessed as part of the relevant assessment processes, prior to approvals being issued.
The proposed facility would operate 24 hours a day, seven days a week. Because three times as many birds would be processed in the area, there would be extra traffic, which would not only put pressure on existing infrastructure but also increase noise pollution on the routes between chicken farms and the proposed processing plant. According to Section 4.10.4 of the EIS, one of the busiest periods for traffic generation would be in the middle of the night, with up to 236 vehicle trips per hour between midnight and 1 am.	As noted in the Traffic Report submitted with the EIS confirms that *"the existing road network has sufficient capacity to accommodate the traffic generated by the processing plant with acceptable impacts on the operation of the key intersections".* The Revised Acoustic Report included as **Attachment 6** has assessed road noise impacts associated with the development and confirmed compliance with the EPA's Road Noise Policy. In particular, the acoustic assessment states "*The RNP also recommends that the increase in road traffic noise levels due to redevelopment of an existing land use development not exceed 12dB(A) during the day and night for freeways and arterial roads. As can be seen by the results in the above Tables, the relative increase due to the development is not expected to be more than 8.8dB(A) during the day and 9.7dB(A) at night and considered acceptable."*
Operations at the facility – as well as the chickens' waste and the bodies of dead chickens – would likely produce strong odours, which could disturb local residents	A revised Air Quality Impact Assessment, including an Odour Management Plan has been prepared by The Odour Unit and is included as **Attachment 7**.

SUBMISSION DETAILS	APPLICANT'S RESPONSE
and other businesses and have a negative impact on their quality of life. For years, Tamworth residents have complained of the smell of the existing Baiada facility. Expanding operations would mean exacerbating odour problems.	The Air Quality Impact Assessment has found: - The predicted odour impact for Protein Recovery Plant and Poultry Processing Facility (including the waste water treatment plant) is below the NSW EPA Odour Impact Assessment Criteria; - The results are below the Odour Impact Assessment Criteria at the nearest sensitive receptor; - The odour contour encroaches beyond the site boundary marginally to the north and marginally to the south. - The proposed Poultry Processing Facility is unlikely to cause adverse odour impacts under normal conditions within the assumptions made for this assessment; - An Odour Management Plan (OMP) is to be adopted as part of any approval. An OMP is a documented operational management system. The OMP is designed to eliminate, prevent or minimise the potential odour generation through a hierarchy of controls through engineered, administration and/or management practices.
According to Section 4.5.5.1 of the EIS, in order to construct the proposed development, approximately 0.83 hectares of Box-Gum Woodland and 0.51 hectares of planted native vegetation would be removed. Bushfires have already decimated the habitats of native species in New South Wales, and animals such as koalas and bats are moving outside their normal territories in search of shelter and food. Removing native vegetation from the area at this crucial time of ecosystem recovery could have negative consequences for koala populations, which are already in decline in the New England area.	The Biodiversity Development Assessment Report prepared to assess the impact of the development upon biodiversity states "There is some limited habitat connectivity between the subject land and surrounding areas, including planted vegetation associated with Boltons Creek…". With respect to the survey methods undertaken for koalas, the BDAR states "*Surveys were undertaken for all remaining species credit species. None of these species were recorded within the subject land, and none are considered likely to occur… Nocturnal spotlighting was undertaken… Call playback was undertaken using a recording of the Squirrel Glider and Koala calls and involved playing the call for five minutes*." With respect to the survey methods undertaken for bats, the BDAR states "*Searches of the subject land failed to detect any bats roosting. Furthermore, targeted surveys for microbats failed to detect the species utilising the subject site in any capacity and it is therefore unlikely the species is reliant on these structures or that they are using the site as anything other than occasional foraging and roosting habitat.*"

SUBMISSION DETAILS	APPLICANT'S RESPONSE
	Despite these survey methods, none of these bats or koalas were sighted or heard. Regardless of this, there are several mitigation measures recommended in the BDAR, which are: • Construction mitigation measures – timing of construction works, delineation of clearing areas, pre-clearance surveys, sedimentation control measures, weed management; • Mitigation measures for prescribed impacts – human made structures, non-native vegetation, connectivity of different areas of habitat that facilitates movement across a species' range, movement of threatened species that maintains their lifecycle, vehicle strike; and • Adaptive management of uncertain impacts – vehicle strike.
The proposed facility does not align with the aims of the New England North West Regional Plan 2036,7 specifically goals 1, 2, and 4. *o* ***Goal 1 – a strong and dynamic regional economy:*** *The word "dynamic" means "characterized by constant change, activity, or progress". Building another chicken processing plant and potentially another 300 broiler sheds in an area that is already dominated by animal agriculture is just the opposite of dynamic.* *o* ***Goal 2 – a healthy environment with pristine waterways:*** *Expanding a facility that is so water-intensive during a time of drought is not consistent with responsible water use, let alone the maintenance of "pristine" waterways. Furthermore, the odour issues discussed above deny local residents a healthy environment.* *o* ***Goal 4 – attractive and thriving communities:*** *The proposed development is a very large structure and would have a significant impact on views of the local area. Few people would consider a poultry plant attractive, and owing to its proximity to Tamworth Airport, it would likely be one of the first and last things that visitors to the area would see and smell. Since operations would take place 24 hours a day, noise caused by truck movements to and from the plant in the early hours of the morning would have the potential to disrupt the sleep of local residents every day of the week.*	The vision for the region contained in the plan includes the following statements which align with the core objectives of the proposed development: • *Growth in agriculture, agribusiness, livestock meat production, mineral resource development, renewable energy, health and education is providing jobs and supporting thriving local communities.* • *Primary production, intensive agriculture and food processing sectors take advantage of the rich soils and climate.* • *Strategically located, with close links between some of Australia's fastest growing areas – South East Queensland, Newcastle and Sydney - is attracting industry investment.* A comprehensive assessment of the facility demonstrating its clear alignment with the New England North Wes Regional Plan is provided in Section 4.1.3 of the Submitted EIS.

SUBMISSION DETAILS	APPLICANT'S RESPONSE
Finally, the facility would cause immense suffering to the chickens who would be slaughtered there at less than 2 months of age. Chickens are intelligent, social animals who can feel pain and distress. Last year, a PETA exposé of Baiada found widespread cruelty in its abattoir and breeding facility. Despite the presence of CCTV cameras at the abattoir, workers punched chickens in the head and bashed them against metal railings before shackling them by the legs. One worker told the eyewitness that he would "just start smashing birds". The eyewitness saw another worker repeatedly tearing birds' heads off – and even putting a severed head on his finger and wiggling it about like a finger puppet. In order to kill 3 million birds a week at the proposed facility, the slaughter line would be extremely fast-paced, meaning that many birds would still be conscious as their throats were slit and that workers would likely endure inhumane conditions.	As noted in the EIS, Baiada have in place a *National Livestock Animal Welfare and Biosecurity Manual* and an approved *Animal Welfare Policy* which states that the treatment of all birds will be ethical and humanely treated throughout all stages of production. Both of these documents were included in the EIS documentation. Furthermore, Baiada is committed to meet or exceed the standards of care detailed in the following Primary Industries Standing Committee documents: - *Model Code of Practice for the Welfare of Animals – Land Transport of Poultry (2006); and* - *Model Code of Practice for the Welfare of Animals – Livestock at Slaughtering Establishments (2002).*

ATTACHMENT 1: REVISED PLANS

AP01

PAVEMENT LEGEND

BIT.	HOT MIX BITUMEN
CONC.	CONCRETE FOR HEAVY VEHICLES
EX-CONC.	EXISTING CONCRETE

HEAVY DUTY CONCRETE (25,515sqm)

EXISTING CONCRETE (6,525sqm)

LIGHT DUTY PAVEMENT (36,000sqm)

SBA ARCHITECTS

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ISSUE	REV.	DESCRIPTION	DATE

CLIENT

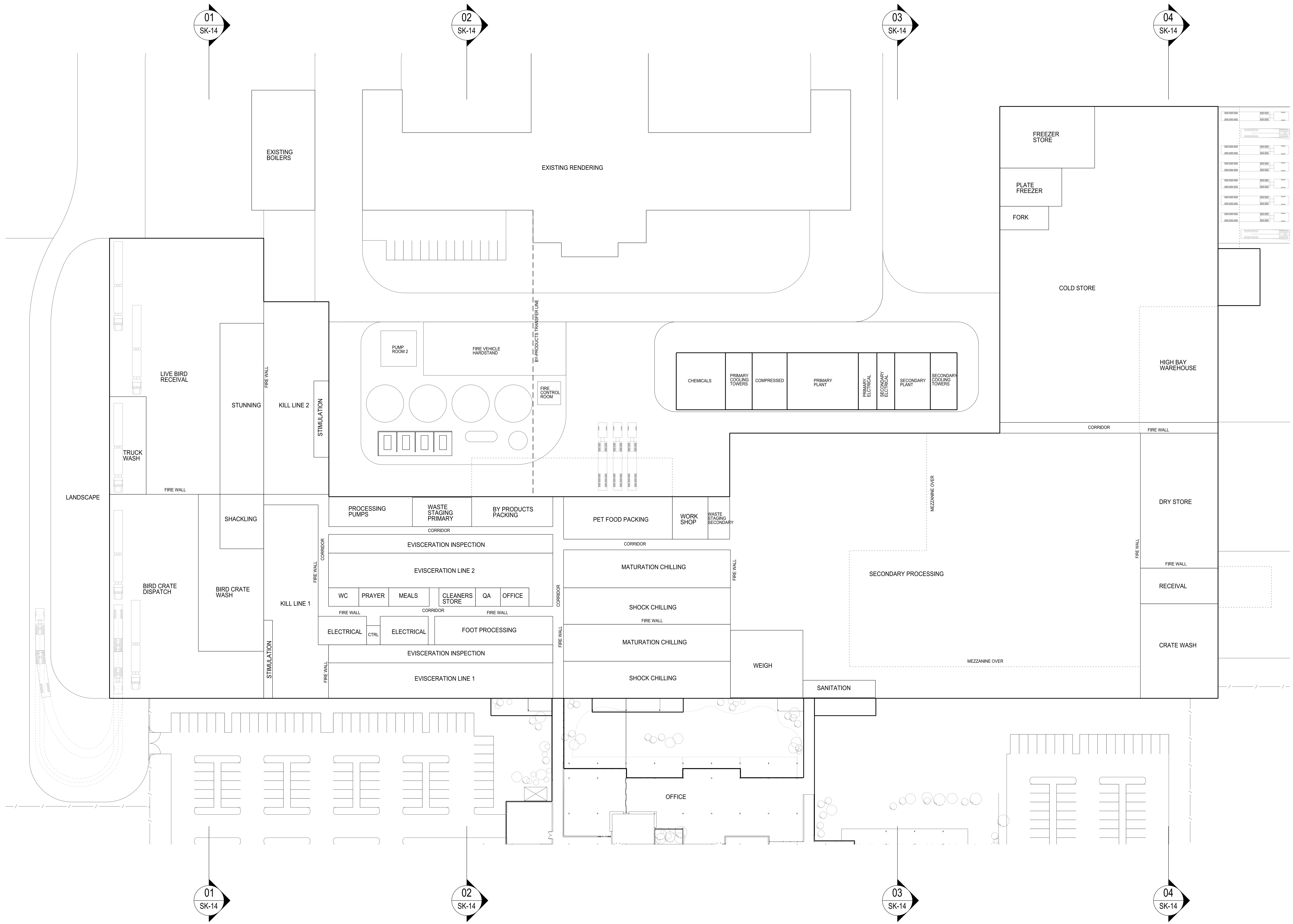
OAKBURN PROCESSING PLANT

OXLEY HIGHWAY, TAMWORTH

DRAWING TITLE

SITE PLAN

DATE	SCALE	JOB NO.	DRAWING NO.	
22.06.20	1:2000@A1	19106	SK 10	F



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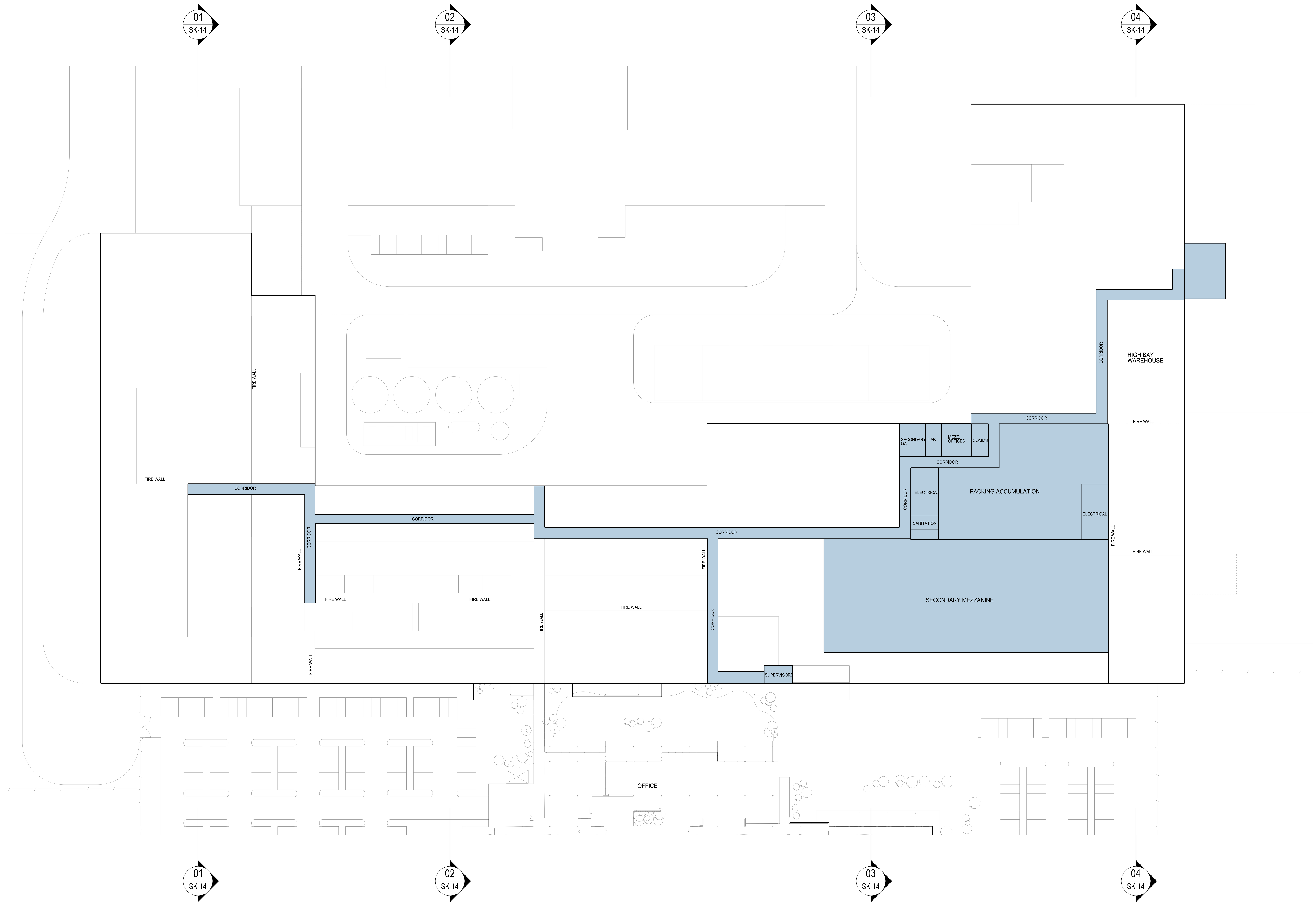
OXLEY HIGHWAY, TAMWORTH

DRAWING TITLE

GROUND FLOOR PLAN
PROCESSING FACILITY

DATE	SCALE	JOB NO.	DRAWING NO.	
23.06.20	1:500@A1	19106	SK 11	B



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ISSUE	REV.	DESCRIPTION	DATE

CLIENT

OAKBURN PROCESSING PLANT

OXLEY HIGHWAY, TAMWORTH

DRAWING TITLE

MEZZANINE PLAN PROCESSING FACILITY

DATE	SCALE	JOB NO.	DRAWING NO.	
23.06.20	1:500@A1	19106	SK 12	B

01 SOUTH ELEVATION 1:500

02 EAST ELEVATION 1:500

03 NORTH ELEVATION 1:500

04 WEST ELEVATION 1:500

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ISSUE REV. DESCRIPTION DATE

CLIENT

OAKBURN PROCESSING PLANT

OXLEY HIGHWAY, TAMWORTH

DRAWING TITLE
ELEVATIONS

DATE	SCALE	JOB NO.	DRAWING NO.	
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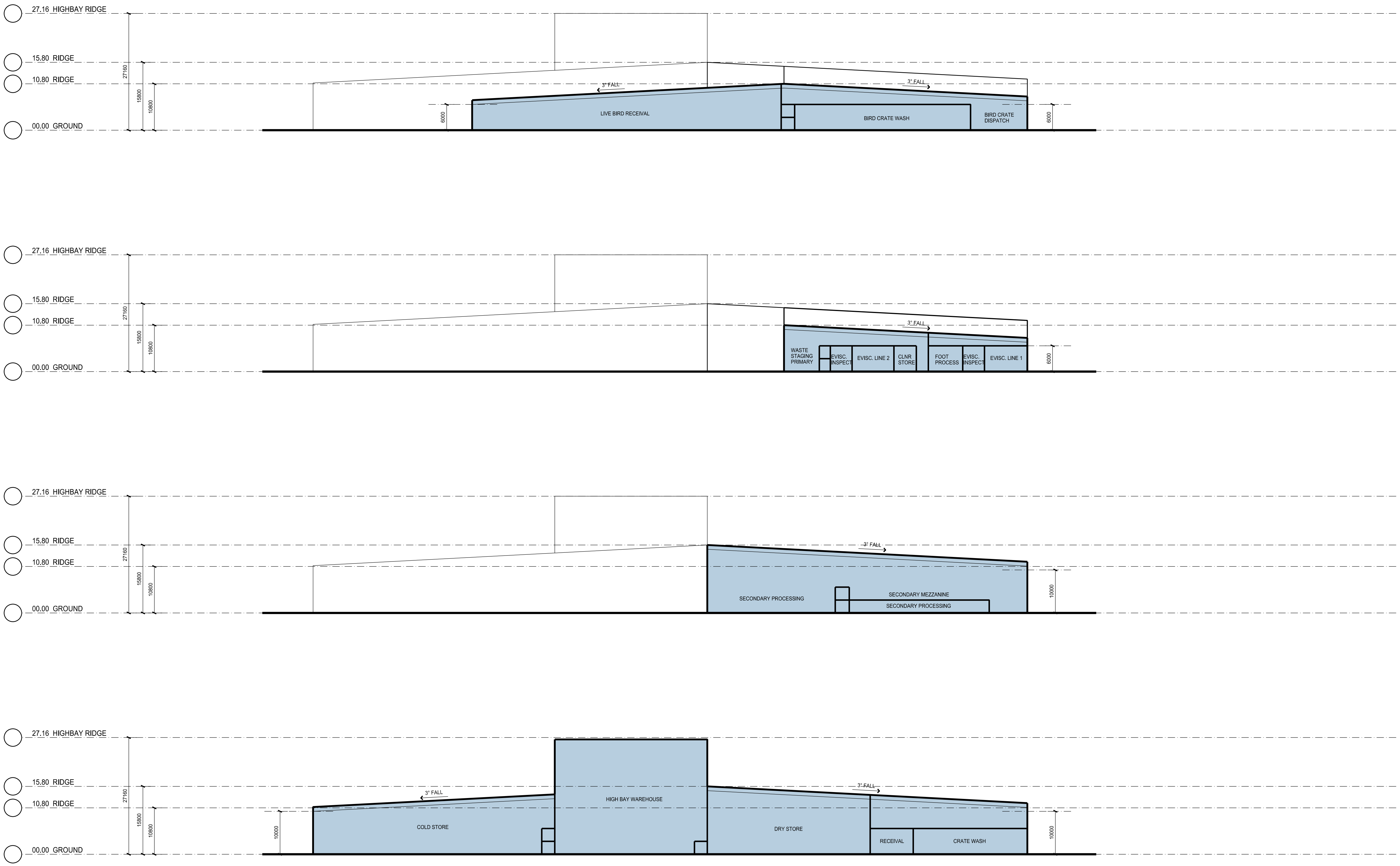

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ISSUE REV. DESCRIPTION DATE

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OAKBURN PROCESSING PLANT

OXLEY HIGHWAY, TAMWORTH

DRAWING TITLE
SECTIONS

DATE	SCALE	JOB NO.	DRAWING NO.	
16.06.20	1:500@A1	19106	SK 14	B

PAVEMENT LEGEND

BIT.	HOT MIX BITUMEN
CONC.	CONCRETE FOR HEAVY VEHICLES
EX-CONC.	EXISTING CONCRETE

STAGE 1 - SITE COMPOUND, WORKSHOP, LANE EXTENSION, INTERNAL ACCESS ROADS TO EXISTING RENDERING BUILDING

STAGE 2 - BULK EARTHWORKS, SITE PREPARATION, DETENTION BASINS, PERIMETER LANDSCAPE, SCREENING MOUNDS AND PLANTING

STAGE 3 - PROCESSING BUILDING, CARPARK & ROADS, OFFICE BUILDING, MAINTENANCE, WASTE WATER TREATMENT, PLANT BUILDINGS, PONDS

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ISSUE	REV.	DESCRIPTION	DATE

CLIENT

OAKBURN PROCESSING PLANT

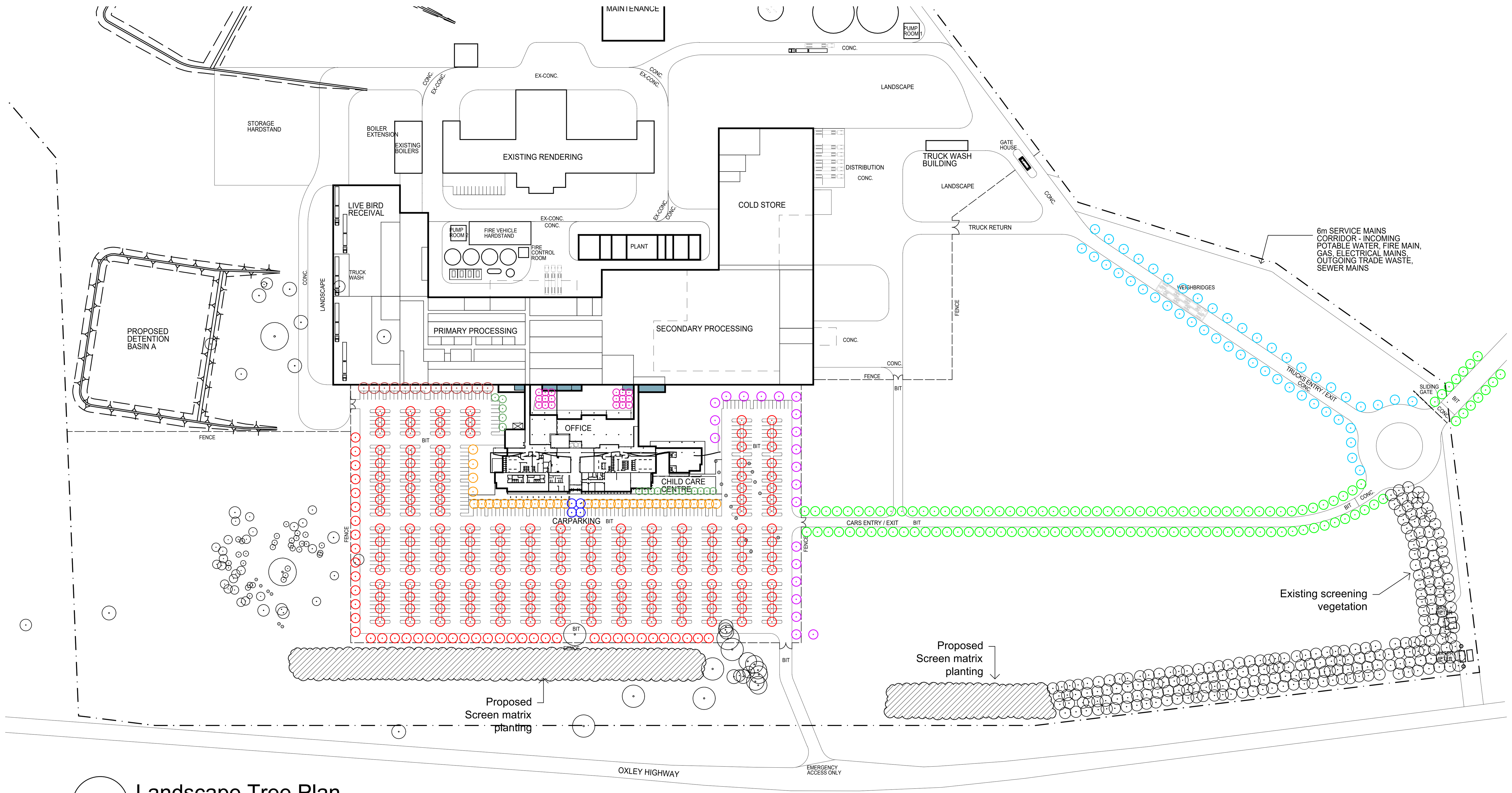
OXLEY HIGHWAY, TAMWORTH

DRAWING TITLE
STAGING PLAN

DATE	SCALE	JOB NO.	DRAWING NO.	
22.06.20	1:2000@A1	19106	SK 16	A

ATTACHMENT 2: LANDSCAPE PLAN

AP02

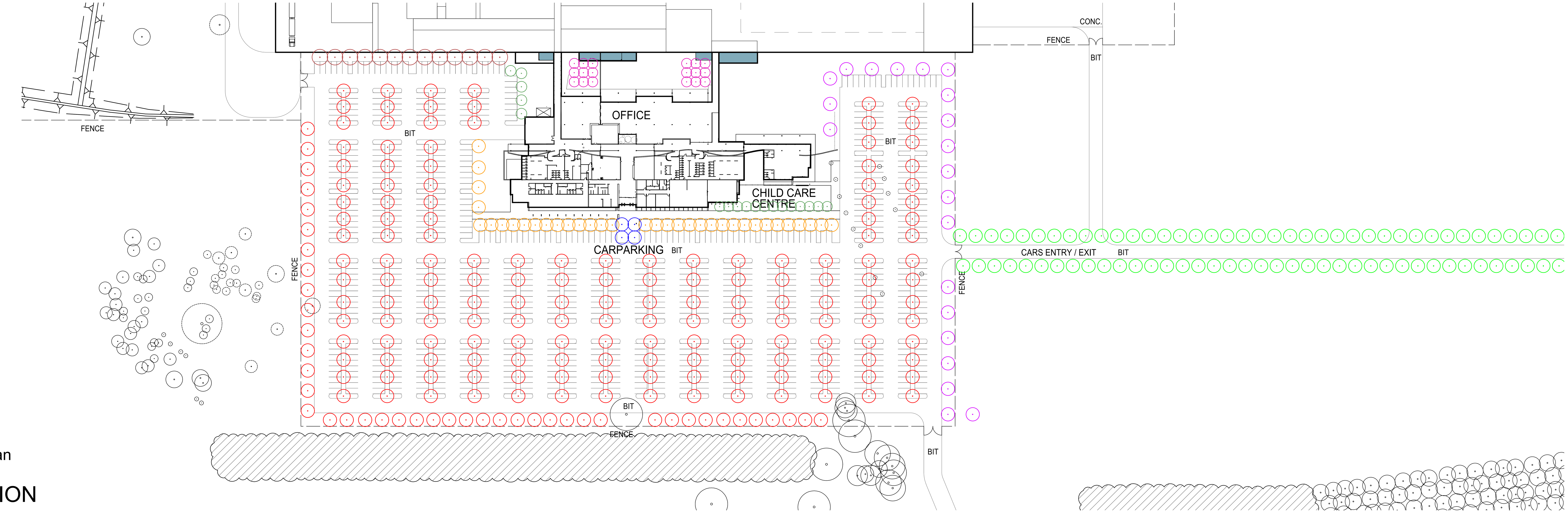


Landscape Tree Plan
1:2000

TREES	Common Name	Mature Size
Fraxinus excelsior 'Aurea'	Golden Ash	7 x 7
Ginkgo biloba	Maidenhair Tree	12 x 5
Gleditsia tricanthos 'Shademaster'	Green Honey Locust	11 x 8
Lagerstromia indica 'Natchez'	Crepe Myrtle	6 x 4
Nyssa sylvatica	Tupelo	11 x 6
Pistacia chinensis	Chinese Pistacia	8 x 6
Populus nigra 'Italica'	Lombardy Poplar	15 x 3
Pyrus 'Aristocrat'	Ornamental Pear	11 x 7
Pyrus 'Capital'	Ornamental Pear	12 x 3
Quercus palustris	Swamp Spanish Oak	15 x 8

PROPOSED SCREEN MATRIX PLANTING

TREES		
Angophora floribunda	Rough Barked Apple	30 x 10
Eucalptus albens	White Box	25 x 10
Eucalptus blakelyi	Blakely's red gum	20 x 8
Eucalptus melliodora	Yellow Box	10 x 15
SHRUBS		
Acacia implexa	Hickory Wattle	2 x 1
Acacia decora	Western Silver Wattle	2 x 1
Hibbertia riparia	Erect Guinea-flower	0.6 x 1
Myoporum montanum	Western Boobialla	4 x 3
Notelaea Microcarpa	Gorge Mock Olive	10 x 4
GRASSES & GROUNDCOVERS		
Ajuga australis	Austral bugle	0.3 x 0.5
Carex inversa	Knob sedge	0.75 x 0.75
Cyperus gracilis	Slender Flat Sedge	0.3 x 0.3
Dianella longifolia	Flax Lily	1 x 1
Lomandra longifolia	Spiny-head Mat-rush	1 x 1
Themeda australis	Kangaroo Grass	1 x 1



Landscape Tree Plan
1:1000

NOT FOR CONSTRUCTION

The contractor shall check and verify all work on site (including work by others) before commencing the landscape installation. Any discrepancies are to be reported to the Project Manager or Landscape Architect prior to commencing work. Do not scale this drawing. Any required dimensions not shown shall be referred to the Landscape Architect for confirmation.

Issue	Revision Description	Drawn	Check	Date
E	For Comment	LM	NM	25.06.2020
D	For Comment	LM	NM	20.05.2020
C	For Comment	LM	NM	20.06.2019
B	For Comment	SM	NM	19.12.2018
A	For Comment	JW	NM	02.10.2018

A1

LEGEND

- Pyrus 'Aristocrat' (Type 1)
- Ginko biloba (Type 2)
- Lagerstromia indica Natchez (Type 3)
- Pyrus 'Capital' (Type 4)
- Nyssa sylvatica (Type 5)
- Gleditsia tricanthos 'Shademaster' (Type 6)
- Pistacia chinensis (Type 7)
- Fraxinus excelsior 'Aurea' (Type 8)
- Quercus palustris (Type 9)
- Populus nigra 'Italica' (Type 10)
- Existing tree
- Proposed screening matrix planting

SITE IMAGE
Landscape Architects
Level 1, 3-5 Baptist Street
Redfern NSW 2016
Australia
Tel: (61 2) 8332 5600
Fax: (61 2) 9698 2877
www.siteimage.com.au

Client: Baiada

Project: Oakburn Processing Plant
Oxley Highway

Drawing Name: Landscape Tree Masterplan

PRELIMINARY

Scale:

Job Number: SS18-3745

Drawing Number: 701

Issue: E

ATTACHMENT 3: ADVANCED WATER TREATMENT DESIGN REPORT

AP03

Hydroflux Industrial Pty Ltd
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25th May 2020

Baiada Poultry Pty Ltd
PO Box 21 Pendle Hill
NSW 2145

Attention: Dean Kent
By Email: dean.kent@baiada.com.au
HY2989 Rev.2.3

Concept Process Design Report for Wastewater Treatment Plant, Advanced Water Treatment Plant,

Dear Dean,

Please see following the concept design report for Tamworth. The scope of this document includes:

- Calcuations confirming the capcity of the treatment plant
- A description of the flow and wastewater quality expected
- High-level design and description of the of the overall process
- Basic block diagram and mass balance of the process
- Estimated energy usage requirements of the process
- Basic Layout of the plant showing land required and elevations

This draft report describes a concept design for a wastewater treatment plant (WWTP) and advanced water treatment plant (AWTP). This document is provided to support Baiada's application for regulatory approval.

Please contact me if you have any queries.

Best Regards,

Andrew Miley | Director
Hydroflux Industrial

HYDROFLUX
industrial

Sydney | Melbourne | Brisbane | Portsmouth | Suva | Auckland

BAIADA POULTRY

APRIL 2020

CONCEPT PROCESS DESIGN REPORT FOR WASTEWATER/ADVANCED WATER TREATMENT PLANT

HY2989 Rev.2.3

CONTENTS

1 Summary

- The system is designed based on the processing up to 3 million birds per week, with an associated wastewater volume of 8 ML/day.
- The Advanced Water Treatment Plant is designed to threat up to 8 million litres of water per day and allow recovery of up to 7.2 million litres (90%) for use as potable water.
- All wastewater from the adjacent rendering facility will be treated separately in the rendering plant wastewater treatment plant which is operational, and has been designed to accommodate additional volumes associated with the processing plant. Treated wastewater from the rendering plant wastewater treatment plant will continue to be discharged to sewer.
- Based on current estimates and processing technology, the facility will require up to 8 million litres of potable water per day, to at full capacity.
- Reuse of wastewater will have a significant impact on the water supply.
- The AWTP will generate a concentrate stream produced by the final process stages of disinfection and salt reduction.
- The Total Dissolved Solids (TDS) concentration at maximum recovery of water (i.e. 90%) will be approximately 13,550 mg/L, which at the full design flow, equates to 10,880 Kg TDS per day in 800 kL of water.
- The TDS mass discharged from the site will be same regardless of the flow treated in the AWTP.
- Accelerated evaporation is proposed to reduce the volume of brine by 90% to 80 kL/day.
- The advanced water treatment plant (AWTP) process is proven and has been operating successfully at two poultry processing plants in Australia for over 10 years.

1.1 Reference Attachments

HY2989-P000-F	WWTP, AWTP PROCESS DRAWING
19106_SK200_9_SITE PLANT	WWTP, AWTP GENERAL ARRANGEMENTS

2 Expected Influent

Baiada owns and operates a poultry processing facility with similar characteristics as those proposed in this concept design. The data available from his existing facility will be used to estimate the conceptual process design.

The average influent wastewater data from the Hanwood site is as follows:

Influent Waste Water Quality Data		
Average January 2017 – May 2018		
pH	6.59	units
Electrical Conductivity	1925	µS/cm
Chemical Oxygen Demand	3964	mg/L
Chemical Oxygen Demand (filtered)	1418	mg/L
Total Suspended Solids	1293	mg/L
Total Nitrogen	209	mg/L
Total Phosphorous	32	mg/L
Biological Oxygen Demand	2377	mg/L
Total Dissolved Solids	1167	mg/L

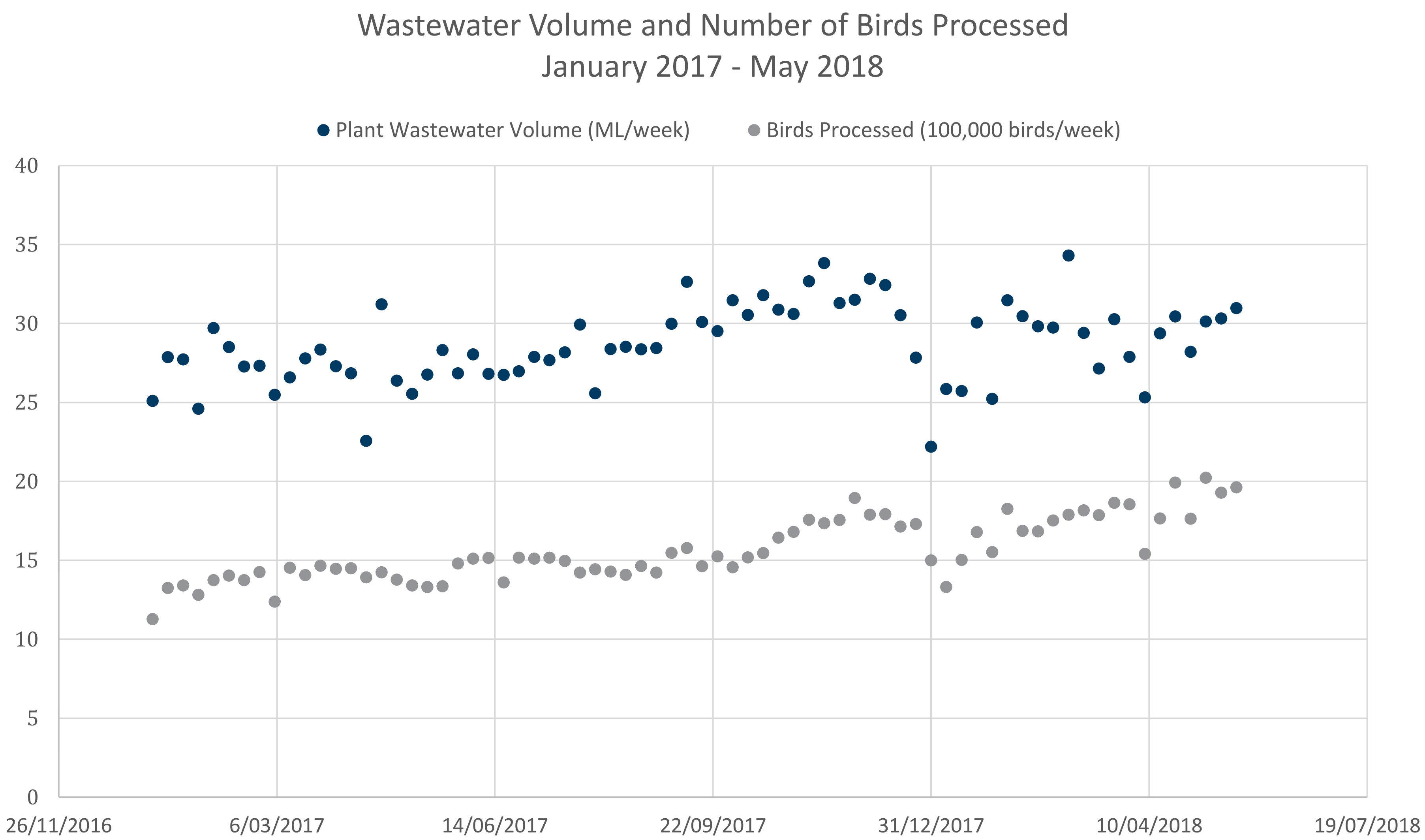
Additionally, the wastewater flows and the number of birds over this period has been recorded:

Influent Water Volume Data		
Average January 2017 – May 2018		
Incoming Water	23.51	ML/week
Birds Processed	1,562,165	birds/ week

From these figures, we can determine a mass loading and wastewater volume per bird processed:

Specific Wastewater Load per Bird Processed		
Average January 2017 – May 2018		
Chemical Oxygen Demand	60.38	g / bird
Chemical Oxygen Demand (filtered)	21.6	g / bird
Total Suspended Solids	19.7	g / bird
Total Nitrogen	3.18	g / bird
Total Phosphorous	0.49	g / bird
Biological Oxygen Demand	36.21	g / bird
Total Dissolved Solids	17.78	g / bird
Water Use	15.23	L / bird

The proposed facility will have the capacity for up to 3 million birds per week. A wastewater flow of 8 ML/day equates to a daily processing capacity of 525,000 birds/day. The wastewater system is thus designed for a total production of up to 3.6 million birds per week, allowing for some contingency.


Wastewater Volume and Number of Birds Processed
January 2017 - May 2018
Plant Wastewater Volume (ML/week)
Birds Processed (100,000 birds/week)
40
35
30
25
20
15
10
5
0
26/11/2016
6/03/2017
14/06/2017
22/09/2017
31/12/2017
10/04/2018
19/07/2018

3 Conceptual Process Design

3.1 Summary

This concept design is for a Wastewater Treatment Plant (WWTP) followed by Advanced Water Treatment Plant (AWTP).

The wastewater from the poultry processing facility will first be treated in a conventional manner, with primary and secondary treatment processes. This will reduce the concentrations of primary suspended solids, organics and nutrients.

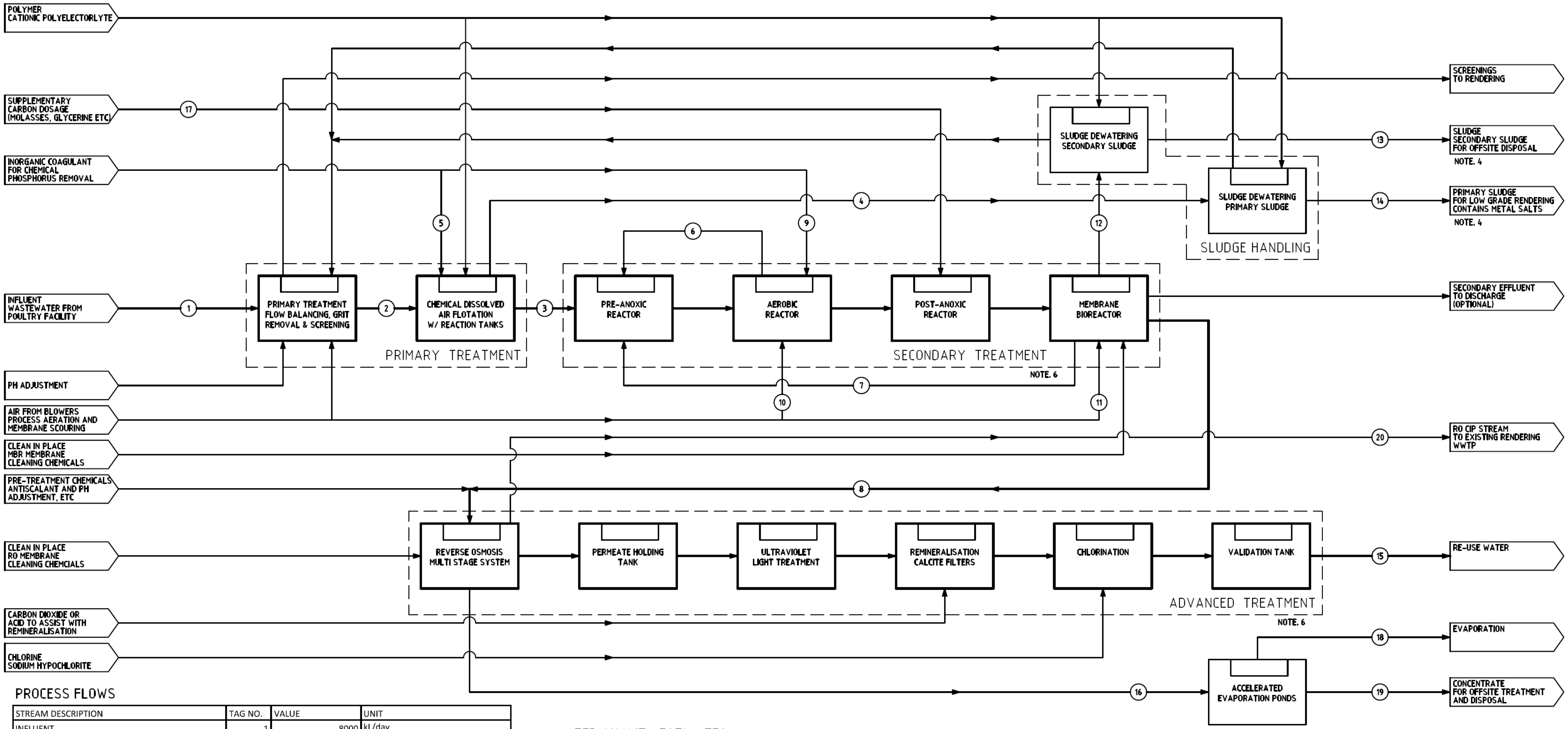
The proposed technology is dissolved air flotation (DAF) to remove fats, oils and grease (FOG) and suspended solids (TSS). Followed by a membrane bioreactor (MBR) designed to remove organics and nutrients such as nitrogen and phosphorus to target levels. The membrane bioreactor combines the features of a conventional bioreactor, combined with the water quality of an ultrafiltration membrane. Chemical phosphorus removal will be employed in both the primary and secondary treatment with the addition of an inorganic coagulant.

The effluent from the MBR will then be suitable for discharge, irrigation and or further treatment for re-use.
The effluent intended for re-use will then be treated by Reverse Osmosis (RO) to reduce the levels of dissolved solids. Following additional treatment, the RO permeate will be suitable for re-use. Additional treatment will consist of: chlorination, ultraviolet light and remineralisation. This system will be designed to meet and exceed the re-use water quality standards including the log reduction values (LVR) of pathogens, as laid out in:

- NSW Food Authority – Water Reuse Guideline – May 2008
- NSW Government – Management of private recycle water schemes – May 2008
- NSW Department of Primary Industries – Recycled Water Management Systems – May 2015
- Australian Government – NHMRC – NRMMC – Australian Drinking Water Guidelines 6 - 2011

A RO concentrate stream will also be produced, this stream will have a high concentration of dissolved salts and is intended to be further treated via accelerated evaporation and with final disposal offsite as a concentrated brine.

3.1.1 Process Flow Diagram



PROCESS FLOWS

STREAM DESCRIPTION	TAG NO.	VALUE	UNIT
INFLUENT	1	8000	kL/day
BALANCED FEED TO DAF	2	8000	kL/day
FEED TO SECONDARY TREATMENT	3	8000	kL/day
PRIMARY SLUDGE TO DEWATERING - NOTE 1	4	10502.4	kg TSS/day
COAGULANT TO DAF - NOTE. 2	5	4998.2	kg/day Ferric Chloride 42%
MIXED LIQUOR RETURN	6	32,000 - 64,000	kL/day
RETURN ACTIVATED SLUDGE	7	8000	kL/day
MEMBRANE BIOREACTOR EFFLUENT	8	7943.2	kL/day
COAGULANT TO SECONDARY TREATMENT - NOTE. 2	9	1249.6	kg/day Ferric Chloride 42%
AERATION FOR AEROBIC REACTOR	10	31960	Nm3/hr @ 620 mBar.g
AERATION FOR MEMBRANE SCOUR	11	13000	Nm3/hr @ 570 mBar.g
WASTE ACTIVATED SLUDGE - NOTE. 1	12	3077.6	kg TSS/day
DEWATERED SECONDARY SLUDGE	13	2923.7	kg TSS/day
DEWATED PRIMARY SLUDGE	14	9977.3	kg TSS/day
TREATED WATER FOR RECYCLING	15	7200	kL/day
RESERVE OSMOSIS CONCENTRATE	16	800	kL/day
SUPPLEMENTARY CARBON - NOTE 3.	17	AS REQUIRED FOR DENITRIFICATION PERFORMANCE.	
EVAPORATION OF CONCENTRATE	18	720	kL/day
CONCENTRATE POST EVAPORATION	19	80	kL/day
REVERSE OSMOSIS CIP STREAM TO EXISTING WWTP	20	40	kL/month

WATER QUALITY ESTIMATES

STREAM DESCRIPTION	TAG NO.	VOLUMETRIC FLOW	COD	BOD	TN	TKN	TP	PO4-P	TS	TSS	TDS
-	#	kL/day	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
INFLUENT	1	8000	3970	2380	210	210	40	36	2700	1300	1400
FEED TO SECONDARY TREATMENT	3	8000	1500	899	210	210	10	10	1600	200	1400
MEMBRANE BIOREACTOR EFFLUENT	8	8000	50	20	21	15	1	1	1405	5	1400
TREATED WATER FOR RECYCLING	15	7200	-	-	-	-	-	-	50 - 200	-	50 - 200
RESERVE OSMOSIS CONCENTRATE	16	800	250	200	210	150	312	272	13600	50	13550
CONCENTRATE POST EVAPORATION	19	80	2500	2000	2100	1500	3120	2720	136000	500	135500

NOTE. 5

NOTES:

1. PRELIMINARY CALCULATIONS SUGGEST 1,041 KG TSS IS PRECIPITATED DUE TO CHEMICAL P REMOVAL. FOR DESIGN PURPOSES IT HAS BEEN ASSUMED THAT 80% OF THIS SLUDGE IS PRODUCED DURING PRIMARY TREATMENT, WITH THE RESIDUAL PRODUCED IN THE SECONDARY TREATMENT PROCESS.
2. ESTIMATED FERRIC CHLORIDE DOSAGE IS 3,123.9 KG/DAY AS 42% SOLUTION. ASSUMPTION HAS BEEN MADE THAT THIS IS DOSED 4:1 INTO PRIMARY AND SECONDARY TREATMENT STAGES. MOLAR RATIO OF 2:1 [METAL]:[PHOSPHATE] USED FOR CALCULATIONS.
3. SUPPLEMENTARY CARBON DOSAGE MAY BE REQUIRED TO ACHIEVE TARGET TOTAL NITROGEN VALUES IN THE EFFLUENT.
4. WATER CONTENT OF DEWATERED SLUDGE HAS NOT BEEN CONSIDERED IN THE MASS BALANCE.
5. IMPACT OF CHEMICAL DOSING FOR PH CORRECTION, DISINFECTION AND CLEANING HAS NOT BEEN CONSIDERED IN THIS MASS BALANCE.
6. SECONDARY AND ADVANCED TREATMENT SPLIT INTO TWO PARALLEL TREATMENT TRAINS

3.2 Primary Treatment

The balancing tanks will ensure that the flows are hydraulically managed from the processing facility, this will serve to equalise the effluent concentrations and mitigate swings in pH that may be caused by clean in place (CIP) waste streams.

The primary treatment shall be designed to protect downstream processes from solids, and fats oil and grease (FOG). Large solids may cause mechanical issues with downstream processes, and FOG can upset the biological process when introduced in high concentrations.

The physical treatment processes (screens, grit removal and dissolved air flotation) are designed on the basis that the wastewater treatment plant is operated on a 14-hour per day.

3.2.1 Balance Tank

Objectives of this process unit:

- Ensure the flow from the plant can be adequately pumped to the WWTP
- Provide a balancing volume, such that spikes in pH and concentration may be effectively mitigated

Our recommendation is for a balance tank with a volume of 2000 m^3, this allows for 6 hours hydraulic retention time. Our experience with industrial wastewater shows that this volume will be adequate for balancing pump flows to primary treatment.

3.2.2 Grit Removal

Objectives of this process unit:

- Protect downstream equipment from readily settleable solids.

Grit removal is important to remove readily settleable particles such as sand from the process to protect downstream equipment.

3.2.3 Screening

Objectives of this process unit:

- Protect downstream equipment from large solids.

Coarse screening should be provided to protect downstream equipment, such as pumps and instruments. At a minimum, this should include screening to < 3mm. Hydroflux proposes an automatic bar screen or drum screen (or similar) for this purpose.

The screening details will need to be confirmed during detailed design to ensure they are compliant with the membrane bioreactor (MBR) pre-treatment requirements. This is a requirement of the specific membrane elements used and varies from manufacturer to manufacturer.

3.2.4 Primary Dissolved Air Flotation

Objectives of this process unit:

- Reduce levels of FOG.
- Recover valuable proteins, fats and oils for rendering.
- Remove precipitates from chemical phosphorus removal

A dissolved air flotation (DAF) unit, creates a stream of microbubbles which attach to solids and FOG, causing them to float. This allows for the separation of solids and FOG from a wastewater stream.

Aerobic treatment systems are generally not tolerant to high - moderate levels of FOG, typically aerobic reactors will start to be adversely impacted when fed wastewaters with a higher concentration than 30 mg/L. The FOG will interfere with the aeration processes and thus starve the biomass of the required oxygen.

This DAF is intended to run with both inorganic coagulant and polymer. As such the for concept design an influent hydraulic loading rate of between 6.5m³/m².hr has been selected. This corresponds to a minimum surface area requirement of 88 square metres. The calculated minimum recycle flow is 20% to meet a recommended air: solids ratio of 0.01 (kg Air/kg Solids).

Hydroflux suggests that three units with a third the rated capacity be put in parallel for maintenance and operation reasons.

Chemical DAF units can typically be expected to remove 85-95% of the total suspended solids (TSS) and fat oils and grease (FOG).

Table 1 - Concept design calculations: Primary Dissolved Air Flotation

Parameters	Value	Units
Influent Bypass to SBR Design Flow	8,000	m³/day
Design Flow	571.4	m³/h
Design Influent Hydraulic Loading	6.5	m³/m².h
Required Surface Area	87.9	m²
Design Solids and FOG Concentration	1500	mg/L
Solids Loading	857.1	kg/h
Design Air: Solids Ratio	0.01	kg Air/kg Solids
Required Air Flow	8.57	kg Air/hr
Air Solubility @ 450kPa, 20°C	95.9	g/m³
Nominal Saturator Efficiency	80%	
Required Recycle Flow	111.7	m³/h
Recycle Ratio	20%	-
Actual Hydraulic Loading	7.8	m³/m².h

3.3 Secondary Treatment

Secondary treatment is required to remove the soluble nutrients and organics. Poultry processing wastewater is readily biodegradable and has a high concentration of organic compounds and nutrients such as nitrogen and phosphorus. As such, it well suited for biological treatment.

As the effluent is destined for re-use, a membrane bioreactor (MBR) has the benefit that it produces a very high-water quality effluent, that can be paired with reverse osmosis without significant pre-treatment. Other potential technologies will normally require additional pre-treatment including a combination of the following: multimedia filtration, cartridge filtration and or micro/ultrafiltration.

3.3.1 Aerobic Treatment – Membrane Bioreactor

Design Objective for this process unit:

- Remove residual organic carbon compounds
- Nutrient removal of nitrogen compounds
- Retain secondary solids
- Remove Colloidal Solids
- Remove Turbidity
- Contribute to log removal of pathogens for re-use
- Meet pre-treatment requirements for Reverse Osmosis

The membrane bioreactor (MBR) is an activated sludge treatment process, combined with membrane treatment process. Activated sludge processes are a suspended growth biological treatment process which conventionally relies on settling for biomass removal. In an MBR the separation is achieved using a microfiltration (MF) or ultrafiltration (UF) membrane. For this design Hydroflux suggests the use of a submerged flat sheet ultrafiltration membrane.

The secondary treatment process has been designed based on the following requirements:

Table 2 - Concept design: MBR Influent Design Parameters

Parameters	Inlet	Outlet	Unit
Influent Volumetric Flow	8000		m^3/day
COD	1500	50	mg/L
TN	210	20	mg/L
TKN	210	15	mg/L
NH4-N	190	1	mg/L
NO2-N	N/A	1	mg/L
NO3-N	N/A	10	mg/L
TP	10	1*	mg/L
PO4-P	9.8	1*	mg/L
TSS	200	5	mg/L

Note: *Requires chemical phosphorus removal.

As greater than 90% nitrogen removal is required, the conventional pre-anoxic (or Modified Ludzack-Ettinger) process is not suitable to meet the process requirements. As such Hydroflux suggests the application of the 4 stage Bardenpho process (pre and post-anoxic process). The Bardenpho process splits the biological treatment into four stages:

- Pre-anoxic
- Aerobic
- Post-anoxic
- Re-aeration (in this case the Membrane Bioreactor Tank)

Bardenpho process can be configured to remove greater than 95% of the nitrogen in the wastewater. However, depending on influent characteristics, carbon dosage may be required in the post-anoxic reactor. At this stage Hydroflux expects that whilst the influent is ratio of COD:TN is correctly balanced; it will be likely that some carbon dosing will be required to meet downstream process requirements.

Hydroflux is also suggesting that the system be split into two parallel process trains for operational redundancy.

Table 3 - Concept design calculations: Membrane Bioreactor

Parameters	Value	Units
Influent Flow to MBR	8,000	m^3/day
Design Influent COD Concentration	1,500	mg/L
Design COD Loading	12,000	kg/day
Design Influent TKN Loading	210	mg/L
Design TKN Loading	1,680	kg/day
COD Specific Oxygen Demand	1.3	kg O_2 / kg COD
TKN Specific Oxygen Demand	4.3	kg O_2 / kg TKN
COD Oxygen Demand	15,600	kg O_2/day
TKN Oxygen Demand	7,224	kg O_2/day
Assumed Aeration Efficiency	1.2	kg O_2/kWh
Total Oxygen Demand	22,824	kg O_2/day
Total Aeration Energy Required	19,020	kWh/day
Reactor Volume Selection		
Reactor Trains	2	-
Food to Micro-organism Ratio	0.18	kg COD/kg MLSS.day
Mixed Liquor Suspended Solids	6,500	mg/L
Biomass Required	66,667	kg MLSS
Total Reactor Volume	10,256	m^3
Individual Reactor Train Volume	5,128	m^3
Overall Hydraulic Retention Time	1.28	days
Blower Indicative Sizing		
Daily Aeration Hours	22	h/day
Rated Blower Power Per Reactor Train	432	kW
Total Blower Rated Power	865	kW

The flux and trans-membrane pressure (TMP) of the membrane modules will be monitored to ensure correct control can be achieved. The submerged membrane modules will require suction pumps, and air scouring.

Additionally, the system will include provision for clean in place (CIP) chemical treatment which is required to maintain membrane performance. Typical CIP chemicals used to clean the membrane elements include hypochlorite for organic scaling, and citric acid for inorganic scaling.

Hydroflux has calculated the membrane area requirements as follows:

Table 4 – Membrane Area Requirements for MBR

Parameter	Value	Unit
Operational Hours	14	h/day
Volumetric Capacity Required	8,000	kL/day
Hourly Capacity	571	kL/h
Design Flux	10	L/m^2.h
Required Membrane Surface Area	57,143	m^2

For concept design purposes Hydroflux has considered the usage of a Toray membrane module, each module offers 600 m^2, which translates to a minimum requirement of 138 modules. For this number of modules, the recommended aeration flowrate is approximately 13,000 Nm^3/h, this value has been used for energy estimation.

3.4 Advanced Water Treatment

The advanced water treatment plant main purpose is to produce a very high-quality water for re-use purposes. As well as the water quality requirements, there is also be a requirement for the development and implementation of a HACCP (Hazard Analysis and Critical Control Points) plan.

This plan will be developed specifically for the plant based on input and consultation from key stakeholders. Hydroflux's staff have previously been involved in the design and development of successful AWTP projects and have a clear understanding of the required process.

Essentially, the plan provides a systemic approach for operation, monitoring and decision making to ensure that the water produced from the plant is safe for it's intended usage.

3.4.1 Pathogen Removal Summary

The effluent from the MBR will require additional treatment prior to reuse. This is required to satisfy the log reduction of pathogens, ensuring the water will exceed the applicable guidelines. The following table provides an overview of the expected log removal of different type of pathogens.

Table 5 - Concept design calculations: Log Reduction Values of Pathogens

Process	Protozoa Log Reduction	Virus Log Reduction	Bacteria Log Reduction
Ultra-filtration (MBR)	3	2.5	3
Reverse Osmosis	5	4	5
Ultraviolet Light Irradiation	3	3	3
Chlorination (minimum 30 minutes contact)	2	2	2
Total	**13**	**11.5**	**13**

3.4.2 Reverse Osmosis (RO)

Objectives of this process unit:

- Contribute to log removal of pathogens for re-use water.
- Concentrate stream produced at total dissolved solids (TDS) concentrations of approx. 13,600 mg/L
- Reduce TDS concentrations in permeate to less than 100 mg/L
- Recover up to 90% of input wastewater for re-use

This system will use both low-pressure RO membranes, which typically allow for concentrate TDS concentrations of up to 10,000 – 12,000 mg/L TDS, and high-pressure RO membranes which can be used up to and exceeding concentrations of 50,000 mg/L TDS.

The feed water is sent to pressure vessels containing semi-permeable reverse osmosis membrane elements. The membranes allow the passage of the water molecule but reject a portion of the dissolved solids. This creates a concentrate stream and permeate stream (treated water). This separation is driven by the pressure gradient generated by the feed pumps.

As the permeate (treated water) is produced, the concentration of the remaining water (concentrate) increases. This increase in concentration, results in an increase in the osmotic pressure of the concentrate, and thus the pressure required to overcome this. Thus, as higher water recoveries are targeted, there is an increase in the required driving pressure and energy usage.

The sustainable level of water recovery will depend on the composition and ionic balance of the feedwater and may be limited by the presence of sparingly soluble salts and other potential foulants including silica. pH correction and antiscalants may be required to maximise the water recovery in this process.

The performance of up-stream processes such as the secondary treatment and chemical phosphorus removal have the potential to increase rates of scaling and fouling. As such, performance of upstream processes will need to be considered when evaluating RO performance.

Balance tanks are required for the feed water, permeate and concentrate streams, such that the dynamics of the system can be adjusted without knock-on effects throughout the process. In addition, a clean in place system will be required to periodically treat the membrane units to restore capacity due to fouling.

3.4.3 Ultraviolet Light Treatment

Objectives of this process unit:

- Achieve 3 log reductions of protozoa, viruses and bacteria

Ultraviolet light is an effective way to achieve disinfection of water, it is well suited to permeate and distillate treatment due to the favourable UV transmittance of the water source. The UV dosage required for disinfection is linked to the turbidity and colour of the water, as such a relatively low dosage is required for this application.

The required dosage would be assessed during detailed design.

3.4.4 Remineralisation

Objectives of this process unit:

- Add Hardness and Alkalinity to the water.

Reverse osmosis removes such a large amount of the dissolved solids from water, that the permeate ends up corrosive. To mitigate this hardness and alkalinity are added to protect pipes and equipment in contact with the re-use water.

Remineralisation filters containing calcite are used for this purpose. The permeate will require the addition of carbon dioxide gas (or acid) prior to introduction to the remineralisation filter to improve the process.

3.4.5 Chlorination

Objectives of this process unit:

- Achieve target log removal of protozoa, viruses and bacteria
- Provide free chlorine residual for ongoing disinfection of water

Dosing levels and contact time to be considered during detailed design and would be subject to HACCP approval. Typical values are a minimum of 30 minutes contact time, and 1 mg/L free chlorine residual.

3.5 Reject Streams to Existing Wastewater Treatment Plant

Both the membrane bioreactor and reverse osmosis systems will need to undergo cleaning to maintain efficient operation. The clean in place (CIP) waste streams generated by the reverse osmosis system is proposed to be sent to the existing rendering wastewater treatment system, and ultimately be discharged to trade waste.

For the reverse osmosis system, a typical clean in place schedule would include inorganic acid and organic acid wash, non-oxidising biocide wash, and an alkaline and surfactant wash. Each reverse osmosis train is required to be cleaned quarterly (3 months) with an expected production CIP waste stream of 20 kL/cycle. The 8 ML/day design is expected to contain 5 membrane trains; thus, the total expected CIP wastage volume is 100 kL/quarter.

The cleaning of the individual trains would be on a rotating schedule, where roughly two trains would be cleaned each month generating, a total CIP volume of 40 kL/month. As the existing plant is designed to treat up to 4 ML/week or 16 ML/month, the addition of 40 kL/month of CIP waste will not make any significant impact to existing wastewater treatment systems performance.

The CIP streams from the membrane bioreactor, will be self-contained in the new proposed system. These streams will not need to be sent to the existing treatment plant. A typical clean in place schedule would be monthly cleaning with chlorine, caustic and organic acids.

3.6 Accelerated Evaporation Ponds

In order to minimise the volume of reverse osmosis brine for off-site disposal, Hydroflux is proposing the use of accelerated evaporation ponds.

Accelerated evaporation is the process of mechanically spraying the wastewater into the atmosphere, enhancing the surface area for evaporation. The key design parameter for this kind of unit is the evaporation efficiency, which is the percentage of the sprayed wastewater that will evaporate. The evaporation efficiency typically ranges between 20-80%, depending on a range of factors, including wind speed, temperature, humidity, etc.

Figure 1 - Images of Typical Accelerated Evaporation Processes

Hydroflux has contacted two suppliers for conceptual design information. It has been indicated that we can expect an average of 30-50% evaporation efficiency in the Tamworth location.

The required land use for accelerated evaporation, is dictated by the minimum distance between units and potential for overspray. Overspray occurs when a droplet travels outside the pond surface, and the droplet ends up in an unintended location.

Accelerated evaporation systems can be implemented with inbuilt weather monitoring. A control system can adjust the operation to reduce or eliminate overspray, by controlling droplet size and or stopping/reducing spray flow. In addition, the installation of overspray curtains or an earth berm is typically recommended around the periphery of the pond, especially with reference to the prevailing wind direction. In this instance, Hydroflux suggest that an overspray curtain should be considered, and combined with a weather-based control system.

Figure 2 - Example Image of spray curtain design to mitigate overspray in accelerated evaporation

The proposed system relies on the extraction of the residual brine in order to avoid the ongoing accumulation of dissolved salts in the pond. To this effect Hydroflux is recommended that the 80 kL/day of the residual concentrate is extracted, at equilibrium this would result in a pond concentration of 136,000 mg/L TDS, slightly below the expected solubility limits of many sparingly soluble salts (~150,000 mg/L).

As way of concept design Hydroflux is proposing the installation of three 10,000 m^2 lagoons, with a minimum depth of 1.5 m. This includes a minimum freeboard of 500mm in order to accommodate the 7-day RDRD (rare design rainfall depth) for a 1 in 2000-year event, of approximately 480mm. The ponds will require raised banks to avoid ingress of stormwaters which fall outside the pond footprint.

The following concept design calculations have been used to determine the appropriate pond area sizing and for production of power consumption estimates.

Table 6 - Pond Sizing as per provided supplier information

Parameter	Value	Unit
Concentrate Flow	800	kL/day
Brine Concentration	13,550	mg/L
Target Concentration	135,500	mg/L
Residual Concentrate	80	kL/day
Evaporation Required	720	kL/day
Unit Evaporation Rate*	65	LPM/unit
	3.9	kL/hr.unit
Operating Hours	12	hr/day
Unit Evaporation	46.8	kL/day.unit
Required Units	15.4	units
Suggested Unit Spacing**	900	m2/unit
Total Pond Area for Unit Spacing	14,400	m2
Pond Area Safety Factor	2	-
Total Pond Area with Safety Factor	28,800	m2
Nominal Suggested Area	**30,000**	**m2**
Unit Power	21	kW
Total Power	336	kW
Total Energy Consumption	4032	kWh/day
Notes: **Preliminary estimate provided by supplier* ***Suggested spacing for specific unit provided by supplier is for 30 m by 30 m*		

3.6.1 Pond de-sludging

The ponds are designed as accelerated evaporation ponds which limits the capacity of the ponds to the theoretical solubility limit to avoid precipitation of sparingly soluble salts that will result in scaling and issues.

To avoid the precipitation of sparingly soluble salts, the theoretical capacity of the 1.5 m deep ponds is 1.7 years for total system and 0.6 years for single pond based on a flow of 8 ML/day. The values are linear so a 3 m pond will provide double the retention time.

If sparingly soluble salts are allowed to precipitate, then the ponds will require attention after approximately 4.2 years for the total pond system, and 1.4 years for a single pond.

Calculations are based on 8 ML of wastewater being discharged per day.

Parameter	Value	Unit
Daily Salt Mass	10,840	kg/day
Pond Depth	1.5	m
Total Pond Volume	45,000	m3
Solubility Limit	365	g/L
Capacity of Pond (Solubility Limit)	16,425,000	kg
Time to Total Pond Capacity Reached	1515	days
	4.2	years
Approx. Sparingly Soluble Limit*	150	g/L
Capacity of Pond (Precipitation Limit)	6,750,000	kg
Time to Total Pond Capacity Reached	623	days
	1.7	years

*Approximately solubility limit for sparingly soluble salts. This is indicative only, and other salts may precipitate prior to this limit.

The concentrated salt waste will be disposed of via a licenced disposal facility.

4 Estimated Energy Usage

The following table contains estimates for the energy usage of the plant.

Table 7 - Concept Design - Estimated Energy Usage

Flow	Power	Energy	Cost @ 20c/kWh	Cost/Year
	kW	kWh/day	$AUD/day	$AUD
Primary Dissolved Air Flotation	29	684	$136.80	$49,932
Aerobic Reactor	865	9510	$1,902.00	$694,230
MBR Air Scour	339	7331	$1,466.21	$535,166
RAS, MLR, WAS Pumps, and Anoxic Mixing	220	5280	$1,056.00	$385,440
Low Pressure Reverse Osmosis*	1429	20000	$4,000.00	$1,460,000
High Pressure Reverse Osmosis*	857	12000	$2,400.00	$876,000
Remineralisation Filters	103	1440	$288.00	$105,120
Ultraviolet Irradiation	51	720	$144.00	$52,560
Accelerated Evaporation	336	4032	$806.40	$294,336
Allowance for Transfer Pumps and Misc.	200	4800	$960.00	$350,400
Allowance for Screens and Sludge Handling	100	2400	$480.00	$175,200
Total	**4529**	**68197**	**$13,639.41**	**$4,978,384**

Notes: There are several components including: sludge handling, transfer pumps, and screening for which an allowance has been made without any calculations. The overall estimate should only be considered as a guide, actual energy usage is subject to detailed design.

ATTACHMENT 4: WINDSHEAR REPORT

AP04

BAIADA OAKBURN FACILITY

Windshear and Wake Turbulence Impacts

Prepared for:

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SLR Ref: 610.19171-R01
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BASIS OF REPORT

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.19171-R01-v1.0	25 June 2020	Dr Peter Georgiou	Dr Neihad Al-Khalidy	Dr Neihad Al-Khalidy

EXECUTIVE SUMMARY

SLR Consulting Australia Pty Ltd (SLR) has been engaged to assess Baiada's proposed Oakburn Poultry Processing Facility (Tamworth, NSW) in relation to potential building-induced windshear and wake turbulence effects according to the National Airports Safeguarding Framework (NASF) Guideline B, 2018 – Managing the Risk of Building Generated Windshear and Turbulence at Airports.

The assessment has been carried out in two stages:

- A Preliminary Qualitative Assessment investigating the potential for the proposed development to create downstream windshear and wake turbulence effects and the likely compliance of the same with respect to NASF-B (2018) criteria; and
- A Quantitative Assessment carried out via a 1:750 model-scale Environmental Wind Tunnel Study whereby hot-wire sensor measurements were made to investigate mean wind speeds and wind turbulence conditions along Tamworth Airport's main Runway 12L/30R and its northwest projection for aircraft landing flight path geometries potentially vulnerable to crosswinds from the northeast, passing firstly over the proposed Baiada Facility project domain, and then impacting landing flight paths on Runway 12L.

This study is required to assist in the preparation, lodgement and approval of a Major Development Plan for the proposed development.

The present study involved 1:750 scale model wind tunnel testing of two "built environment" scenarios:

- "Baseline" existing built environment at the airport and surrounds
- "Future" "Baseline" + proposed development

NASF-B (2018) Threshold "Triggers"

The study showed that the proposed development does not satisfy NASF-B (2018) with respect to the "1:35" rule - refer Section 2.

Accordingly, further quantitative assessment (ie via wind tunnel testing or CFD modelling) was undertaken as required for acceptance of the proposed concept design in relation to the NASF-B considerations covering mean wind speed deficit and wake turbulence.

Tamworth Airport BoM Station 55325 Wind Characteristics

The study analysed the exceedance characteristics of the long-term wind record (2008-2018) obtained at the Bureau of Meteorology (BoM) weather station located at Tamworth Airport, BoM 55325, in terms of both mean wind speed and turbulence. The site of the weather station is close to the project domain areas and shares similar upstream turbulence characteristics to Runway 12L positions (and its northwesterly projection) under crosswind (ie northeast) wind conditions. These statistics serve as a reference dataset to assess exceedance levels of interest in relation to NASF-B and the proposed development.

EXECUTIVE SUMMARY

Initial Tamworth Airport BoM 55325 1:750 Model Scale Wind Tunnel Test

An initial 1:750 model scale wind tunnel test was undertaken to directly measure the mean wind speed and turbulence level at the 10 m height anemometer location of Tamworth Airport BoM 55325. During this test a reference height wind speed (mean and gust) was also recorded at a location upstream of the model test area so as to be unaffected by any existing building wake effects.

This reference height wind speed was also used in the subsequent built environment scenarios and served as a "bridge" to relate wind speeds (mean and gust) measured along flight landing path positions back to the 10 m height mean wind speed at Tamworth Airport BoM 55325.

Built Scenarios 1:750 Model Scale Wind Tunnel Tests

As noted above, two built environment scenarios were tested to assess the impact of the proposal.

Hot-wire sensors were used to make wind speed measurements at positions located in a vertical plane centred on Runway 12L and its southern projection – refer Figure 9. The measurement grid had a horizontal spacing of 100 m and a vertical grid spacing of 5 m (ranging from 5 m up to 60 m above ground level).

Four wind directions were tested – 20.5°, 43°, 65.6° and 88° - noting that 43° is the wind direction perpendicular to Runway 12L (from the northeast).

NASF-B (2018) Mean Wind Speed Deficit Criteria

"Existing" Built Environment Scenario:

- Predicted exceedance of the mean wind speed deficit criteria at the "worst-case" grid measurement point are All greater than 100 years. This is not surprising given the scale of existing buildings at the site.

"Future" Built Environment Scenario:

- When comparing the results between the "Existing" and "Future" scenarios at any one individual measurement grid point, there were minor variances at particular locations (typically ±10%) both up and down;
- However, the minimum return period for each tested angle at the "worst-case" grid point, remained at or above 100 years.

NASF-B (2018) 4 kt Turbulence Criterion

"Existing" Built Environment Scenario:

- In the "Existing" built environment scenario, predicted 4 kt turbulence exceedance events have return periods ranging from once per year and upwards.

"Future" Built Environment Scenario:

- When comparing individual points along the flight path measurement grid between the "Existing" and "Future" scenario results, there are modest variances in terms of annual exceedance statistics at particular locations both up and down;

EXECUTIVE SUMMARY

- Predicted return periods are lowest (ie more frequently occurring) at locations in line with the highest RL section of the proposed development for the relevant wind direction; and
- 4 kt exceedances do not exceed one per year – essentially the same as the existing condition. This reflects both the low incidence of winds from the relevant crosswind directions of interest and the modest extent of the taller section of the proposed development.

Summary

In relation to wind conditions experienced by aircraft landing from the northwest on Runway 12L:

- The proposed development will have minimal/negligible impact in relation to the NASF-B mean wind speed deficit criteria, essentially no impact at wind speeds of practical interest.
- NASF-B 4 kt turbulence level event exceedances are of the order of once per year with the proposed development – essentially the same as for existing conditions at the airport. This is attributed to the low profile of the proposed development buildings and low probability of occurrence of crosswinds of interest to this study (ie from the NE). Again, the proposed development will have minimal/negligible impact at wind speeds of practical interest on runway turbulence levels.

Note Regarding Building Envelope Changes

It is understood that the final design of the proposed development is currently being reviewed.

Based on extensive studies undertaken by SLR and other Wind Engineering consultancies, the impacts identified in the present study would be an upper bound of expected changes to windshear and wake turbulence if any proposed changes to the development result in a decrease of bulk envelope (especially height-wise) in the main operational building.

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FIGURES

APPENDICES

1 INTRODUCTION

SLR Consulting Australia Pty Ltd (SLR) has been engaged to assess Baiada's proposed Oakburn Poultry Processing Plant, located at 1154 Gunnedah Road, Westdale (Tamworth), in relation to potential building-induced windshear and wake turbulence effects according to the National Airports Safeguarding Framework (NASF) Guideline B, 2018 – Managing the Risk of Building Generated Windshear and Turbulence at Airports.

This assessment has been carried out in two stages:

- A Preliminary Qualitative Assessment investigating the potential for the proposed development to create downstream windshear and wake turbulence effects and the likely compliance of the same with respect to NASF-B (2018) criteria; and
- A Quantitative Assessment carried out via a 1:750 model-scale Environmental Wind Tunnel Study whereby hot-wire sensor measurements were made to investigate mean wind speeds and wind turbulence conditions along Tamworth Airport's main Runway 12L/30R and its northwest projection for aircraft landing flight path geometries potentially vulnerable to crosswinds from the northeast, passing firstly over the proposed Baiada Facility project domain, and then impacting landing flight paths on Runway 12L.

The wind tunnel testing examined two "built environment" scenarios:

- "Baseline" existing built environment at the airport and surrounds
- "Future" "Baseline" + proposed development

This assessment is required to assist in the preparation, lodgement and approval of a Major Development Plan for the Project.

1.1 Structure of Report

The remainder of this report is structured as follows:

Section 2 …	describes the key criteria required to be assessed within NASF-B (2018)
Section 3 …	describes the Project – location, project dimensions, etc
Section 4 …	presents information covering mean wind speeds and turbulence levels at the Tamworth Airport Bureau of Meteorology BoM Station 55325 (BoM 55325)
Section 5 …	presents the initial wind tunnel test results covering wind characteristics at BoM 55325
Section 6 …	details the wind tunnel testing methodology used to assess mean wind speeds and turbulence levels along the flight paths of interest along Runway 12L/30R relevant to NASF-B (2018) – wind directions tested, built environment scenarios, measurement points, etc.
Section 7 …	shows the wind tunnel test results for relevant to the NASF-B (2018) mean wind speed deficit criteria and 4 kt turbulence criterion.
Section 8 …	provides the conclusions to this report

2 THE NASF-B 2018 GUIDELINE

National Airports Safeguarding Framework (NASF) Guideline B, 2018 – Managing the Risk of Building Generated Windshear and Turbulence at Airports contains benchmark assessment trigger points for a new building development or building expansion.

Which buildings should be assessed ?

The "Assessment Trigger Area" (ATA):

Buildings do NOT need to be assessed under NASF-B (2018) if they lie OUTSIDE the so-called ATA, as shown in NASF-B (2018) Figure 1:

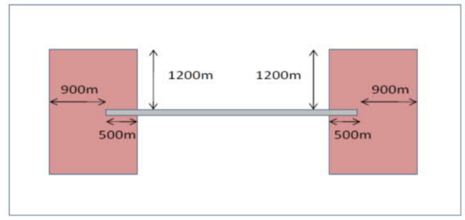


Figure 1: Assessment trigger area around runways, within which buildings should be assessed

If a building lies within the so-called "Assessment Trigger Area", apply the "1:35" Rule

- "1:35 Rule" – If the distance from the nearest runway centreline to the closest point of the new building is more than 35 times the height (above runway level) of the building, no further assessment is required as far as NASF-B (2018) is concerned;

If a building does not satisfy the "1:35" rule, assess the following criteria:

1. "7-knot alongwind criterion" – the variation in mean wind speed due to wind disturbing structures must remain below 7 kt (3.6 m/s) along the aircraft trajectory at heights below 200 ft. The speed deficit change of 7 kt must take place over a distance of at least 100 m;
2. "6-knot crosswind criterion" – the variation in mean wind speed due to wind disturbing structures must remain below 6 kt (3.1 m/s) across the aircraft trajectory at heights below 200 ft. The speed deficit change of 6 kt must take place over a distance of at least 100 m.
3. "4-knot turbulence criterion" – the standard deviation of wind speed must remain below 4 kt (2.06 m/s) at heights below 200 ft.

To satisfy the above alongwind, crosswind and turbulence criteria, the following is noted:

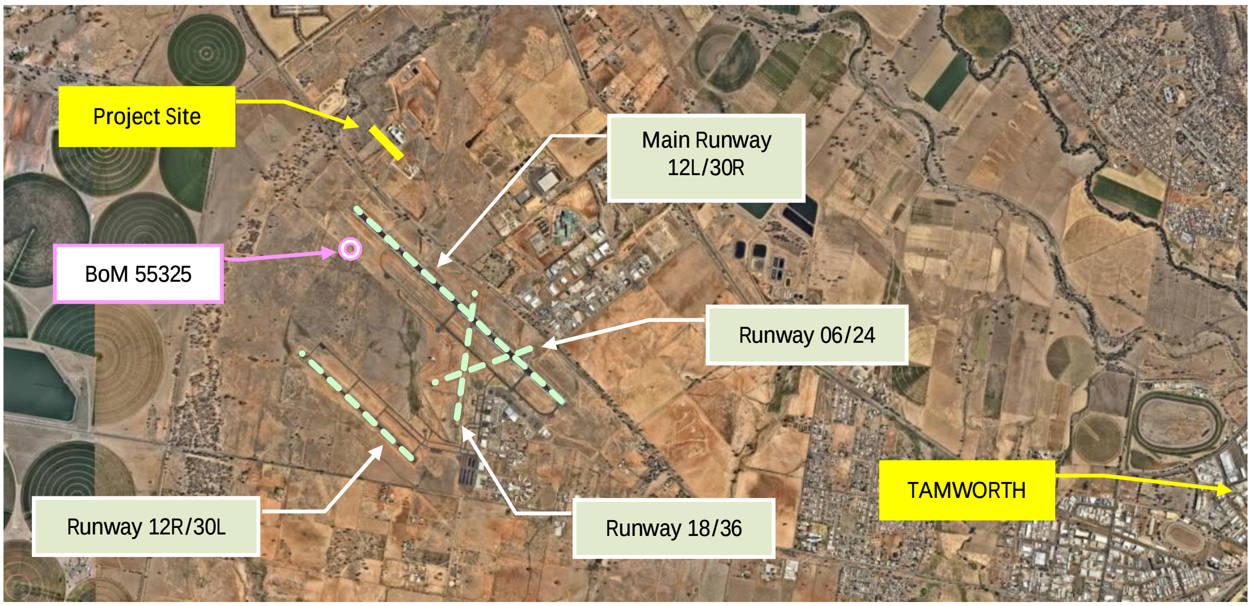
- In the absence of a simple (ie qualitative, expert opinion) safety case option, NASF-B requires a qualified wind engineer or other suitably qualified wind professional to assess the proposed development using Wind Tunnel Testing or Computational Fluid Dynamics (CFD) Simulation Modelling in order to satisfy the approval authority/decision maker (and CASA if their advice is sought) that the structure is acceptable.
- The Wind Tunnel Testing or CFD Simulation Modelling is to be used to assess when and in what circumstances the 6 kt (3.1 m/s) and 7 kt (3.6 m/s) wind speed deficit criteria and 4 kt (2.1 m/s) wake turbulence criterion (refer above) are likely to be exceeded. NASF-B (2018) Clause 34 states: "The assessment report should provide enough information (eg whether the criteria will be exceeded, what wind strength and direction would cause each criteria to be exceeded, how often this can be expected to happen) to allow planners to decide whether the proposed structure is acceptable, whether the risks can be mitigated through operational procedures at the airport, or whether the proposed structure should be refused."

3 THE PROJECT

3.1 Development Location

Baiada's proposed Poultry Processing Plant (the Project) is located at 1154 Gunnedah Road, Westdale, in Tamworth – refer Figure 1.

Figure 1 Project Site Location



3.2 Description of the Project

The development application for the Project includes the following elements:

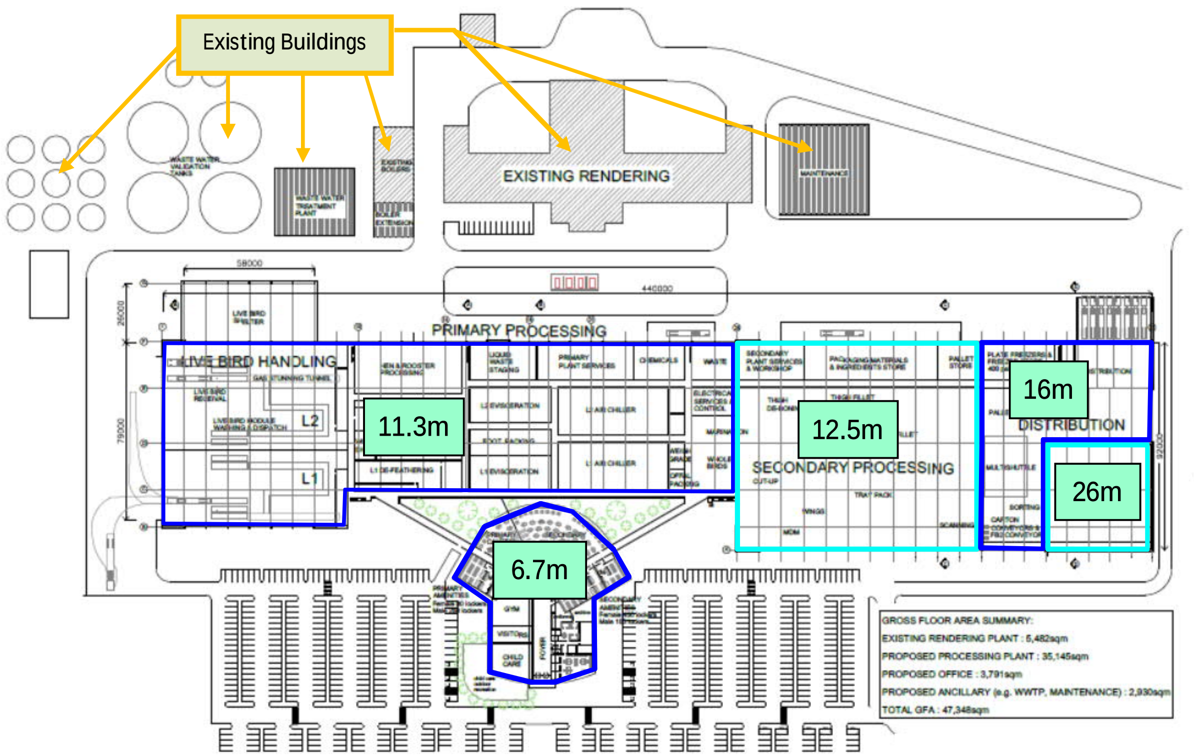
- Construction of a new poultry processing plant consisting of:
  - 38,936 m^2 of Gross Floor Area providing for live bird storage, processing, chilling, cold store and distribution facilities;
  - A 1,600 m^2 workshop and store building;
  - 3,791 m^2 of ancillary administration, staff amenities and childcare space; and
  - An expanded Waste Water Treatment Plant.
- Additional works, including:
  - New access roads, a new staff car parking area, site landscaping and screening vegetation.

Development Footprint

The proposed development footprint in relation to existing buildings on the site is shown in Figure 2.

- In terms of the overall building bulk envelope, the Project comprises a long, essentially rectangular building with four sections of variable height, ranging from 11.3 m (at the western end) to 26 m (at the eastern end) above ground.
- An Ancillary Services building located closer to the main runway at Tamworth Airport has a height of 6.7 m above ground.

Figure 2 Proposed Baiada Facility Footprint and Main Building Heights Above Ground

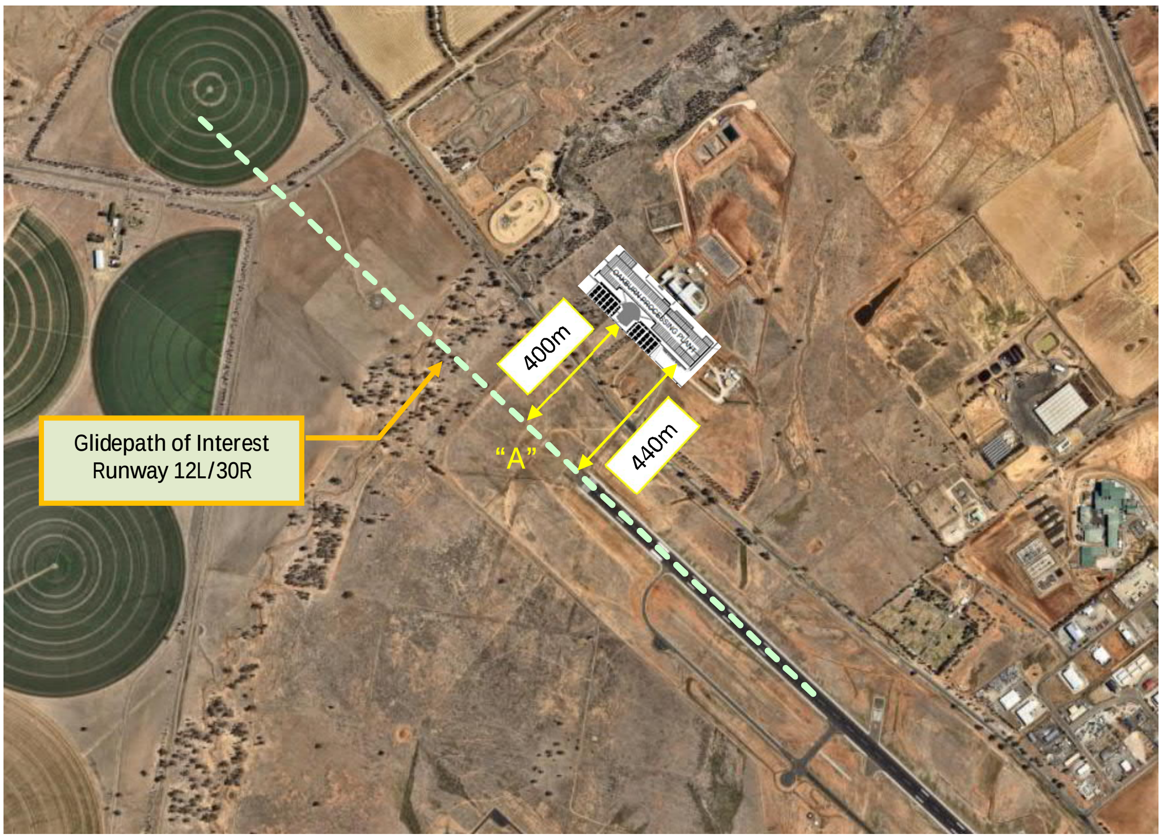


3.3 Development Siting Relative to Runway 12L/30R

The nearest runway to the proposed development is Runway 12L/30R (Tamworth Airport's main runway). The perpendicular distance from the Project to Runway 12L/30R is shown in Figure 3.

An aircraft landing from the northwest on Runway 12L would be at an approximate elevation of 10 m above ground level at point "A" (or higher if landing past the landing strips on the runway).

Figure 3 Location of Project Relative to Runway 12L



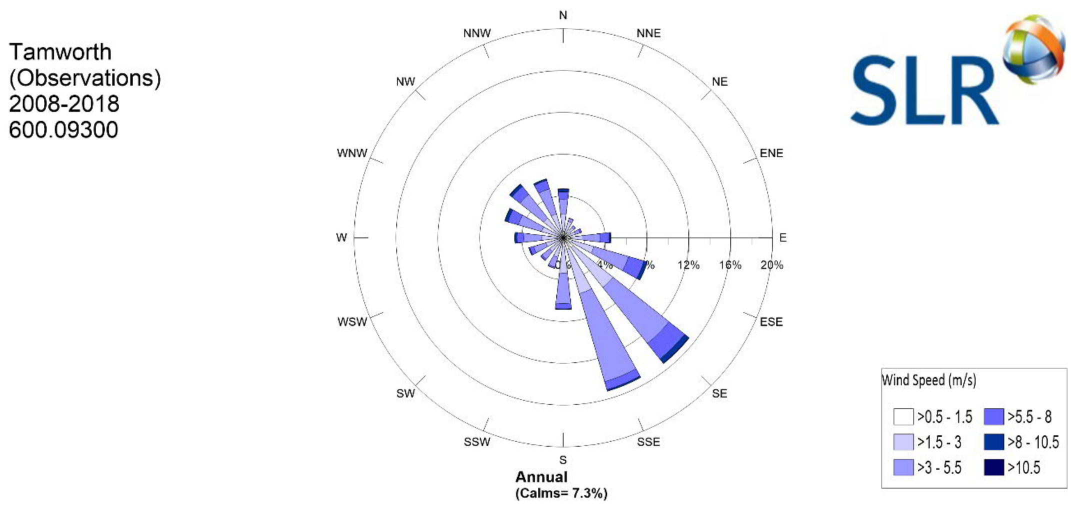
4 TAMWORTH AIRPORT WIND CLIMATE

4.1 Tamworth Airport Bureau of Meteorology (BoM) Station 55325

SLR has analysed wind records from the Bureau of Meteorology's (BoM's) automated weather station located at Tamworth Airport, recorded over the period 2008-2018.

The annual wind rose determined from this data is shown in Figure 4. The corresponding seasonal wind roses are shown in Appendix A.

Figure 4 BoM Station 55325 – Annual Wind Rose (2008-2018)



Two prevailing wind "lobes" are present in the Tamworth Airport data:

Southeast (SE) Winds

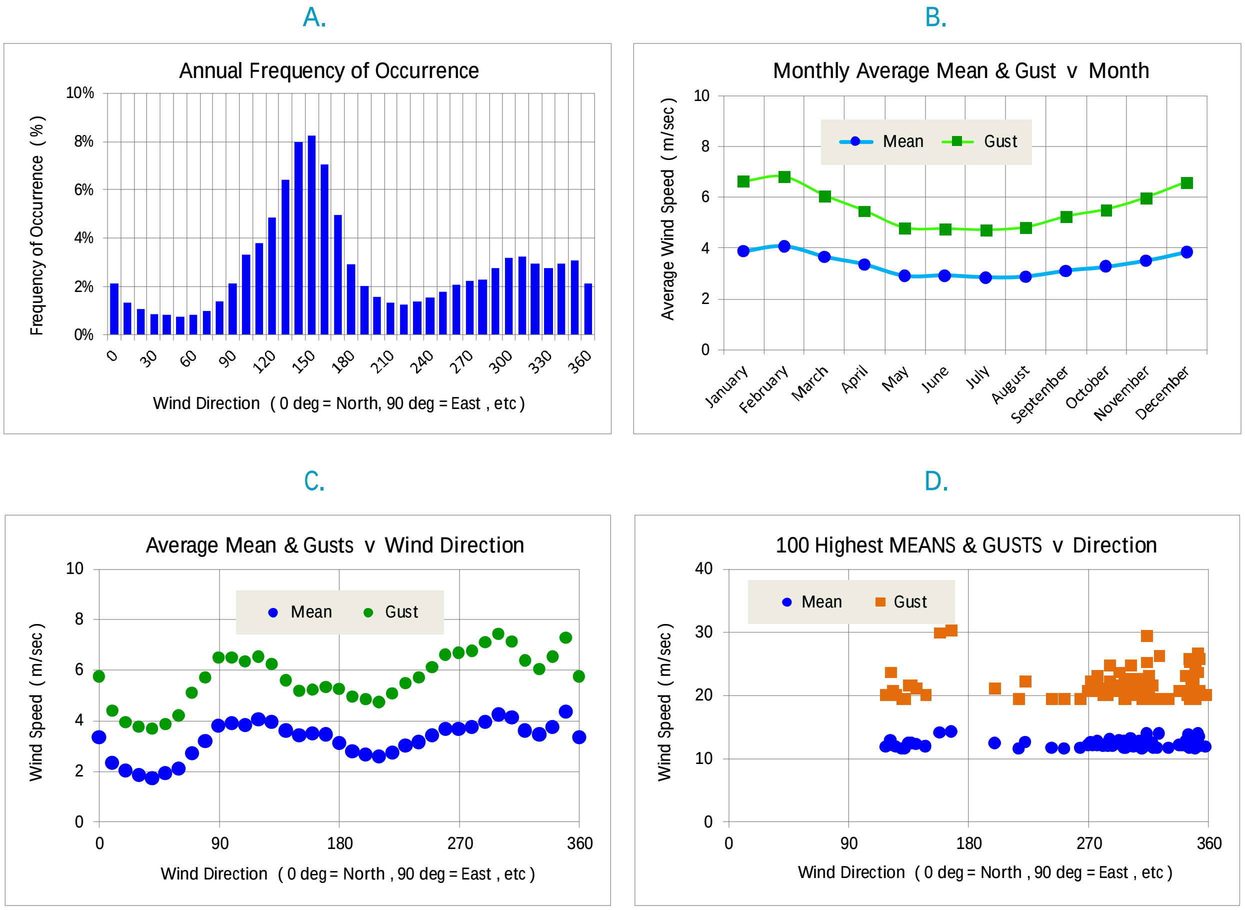
- Appendix A shows that these winds occur all-year round and are strongest and most frequent Late Spring to Early Autumn.

Northwest (NW) Winds

- Appendix A shows that these winds are most frequent Late Winter to Early Summer and are strongest during the months of Spring.

Figure 5 shows key characteristics of the BoM 55325 wind data.

Figure 5 BoM Station 55325 – Representative Wind Characteristics



A. shows the annual frequency of occurrence of all mean winds by wind direction: the two prevailing wind lobes at SE and NW are clearly evident. Note that this figure is simply a reflection of the frequency of occurrence of all winds by wind direction and not necessarily correlated with wind strength.

B. shows the variation of average monthly mean wind speeds and average monthly gusts by month throughout the year: average winds (means and gusts) are highest in the Summer months.

C. shows the average magnitude of mean wind speed and gust with wind direction, determined in 10° increments: interestingly, while SE winds provide by far the most common wind direction, the average wind speed from this direction is not as high as from the NW quadrant.

D. shows the 100 highest mean wind speeds and gusts recorded during the period 2008-2018: the highest winds recorded at Tamworth Airport in this period occurred mostly from the northwest with a secondary group of maxima occurring from the SE.

4.2 BoM Station55325 – Mean Wind Occurrence

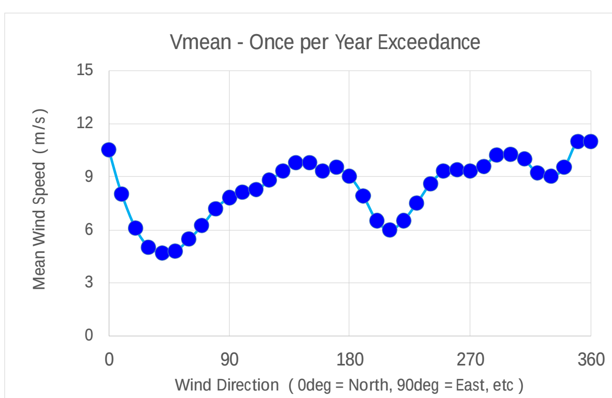
The mean hourly wind speed data recorded at BoM Station 55325 was used to generate Table 1 and Figure 6:

- Table 1 shows the number of hours per year that mean wind speeds are exceeded at BoM 55325 from the crosswind directions of interest in relation to the Project, in 10° increments from 10° to 80°, as well as from all directions combined (0° to 360°). For example, mean winds of 7 m/s or more occur less than once per year from 40°±5°, compared to over 500 times per year for all wind directions.
- Figure 7 shows the variation with wind direction of the mean wind speed which is exceeded, on average, once per year, ie the one-year return period mean wind speed. The 1-yr return period mean wind speed taking into account all wind directions at BoM 55325 is 13 m/s.
- The above data shows that, at the crosswind directions of interest to this study (namely NE), mean wind speeds have a relatively low probability of occurrence.

Table 1 Mean Wind Speed Exceedances (Hours per Year) versus Wind Direction at BoM 55325

Mean Wind (m/s)	Wind Direction (±5° bands)								
	10°	20°	30°	40°	50°	60°	70°	80°	ALL
1	118	94	76	70	65	71	83	117	8144
2	100.9	77.0	61.4	51.9	48.4	54.0	68.6	101.5	6822
3	66.5	43.8	28.7	24.2	24.5	31.1	45.9	72.5	4831
4	29.8	14.2	9.5	7.3	11.3	15.6	28.9	51.9	3034
5	13.8	5.7	3.0	2.8	5.5	7.8	18.6	37.8	1662
6	6.0	2.5	1.6	1.2	1.7	3.6	11.3	23.6	956
7	2.7	1.0	0.52	0.57	0.52	1.2	6.0	13.5	529
8	1.0	0.48	0.24	0.38	0.19	0.86	2.0	6.8	264
9	0.33	0.24	0.24	0.29		0.24	0.67	3.1	124
10	0.14		0.10	0.10		0.14	0.24	0.48	55
11	0.05		0.10					0.19	19
12									6
13									1

Figure 6 Once-per-Year Occurrence Mean Wind Speeds at BoM Station 55325 versus Wind Direction



4.3 BoM Station 55325 – Turbulence Occurrence

The BoM wind record at Station 55325 (Tamworth Airport) comprises mean hourly winds and peak (3-second) gusts as well as the mean (hourly average) wind direction. The turbulence, ie the standard deviation or "RMS" value, of the wind speed, which is relevant to the NASF-B (2018) 4 kt turbulence criterion, is not recorded directly at BoM 55325. Instead, it has to be inferred from the recorded mean and gust wind speeds.

Turbulence (relevant to the NASF-B (2018) 4 kt criterion)

The turbulence level (m/s or knots) can be inferred from the following relationship:

$$\text{Gust} = \text{Mean} + \phi \times \text{Turbulence}$$

where … ϕ = "peak" factor

The peak factor, "ϕ", depends on the averaging times of the recorded mean and gust speeds. For a mean wind averaged over an hour and a 3-second gust, ϕ would be close to 3.7. ϕ also depends on the "response" characteristics of the wind recording instrument, with older instruments exhibiting ϕ values less than 3.7.

Turbulence Intensity & Gust Factor

The Turbulence Intensity and Gust Factor are dimensionless quantities and are defined as follows:

$$\text{Turbulence Intensity} = \text{Turbulence} / \text{Mean}$$
$$\text{Gust Factor} = \text{Gust} / \text{Mean}$$

The above was used to analyse the BoM 55325 wind record of mean wind speed and gust speed to determine associated turbulence levels.

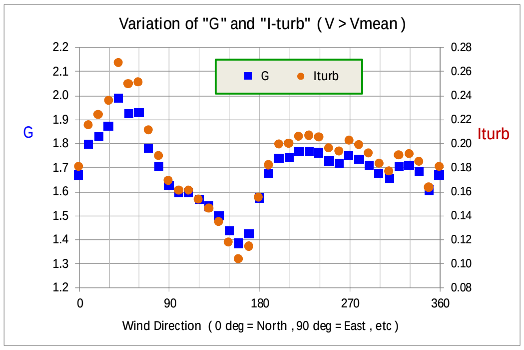
Figure 7 presents the resulting data for Gust Factor, Turbulence Intensity and Turbulence level.

A. shows the variation of Gust Factor ("G") and implied Turbulence Intensity ("i_{TURB}") with wind direction: the data presented are for the higher winds recorded at the site, ie when the wind speed was higher than the average mean wind speed for that particular direction. A relatively low Gust Factor and corresponding low Turbulence Intensity imply that the upstream built environment in that direction is largely free of obstacles such as buildings, trees, etc. A relatively high Gust Factor and corresponding Turbulence Intensity implies that there are buildings, trees, etc, upstream and in close proximity of the site in that direction.

B. shows the variation of 4 kt turbulence level exceedances with wind direction; the data suggest that, on average, turbulence levels are greater than 4 kt at the BoM 55325 site on approximately 42 occasions per year (ie 42 hours per year), with the highest incidence occurring from the northwest (270° to 330°). Note that this data is influenced by both the wind climate characteristics impacting the airport area in general and the local built environment and vegetation, trees, etc, immediately surrounding the site of the BoM 55325 anemometer. The incidence of 4 kt turbulence exceedances from the crosswind direction of interest to this study (NE) is seen to be very low.

Figure 7 Turbulence Occurrence Characteristics at BoM 55325

A.



B.

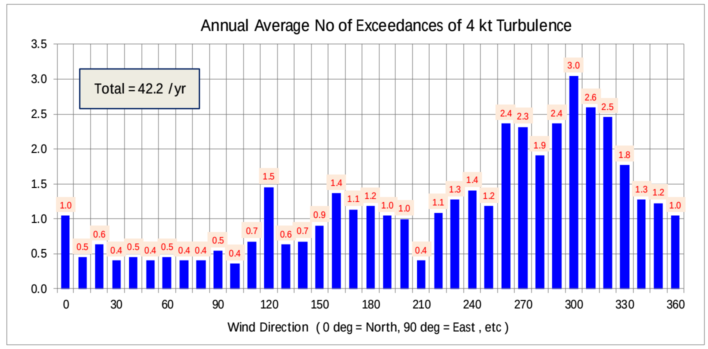


Figure 7-B and Table 1 show that the annual average turbulence exceedance of 4 kt at BoM 55325 (42 hours per year) coincides with a 1-yr return period mean wind speed of 10.3 m/s.

This implies an average turbulence intensity at the airport close to 20%, which aligns well with the average of the turbulence intensity points shown in Figure 7-A.

The above comparison provides confidence in the statistical exceedance probabilities of turbulence levels at the Tamworth Airport BoM 55325 site. Accordingly, confidence can be relied upon with the statistical exceedance probabilities of turbulence predicted for the landing flight paths of interest for Runway 12L/30R for the built environment scenarios of interest to the Project – of particular relevance to assessment of the NASF-B (2018) 4 kt turbulence criterion.

5 NASF-B ASSESSMENT: STAGE 1 - QUALITATIVE

National Airports Safeguarding Framework (NASF) Guideline B, 2018 – Managing the Risk of Building Generated Windshear and Turbulence at Airports contains benchmark assessment trigger points for a new building development or building expansion.

5.1 NASF-B (2018) "Assessment Trigger Area"

As can be seen in Figure 3, the Project would lie within the 1,400 m x 2,400 m NASF-B (2018) "Assessment Trigger Area" (refer Section 2) at the northwest end of Runway 12L/30R.

- Accordingly, further assessment is required as far as NASF-B (2018) is concerned;

5.2 NASF-B (2018) 1:35 Rule

The NASF-B (2018) "1:35 Rule" states that:

- If the distance from the nearest runway centreline to the closest point of the new building is more than 35 times the height (above runway level) of the building, no further assessment is required as far as NASF-B is concerned.

The two new Project building envelopes (Ancillary Service Building and new Operational Building) would lie 400 m and 440 m respectively from the nearest perpendicular point of Runway 12L/30R and its NW projection – refer Figure 3.

To satisfy the 1:35 rule, and hence avoid the necessity for further NASF-B (2018) analysis:

- The Ancillary Services Building would have to have a maximum height of 11.4 m; and
- The main Operational Building would have to have a maximum height of 12.6 m.

The Ancillary Services Building easily satisfies the NASF-B (2018) "1:35 Rule".

The two sections of higher roof height in the new Operational Building (at 16 m and 26 m above ground level) do not satisfy the NASF-B (2018) "1:35 Rule".

On this basis, the proposed development does not satisfy NASF-B (2018) with respect to the "1:35" rule and further assessment is required for acceptance of the proposed design in relation to all NASF-B considerations, ie the two mean wind speed deficit criteria and the 4 kt wake turbulence criterion.

6 WIND TUNNEL TEST PARAMETERS

6.1 Preliminary Test: Wind Profile at BoM 55325

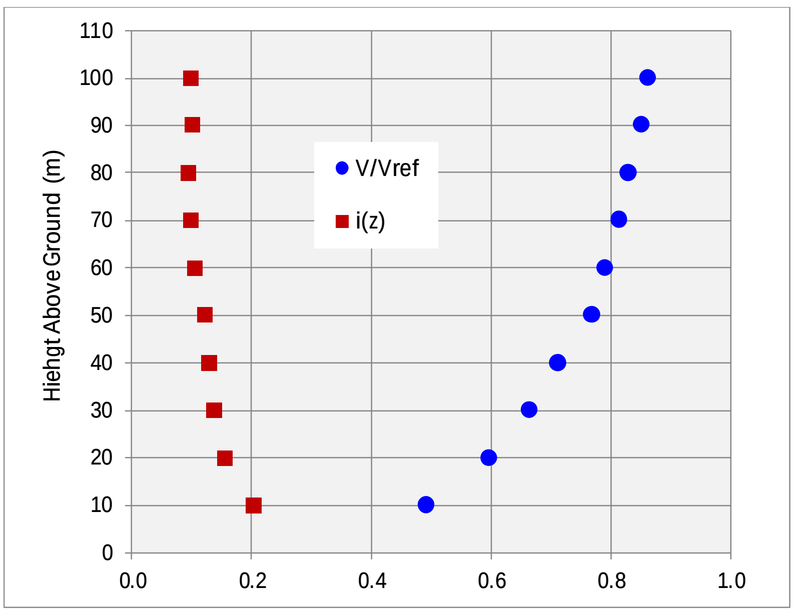
An initial test was undertaken in the wind tunnel with the "existing:" built environment – refer Figure 8 – to measure the change in mean wind speed and turbulence level with height at the location of the Bureau of Meteorology's Station 55325 site.

Concurrent measurements were made at a "Reference" position located upstream of the model (and free of any "obstruction" effects from existing buildings, etc).

Figure 8 shows the variation with height above ground of mean wind speed (ratio relative to the upstream reference mean wind speed) and local turbulence intensity, for a wind direction of 43°, which is the perpendicular wind direction from the northeast to Runway 12L.

- The ratio of the 10 m height BoM 55325 mean wind speed (ie recording height of the BoM wind monitor) to the upstream reference height wind speed at a wind direction of 43° is approximately 0.5.
- The measured turbulence intensity of wind speed at the BoM 55325 10 m recording position is 20%.

Figure 8 BoM 55325 Site Wind Profiles (Wind Direction = 43°)



6.2 Assessment of the Proposed Development

To assess the impact of the Project on Tamworth Airport's Runway 12L/30R operations in terms of windshear and wake turbulence, SLR undertook wind tunnel testing of two built environment scenarios, with the following test parameter combinations.

Built Environment Scenarios

Two built environment scenarios were tested:

- "Baseline" existing built environment at the airport and surrounds; and
- "Future" "Baseline" + proposed development.

Figure 9 shows the 1:750 scale Site Area models discussed above. The 2.5 m diameter "Proximity Model" corresponds to a circular area just under 1.9 km in diameter full-scale.

A reference height wind speed (mean and gust) was also recorded for each test. This was located upstream of the model test area (Proximity Model) and therefore unaffected by building wake effects for any model. The reference height wind speed data was used to relate Runway 12L/19L landing flight path wind speeds to BoM 55325 wind speeds.

Figure 9 Built Environment Scenario 1:750 Scale Models in the Wind Tunnel

"Baseline"

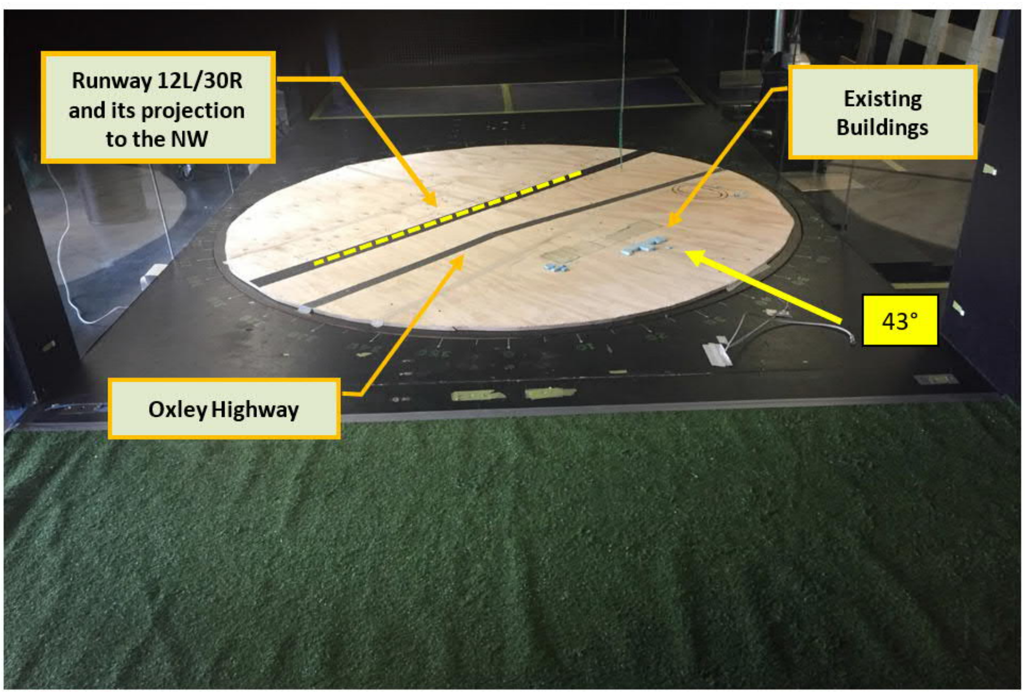
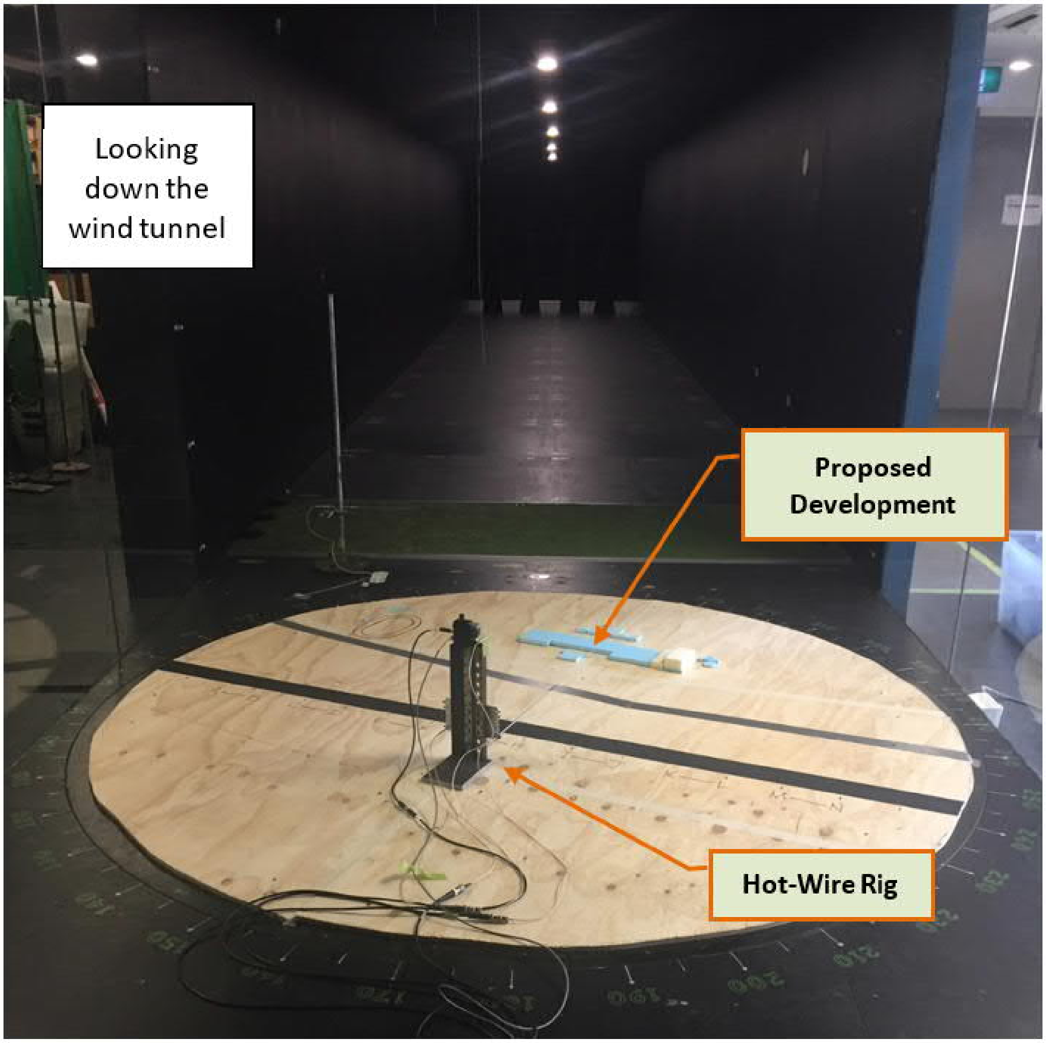


Fig.9 (cont'd)

"Future"



Measurement Probes

Measurements of wind speed were made using calibrated hot-wire probes, configured in a special purpose hot-wire test rig. These are capable of "fast-response" measurements of wind speed, and hence capable of capturing 3-second gusts in the modelled airflow.

- Data sampling rate was 1,024 Hz;
- Measurement sampling time was 30 seconds per sample.

Wind Directions – refer Figure 10

4 wind directions were tested: 20.5°, 43°, 65.5° and 88°.

Note that 43° is the wind direction perpendicular to Runway 12L/30R (from the northeast). A fifth potential wind direction of interest (-2°) was not tested, given it would constitute a significant and non-permissible tailwind for planes landing from the NW. Furthermore, for wind direction of -2°, the proposed development's wake would lie on the runway at a point where planes would already be on the ground.

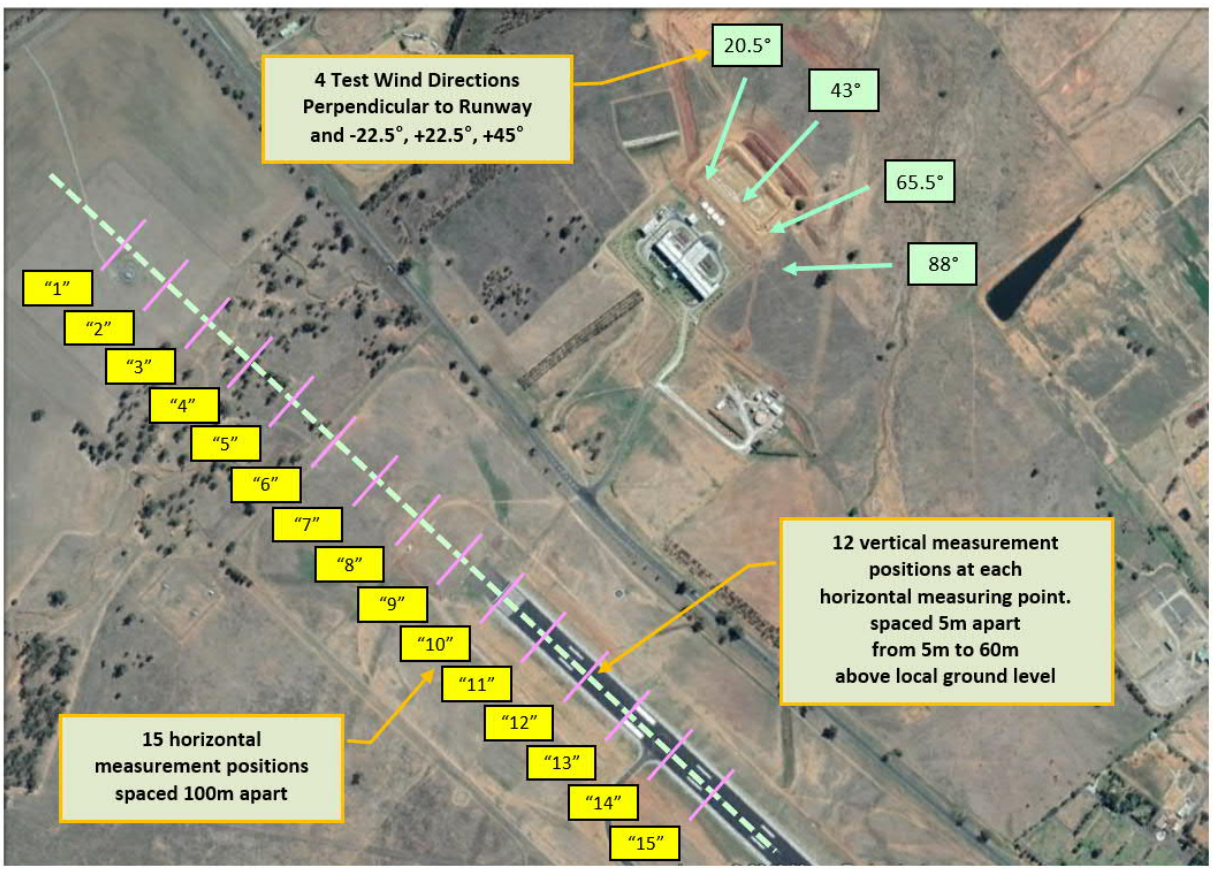
Measurement Grid Points – refer Figure 10

A 15 by 12 measurement grid was used for each of the test combinations:

- 15 Horizontal Positions: 100 m apart along Runway 12L/30R, with the midpoint between locations "8" and "9" being perpendicular to the site along the runway.
- 12 Vertical Positions: 5 m apart from 5 m above ground level to 60 m above ground level.

Figure 10 shows the measurement point locations along Runway 12L/30R and its projection to the northwest as well as the 4 test wind directions.

Figure 10 Runway Horizontal Measurement Positions and Test Wind Directions



7 WIND TUNNEL TEST RESULTS

7.1 NASF-B (2018) Mean Wind Speed Deficit Criteria

The NASF-B (2018) criteria related to mean wind speed deficit for the assessment of building development proposals at airports are:

- "7-knot alongwind criterion" – the variation in mean wind speed due to wind disturbing structures must remain below 7 kt (3.6 m/s) along the aircraft trajectory at heights below 200 ft. The speed deficit change of 7 kt must take place over a distance of at least 100 m;
- "6-knot crosswind criterion" – the variation in mean wind speed due to wind disturbing structures must remain below 6 kt (3.1 m/s) across the aircraft trajectory at heights below 200 ft. The speed deficit change of 6 kt must take place over a distance of at least 100 m.

7.1.1 NASF-B (2018) Mean Wind Speed Deficit Exceedance Calculation Procedure

The procedure for assessment of the two NASF-B (2018) mean wind speed deficit criteria for the two built environment scenarios tested is as follows:

Step 1: Measure the mean wind speed for each built environment scenario and each wind direction examined at each measurement grid point (refer Figure 9);

Step 2: Simultaneously record the upstream reference height mean wind speed for each test;

Step 3: Use the BoM 55325 wind tunnel test profile data to relate the upstream reference height mean wind speed to the mean wind speed which would be occurring at the BoM 55325 weather station location; and

Step 4 Use the statistical occurrence of mean wind speeds at the BoM 55325 site (refer Table 1) to develop tables of the statistical occurrence of mean wind speed deficit exceedances along Runway 12L landing flight paths.

The process is illustrated for the following test configuration: EXISTING / 43°

Table 2 is the ratio of the mean wind speed occurring at each measurement grid position to the BoM 55325 10 m height mean wind speed - "Existing" scenario, wind direction 43°. Lines (ochre-coloured) have been superimposed on Table 2 illustrating potential aircraft landing 3° glide paths on approach to Runway 12L. Data points at locations not physically possible for landing aircraft (ie implying an aircraft landing on the ground before the end of Runway 12L) have been excluded from the table (as well as Table 3).

Table 3 gives the return period of the BoM 55325 10 m height mean wind speed which would produce an exceedance of the NASF-B (2018) deficit criteria.

- Table 2 shows that an aircraft landing on Runway 12L would experience mean wind speeds along potential flight paths varying from 175% (at 60 m height) to 90% (at 5 m height) measured as a ratio of the BoM 55325 10 m height mean wind speed.
- Table 3 (using data from Table 1) shows that the lowest BoM 10 m height mean wind speed able to create an exceedance of the NASF-B (2018) deficit criteria has a return period greater than 10 years. This is not surprising given the low height of the existing buildings on the site.

Table 2 Glide Path Mean Wind Speed Ratios to BoM 55325 10m Mean Wind Speed - EXISTING, 43°

Height (m)	Horizontal Grid Position (refer Figure 9)									
	4	5	6	7	8	9	10	11	12	13
60	1.73	1.72	1.73	1.75	1.75	1.75	1.73	1.70	1.72	1.74
55	1.71	1.70	1.71	1.72	1.71	1.70	1.68	1.67	1.70	1.73
50	1.69	1.69	1.69	1.70	1.67	1.65	1.64	1.64	1.68	1.73
45	1.66	1.66	1.67	1.68	1.64	1.60	1.61	1.62	1.67	1.71
40	1.64	1.63	1.64	1.66	1.61	1.56	1.59	1.61	1.65	1.70
35	1.58	1.56	1.58	1.61	1.56	1.51	1.53	1.56	1.58	1.60
30	1.52	1.49	1.53	1.56	1.51	1.45	1.48	1.50	1.50	1.50
25		1.45	1.47	1.49	1.44	1.40	1.41	1.42	1.44	1.46
20			1.41	1.42	1.38	1.34	1.35	1.35	1.38	1.41
15				1.27	1.25	1.23	1.22	1.21	1.23	1.24
10					1.12	1.12	1.09	1.07	1.07	1.07
5						1.01	0.97	0.93	0.91	0.90

Table 3 BoM 55325 Return Period for NASF-B (2018) Deficit Criteria Exceedance: EXISTING, 43°

Height (m)	Horizontal Grid Position (refer Figure 9)									
	4	5	6	7	8	9	10	11	12	13
60	>100	>100	>100	>100	>100					
55	>100	>100	>100	>100	>100	>100				
50	>100	>100	>100	>100	>100	>100	>100			
45	>100	>100	>100	>100	>100	>100	>100	>100		
40	>100	>100	>100	>100	>100	>100	>100	>100	>100	
35	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100
30	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100
25		>100	>100	>100	>100	>100	>100	>100	>100	>100
20			>100	>100	>100	>100	>100	>100	>100	>100
15				>100	>100	>100	>100	>100	>100	>100
10					>100	>100	>100	>100	>100	>100
5						>100	>100	>100	>100	>100

7.1.2 NASF-B (2018) Mean Wind Speed Deficit Criteria Exceedance - Scenario Comparison

The results shown in Tables 4 and 5 give the BoM 55325 10 m height mean wind speed which would produce an exceedance of the NASF-B (2018) deficit criteria for the two tested built environment scenarios.

"EXISTING" Built Environment Scenario - refer Table 4

Wind Direction 20.5°

- The return period of NASF-B (2018) mean wind speed deficit criteria exceedance ranges exceeds 100 years for all grid measurement points.

Wind Direction 43°

- The return period of NASF-B (2018) mean wind speed deficit criteria exceedance ranges exceeds 100 years for all grid measurement points.

Wind Direction 65.5°

- The return period of NASF-B (2018) mean wind speed deficit criteria exceedance ranges exceeds 100 years for all grid measurement points.

Wind Direction 88°

- The return period of NASF-B (2018) mean wind speed deficit criteria exceedance ranges exceeds 100 years for all grid measurement points.

"FUTURE" Built Environment Scenario - refer Table 5

A review of the mean wind speeds in Table 5 causing an exceedance of the NASF-B (2018) mean wind speed criteria shows the following:

- When comparing the results between the "Existing" and "Future" scenarios at any one individual measurement grid point, there were minor variances at particular locations (typically ±10%) both up and down;
- However, the minimum return period for each tested angle at the "worst-case" grid point, remained at or above 100 years.

Summary:

Exceedances of the NASF-B (2018) mean wind speed criteria are essentially non-existent for both the "Existing" and "Future" scenarios at practical wind speeds, ie winds occurring with a return period of less than one per hundred years.

Table 4 BoM 55325 Mean Wind Speed for NASF-B (2018) Deficit Criteria Exceedance: EXISTING

	Wind Direction = 20.5°									
	6	7	8	9	10	11	12	13	14	15
60	>100	>100	>100							
55	>100	>100	>100	>100						
50	>100	>100	>100	>100	>100					
45	>100	>100	>100	>100	>100	>100				
40	>100	>100	>100	>100	>100	>100	>100			
35	>100	>100	>100	>100	>100	>100	>100	>100		
30	>100	>100	>100	>100	>100	>100	>100	>100	>100	
25	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100
20	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100
15		>100	>100	>100	>100	>100	>100	>100	>100	>100
10			>100	>100	>100	>100	>100	>100	>100	>100
5				>100	>100	>100	>100	>100	>100	>100

	Wind Direction = 43°									
	4	5	6	7	8	9	10	11	12	13
60	>100	>100	>100	>100	>100					
55	>100	>100	>100	>100	>100	>100				
50	>100	>100	>100	>100	>100	>100	>100			
45	>100	>100	>100	>100	>100	>100	>100	>100		
40	>100	>100	>100	>100	>100	>100	>100	>100	>100	
35	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100
30	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100
25		>100	>100	>100	>100	>100	>100	>100	>100	>100
20			>100	>100	>100	>100	>100	>100	>100	>100
15				>100	>100	>100	>100	>100	>100	>100
10					>100	>100	>100	>100	>100	>100
5						>100	>100	>100	>100	>100

	Wind Direction = 65.5°									
	2	3	4	5	6	7	8	9	10	11
60	>100	>100	>100	>100	>100	>100	>100			
55	>100	>100	>100	>100	>100	>100	>100	>100		
50	>100	>100	>100	>100	>100	>100	>100	>100	>100	
45	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100
40	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100
35		>100	>100	>100	>100	>100	>100	>100	>100	>100
30			>100	>100	>100	>100	>100	>100	>100	>100
25				>100	>100	>100	>100	>100	>100	>100
20					>100	>100	>100	>100	>100	>100
15						>100	>100	>100	>100	>100
10							>100	>100	>100	>100
5								>100	>100	>100

	Wind Direction = 88°								
	1	2	3	4	5	6	7	8	9
60	>100	>100	>100	>100	>100	>100	>100		
55	>100	>100	>100	>100	>100	>100	>100	>100	
50	>100	>100	>100	>100	>100	>100	>100	>100	>100
45	>100	>100	>100	>100	>100	>100	>100	>100	>100
40		>100	>100	>100	>100	>100	>100	>100	>100
35			>100	>100	>100	>100	>100	>100	>100
30				>100	>100	>100	>100	>100	>100
25					>100	>100	>100	>100	>100
20						>100	>100	>100	>100
15							>100	>100	>100
10								>100	>100
5									>100

Table 5 BoM 55325 Mean Wind Speed for NASF-B (2018) Deficit Criteria Exceedance: FUTURE

	Wind Direction = 20.5°									
	6	7	8	9	10	11	12	13	14	15
60	>100	>100	>100							
55	>100	>100	>100	>100						
50	>100	>100	>100	>100	>100					
45	>100	>100	>100	>100	>100	>100				
40	>100	>100	>100	>100	>100	>100	>100			
35	>100	>100	>100	>100	>100	>100	>100	>100		
30	>100	>100	>100	>100	>100	>100	>100	>100	>100	
25	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100
20	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100
15		>100	>100	>100	>100	>100	>100	>100	>100	>100
10			>100	>100	>100	>100	>100	>100	>100	>100
5				>100	>100	>100	>100	>100	>100	>100

	Wind Direction = 43°									
	4	5	6	7	8	9	10	11	12	13
60	>100	>100	>100	>100	>100					
55	>100	>100	>100	>100	>100	>100				
50	>100	>100	>100	>100	>100	>100	>100			
45	>100	>100	>100	>100	>100	>100	>100	>100		
40	>100	>100	>100	>100	>100	>100	>100	>100	>100	
35	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100
30	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100
25		>100	>100	>100	>100	>100	>100	>100	>100	>100
20			>100	>100	>100	>100	>100	>100	>100	>100
15				>100	>100	>100	>100	>100	>100	>100
10					>100	>100	>100	>100	>100	>100
5						>100	>100	>100	>100	>100

	Wind Direction = 65.5°									
	2	3	4	5	6	7	8	9	10	11
60	>100	>100	>100	>100	>100	>100	>100			
55	>100	>100	>100	>100	>100	>100	>100	>100		
50	>100	>100	>100	>100	>100	>100	>100	>100	>100	
45	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100
40	>100	>100	>100	>100	>100	>100	>100	>100	>100	>100
35		>100	>100	>100	>100	>100	>100	>100	>100	>100
30			>100	>100	>100	>100	>100	>100	>100	>100
25				>100	>100	>100	>100	>100	>100	>100
20					>100	>100	>100	>100	>100	>100
15						>100	>100	>100	>100	>100
10							>100	>100	100	>100
5								>100	>100	100

	Wind Direction = 88°								
	1	2	3	4	5	6	7	8	9
60	>100	>100	>100	>100	>100	>100	>100		
55	>100	>100	>100	>100	>100	>100	>100	>100	
50	>100	>100	>100	>100	>100	>100	>100	>100	>100
45	>100	>100	>100	>100	>100	>100	>100	>100	>100
40		>100	>100	>100	>100	>100	>100	>100	>100
35			>100	>100	>100	>100	>100	>100	>100
30				>100	>100	>100	>100	>100	>100
25					>100	>100	>100	>100	>100
20						>100	>100	>100	>100
15							>100	>100	>100
10								>100	>100
5									>100

7.2 NASF-B (2018) 4 kt Turbulence Criterion

The remaining NASF-B (2018) criterion for assessment of building development proposals at airports is the so-called 4 kt turbulence criterion, which requires that:

- The standard deviation ("RMS") of wind speed (ie the turbulence level) must remain below 4 kt (2.06 m/s) at heights below 200 ft.

7.2.1 NASF-B (2018) 4 kt Turbulence Exceedance Calculation Procedure

The procedure for assessment of the 4 kt turbulence criterion for the two built environment scenarios tested is as follows:

Step 1: Measure the turbulence level for each built environment scenario and each wind direction examined at each measurement grid point (refer Figure 9);

Step 2: Simultaneously record the upstream reference height mean wind speed for each test;

Step 3: Use the BoM 55325 location wind tunnel test data to relate the upstream reference height mean wind speed to the mean wind speed which would be occurring at the BoM 55325 weather station location; and

Step 4 Use the statistical occurrence of mean wind speeds at the BoM 55325 site (refer Table 1) to develop tables of the return period of 4 kt turbulence exceedances along Runway 12L landing flight paths.

The process is illustrated for the following test configuration: EXISTING / 436°

Table 6 gives the 10 m height mean wind speed which would be occurring at the BoM 55325 weather station location when a 4 kt turbulence level would be occurring at each measurement grid position - "Existing" scenario, wind direction 43°. Lines (ochre-coloured) have been superimposed on Table 6 illustrating potential aircraft landing 3° glide paths on approach to Runway 12L.

Table 7 gives the return period corresponding to the mean wind speed values shown in Table 6 – this is the recurrence interval of a 4 kt event for the "Existing" built environment scenario and for a wind direction of 43°±5°.

Sample Tables 6/7 Data Point: Horizontal Position "11", Height above Ground = 15 m

- Table 6 shows that an aircraft landing on Runway 12L would experience a turbulence level of 4 kt at this location (directly perpendicular to the Project) with the BoM 55325 site recording a 10 m height mean wind speed of 11 m/sec.
- Table 7 shows that the above event is predicted to about once every 6 years.

Table 6 BoM 10m Height Mean Wind Speed for 4 kt Turbulence at Glide Path Location – EXISTING, 296°

Height (m)	Horizontal Grid Position (refer Figure 9)									
	4	5	6	7	8	9	10	11	12	13
60	13.0	13.0	13.0	12.5	13.0	13.5	12.5	12.0	13.0	14.0
55	13.0	13.0	13.0	13.0	13.0	13.0	12.5	12.0	12.5	13.5
50	13.0	13.0	13.0	13.0	13.0	12.5	12.0	12.0	12.0	12.5
45	13.0	13.0	13.0	13.0	13.0	12.5	12.0	11.5	12.0	12.0
40	13.0	13.0	13.0	13.0	12.5	12.0	12.0	11.5	11.5	11.5
35	13.0	13.0	13.0	13.0	12.5	12.5	12.0	12.0	11.5	11.5
30	12.5	12.5	12.5	12.5	13.0	13.0	12.5	12.0	12.0	11.5
25		12.5	12.0	12.0	12.0	12.5	12.0	11.5	11.5	11.5
20			11.5	11.5	12.0	12.0	11.5	11.0	11.0	11.5
15				11.5	11.5	12.0	11.5	11.0	11.5	11.5
10					11.5	12.0	11.5	11.5	11.5	12.0
5						12.0	11.5	11.5	12.0	12.5

Table 7 Return Period for a Flight Path 4 kt Turbulence Exceedance: EXISTING, 296° (±7.5°)

Height (m)	Horizontal Grid Position (refer Figure 9)									
	4	5	6	7	8	9	10	11	12	13
60	>100	>100	>100	65	>100	>100	65	25	>100	>100
55	>100	>100	>100	>100	>100	>100	65	25	65	>100
50	>100	>100	>100	>100	>100	65	25	25	25	65
45	>100	>100	>100	>100	>100	65	25	15	25	25
40	>100	>100	>100	>100	65	25	25	15	15	15
35	>100	>100	>100	>100	65	65	25	25	15	15
30	65	65	65	65	>100	>100	65	25	25	15
25		65	25	25	25	65	25	15	15	15
20			15	15	25	25	15	6	6	15
15				15	15	25	15	6	15	15
10					15	25	15	15	15	25
5						25	15	15	25	65

7.2.2 NASF-B (2018) 4 kt Turbulence Exceedance – Built Scenario Comparison

The results shown in Tables 8 and 9 give the return period of a 4 kt event occurring at the flight landing path grid measurement points for the two tested built environment scenarios.

"EXISTING" Built Environment Scenario - refer Table 8

Wind Direction 20.5°

- Predicted 4 kt Turbulence Exceedance return periods range from 4 years and up. The most affected areas are at locations 13 and 14, directly downstream of the existing buildings for this wind direction.

Wind Direction 43°

- Predicted 4 kt Turbulence Exceedance return periods range from 2 years (at just one location) and up for this "perpendicular" wind direction.

Wind Direction 65.5°

- Predicted 4 kt Turbulence Exceedance return periods range from once per year and upwards.
- Predicted 4 kt Turbulence Exceedance return periods range from 4 years (one location) and upwards.

"FUTURE" Built Environment Scenario - refer Table 9

Wind Direction 20.5°

- Predicted 4 kt Turbulence Exceedance return periods range reduce at several locations and range from 2 years and up. Again, the most affected areas are at locations 13 and 14, directly downstream of the existing buildings and proposed development for this wind direction.

Wind Direction 43°

- Predicted 44 kt Turbulence Exceedance return periods range reduce, most noticeably at location 11 which is in line with the wake behind the highest RL section of the proposed development (at the eastern end). Return periods range from 1 year and up.

Wind Direction 65.5°

- Predicted 4 kt Turbulence Exceedance return periods also range from once per year and upwards with the largest impact seen at locations 7 and 8, in line with the highest RL section of the proposed development (at the eastern end).

Wind Direction 88°

- Predicted 4 kt Turbulence Exceedance return periods are modified depending upon location – again ranging from 4 years and up.

Summary:

Exceedances of the NASF-B (2018) 4 kt turbulence criterion are minimal (ie no more than once per year from wind directions of interest) and essentially the same for both the "Existing" and "Future" scenarios.

Table 8 4 kt Turbulence Exceedance Statistics for all "EXISTING" Scenarios (Hours per Year)

	Wind Direction = 20.5°									
Ht	6	7	8	9	10	11	12	13	14	15
60	45	25	45	>100	>100					
55	>100	>100	>100	>100	>100	>100				
50	>100	>100	>100	>100	>100	>100	45			
45	>100	>100	>100	>100	>100	>100	25	7		
40	>100	>100	>100	>100	>100	>100	25	4	25	
35	>100	>100	>100	>100	>100	45	45	25	45	>100
30	>100	>100	>100	>100	>100	45	45	45	>100	>100
25	>100	>100	>100	>100	>100	25	25	25	45	>100
20	>100	45	>100	>100	>100	25	25	7	45	>100
15		>100	>100	>100	>100	45	25	25	25	45
10			>100	>100	>100	45	45	25	25	7
5				>100	>100	>100	45	25	7	4

	Wind Direction = 43°									
Ht	4	5	6	7	8	9	10	11	12	13
60	25	25	25	15	25					
55	25	25	25	25	25	25				
50	25	25	25	25	25	15	6			
45	25	25	25	25	15	15	6	6		
40	25	25	25	25	15	6	6	4	4	
35	25	25	25	25	15	15	6	6	4	4
30	15	15	15	15	25	25	15	6	6	4
25		15	6	6	15	15	6	4	4	4
20			6	4	6	6	4	2	4	4
15				4	6	6	4	4	4	6
10					6	6	4	4	6	6
5						6	4	4	6	15

	Wind Direction = 65.5°									
Ht	2	3	4	5	6	7	8	9	10	11
60	>100	>100	>100	>100	11	3	11			
55	>100	>100	>100	30	7	2	7	68		
50	>100	>100	>100	11	3	1	3	30	68	
45	>100	>100	>100	11	3	1	3	11	30	68
40	>100	>100	68	11	3	1	2	3	11	30
35		>100	68	7	3	2	3	7	11	68
30			68	7	3	2	3	7	30	68
25				3	3	3	3	7	11	30
20					3	3	7	7	7	7
15						3	3	3	7	11
10							3	2	7	30
5								2	7	30

	Wind Direction = 88°								
Ht	1	2	3	4	5	6	7	8	9
60	>100	>100	>100	50	7	7	20		
55	>100	>100	>100	>100	20	20	20	>100	
50	>100	>100	>100	>100	>100	50	20	>100	>100
45	>100	>100	>100	>100	20	20	50	>100	>100
40		>100	>100	50	7	20	50	50	50
35			>100	>100	20	20	20	50	50
30				>100	>100	50	20	50	50
25					50	50	50	20	7
20						50	>100	20	4
15							50	20	20
10								50	>100
5									>100

Table 9 4 kt Turbulence Exceedance Statistics for all "FUTURE" Scenarios (Hours per Year)

	Wind Direction = 20.5°									
Ht	6	7	8	9	10	11	12	13	14	15
60	>100	>100	>100	>100	>100					
55	>100	>100	>100	>100	>100	>100				
50	>100	>100	>100	>100	>100	>100	25			
45	>100	>100	>100	>100	>100	>100	45	2		
40	>100	>100	>100	>100	>100	>100	45	4	45	
35	>100	>100	>100	>100	>100	>100	45	4	25	>100
30	>100	>100	>100	>100	>100	>100	25	2	7	45
25	>100	>100	>100	>100	>100	>100	45	4	25	>100
20	>100	>100	>100	>100	>100	>100	45	4	25	>100
15		>100	>100	>100	>100	>100	45	2	7	>100
10			>100	>100	>100	>100	25	2	7	45
5				>100	>100	>100	25	2	4	25

	Wind Direction = 43°									
Ht	4	5	6	7	8	9	10	11	12	13
60	>100	65	>100	>100	15	2	2			
55	>100	>100	>100	>100	15	2	2	2		
50	>100	>100	>100	>100	15	4	2	1	6	
45	>100	>100	>100	>100	25	4	4	2	15	>100
40	65	65	>100	>100	25	6	4	4	25	>100
35	>100	>100	>100	>100	25	6	4	4	15	65
30	>100	>100	>100	>100	25	6	4	4	6	25
25		>100	>100	25	15	6	4	2	6	65
20			65	15	15	15	4	1	6	>100
15				25	15	6	4	2	15	>100
10					15	6	4	2	15	>100
5						4	4	4	15	>100

	Wind Direction = 65.5°									
Ht	2	3	4	5	6	7	8	9	10	11
60	>100	>100	>100	68	11	7	11	11		
55	>100	>100	>100	68	11	3	7	11	68	
50	>100	>100	>100	30	7	2	3	7	30	>100
45	>100	>100	>100	68	7	1	3	7	30	>100
40	>100	>100	>100	>100	7	1	2	7	30	>100
35		>100	>100	>100	3	1	2	7	68	>100
30			>100	68	2	1	1	11	>100	>100
25				30	3	1	3	30	>100	>100
20					3	2	7	68	>100	>100
15						2	11	>100	>100	>100
10							11	>100	>100	>100
5								>100	>100	>100

	Wind Direction = 88°								
Ht	1	2	3	4	5	6	7	8	9
60	>100	>100	50	20	20	7	4		
55	>100	>100	20	20	20	7	4	20	
50	50	>100	20	20	20	7	7	20	>100
45	>100	>100	20	20	20	7	7	20	>100
40		>100	50	50	50	20	7	20	>100
35			50	20	20	20	7	50	>100
30				20	7	7	20	50	50
25					20	20	20	50	50
20						50	50	50	50
15							50	50	>100
10								>100	>100
5									>100

8 CONCLUSIONS AND SUMMARY

The present study involved 1:750 scale model wind tunnel testing of two "built environment" scenarios"

- "Baseline" existing built environment at the airport and surrounds
- "Future" "Baseline" + proposed development

NASF-B (2018) Threshold "Triggers"

The study showed that the proposed development does not satisfy NASF-B (2018) with respect to the "1:35" rule - refer Section 2.

Accordingly, further quantitative assessment (ie via wind tunnel testing or CFD modelling) was undertaken as required for acceptance of the proposed concept design in relation to the NASF-B considerations covering mean wind speed deficit and wake turbulence.

Tamworth Airport BoM Station 55325 Wind Characteristics

The study analysed the exceedance characteristics of the long-term wind record (2008-2018) obtained at the Bureau of Meteorology (BoM) weather station located at Tamworth Airport, BoM 55325, in terms of both mean wind speed and turbulence. The site of the weather station is close to the project domain areas and shares similar upstream turbulence characteristics to Runway 12L positions (and its northwesterly projection) under crosswind (ie northeast) wind conditions. These statistics serve as a reference dataset to assess exceedance levels of interest in relation to NASF-B and the proposed development.

Initial Tamworth Airport BoM 55325 1:750 Model Scale Wind Tunnel Test

An initial 1:750 model scale wind tunnel test was undertaken to directly measure the mean wind speed and turbulence level at the 10 m height anemometer location of Tamworth Airport BoM 55325. During this test a reference height wind speed (mean and gust) was also recorded at a location upstream of the model test area so as to be unaffected by any existing building wake effects.

This reference height wind speed was also used in the subsequent built environment scenarios and served as a "bridge" to relate wind speeds (mean and gust) measured along flight landing path positions back to the 10 m height mean wind speed at Tamworth Airport BoM 55325.

Built Scenarios 1:750 Model Scale Wind Tunnel Tests

As noted above, two built environment scenarios were tested to assess the impact of the proposal.

Hot-wire sensors were used to make wind speed measurements at positions located in a vertical plane centred on Runway 12L and its southern projection – refer Figure 9. The measurement grid had a horizontal spacing of 100 m and a vertical grid spacing of 5 m (ranging from 5 m up to 60 m above ground level).

Four wind directions were tested – 20.5°, 43°, 65.6° and 88° - noting that 43° is the wind direction perpendicular to Runway 12L (from the northeast).

NASF-B (2018) Mean Wind Speed Deficit Criteria

"Existing" Built Environment Scenario:

- Predicted exceedance of the mean wind speed deficit criteria at the "worst-case" grid measurement point are All greater than 100 years. This is not surprising given the scale of existing buildings at the site.

"Future" Built Environment Scenario:

- When comparing the results between the "Existing" and "Future" scenarios at any one individual measurement grid point, there were minor variances at particular locations (typically ±10%) both up and down. However, the minimum return period for each tested angle at the "worst-case" grid point, remained at or above 100 years.

NASF-B (2018) 4 kt Turbulence Criterion

"Existing" Built Environment Scenario:

- In the "Existing" built environment scenario, predicted 4 kt turbulence exceedance events have return periods ranging from once per year and upwards.

"Future" Built Environment Scenario:

- When comparing individual points along the flight path measurement grid between the "Existing" and "Future" scenario results, there are variances in terms of annual exceedance statistics at particular locations both up and down. As expected, predicted return periods are lowest (ie more frequently occurring) at locations in line with the highest RL section of the proposed development for the relevant wind direction.
- 4 kt exceedances do not exceed one per year. This reflects both the low incidence of winds from the relevant cross-wind directions of interest and the modest extent of the taller section of the proposed development.

Summary

In relation to wind conditions experienced by aircraft landing from the northwest on Runway 12L:

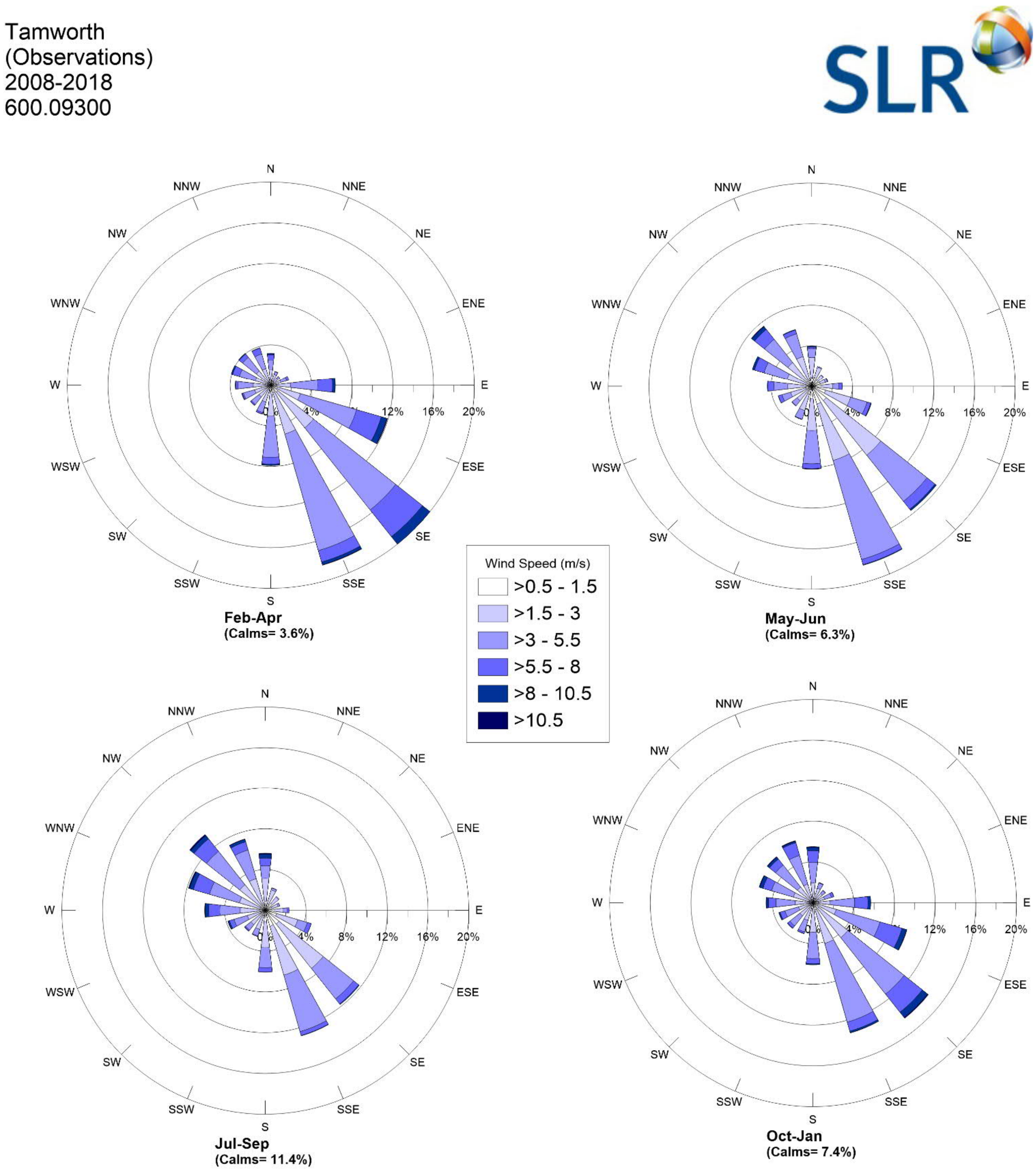
- The proposed development will have minimal/negligible impact in relation to the NASF-B mean wind speed deficit criteria, essentially no impact at wind speeds of practical interest.
- NASF-B 4 kt turbulence level event exceedances are of the order of once per year with the proposed development – essentially the same as for existing conditions at the airport. This is attributed to the low profile of the proposed development buildings and low probability of occurrence of crosswinds of interest to this study (ie from the NE). Again, the proposed development will have minimal/negligible impact at wind speeds of practical interest on runway turbulence levels.

Note Regarding Building Envelope Changes

It is understood that the final design of the proposed development is currently being reviewed. Based on extensive studies undertaken by SLR and other Wind Engineering consultancies, the impacts identified in the present study would be an upper bound of expected changes to windshear and wake turbulence if any proposed changes to the development result in a decrease of bulk envelope (especially height-wise) in the main operational building.

APPENDIX A

Tamworth Airport Seasonal Wind Roses



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ATTACHMENT 5: REVISED HAZARD ASSESSMENT

AP05

CHEMICAL USE AND STORAGE

1.1 CHEMICAL STORAGE

Chemical handling and storage procedures will be undertaken in accordance with the Applicable Material Safety Data Sheets (MSDS), good manufacturing practice and all relevant Australian Standards. Chemical handing, use and storage procedures will also be documented in a comprehensive Environment Management Plan which will be prepared for the site.

As an example, **Table 1** provides a list of chemicals anticipated to be used and stored at the processing plant. This is based on a similar processing plant operated by Baiada in in Griffith, NSW which has approval to process up to 2.8 Million Birds / Week but has been updated to reflect the porposed operations. Storage Locations within the processing plant are shown on the attached plans.

Table 1: Proposed Chemical Storage Volumes based on Hanwood Processing Plant

SUBSTANCE	UN NUMBER	QUANTITY	SEPP 33 Threshold Quantities
N2 Gas (C2.2)	1977	10,000L	N/A
O2 Gas (C2.2)	1075	10,000L	N/A
C02 Gas (C2.2)	1013	10,000L	N/A
Petroleum Gas Liquefied (C2.1)	1075	1,176L (0.6T) 1.176m3	$16m^3$/10T
Petroleum Gas Liquefied (C2.1)	1075	3,000L (1.53T) 3.0m3	$16m^3$/10T
Ferric Sulphate (C8 PGIII)	1760	15,000L (19.5T)	50T
Hypochlorite Solution (C8 PGIII)	1791	1,000L (1.2T)	50T
Hypochlorite Solution (C8 PGIII)	1791	1,000L (1.2T)	50T
Hypochlorite Solution (C8 PGIII)	1791	4,000L (6.0T)	50T
Hypochlorite Solution (C8 PGIII)	1791	1,000L (1.2T)	50T
Hypochlorite Solution (C8 PGIII)	1791	2,000L (2.4T)	50T
Hypochlorite Solution (C8 PGIII)	1791	400L (0.48T)	50T
Sodium Hypochlorite Solution (C8 PGIII)	1791	2,400L (2.88T)	50T
Chlorite Solution	1908	2,000L (2.56T)	25T

SUBSTANCE	UN NUMBER	QUANTITY	SEPP 33 Threshold Quantities
(C8 PGII)			
Sodium Hydroxide Solution (C8 PGII)	1824	2,000L (3.0T)	50T
Sodium Hydroxide Solution (C8 PGII)	1824	1,000L (1.5T)	25T
Sodium Hydroxide Solution (C8 PGII)	1824	400L (0.6T)	50T
Sodium Hydroxide Solution (C8 PGII)	1824	2,000L (3.0T)	25T
Ammonia Anhydrous (C2.3)	1005	3,000L (2.05T)	5T
Ammonia Anhydrous (C2.3)	1005	1,200L (0.82T)	5T
Ammonia Anhydrous (C2.3)	1005	1,200L (0.82T)	5T
Ammonia Anhydrous (C2.3)	1005	1,200L (0.82T)	5T
Ammonia Anhydrous (C2.3)	1005	1,200L (0.82T)	5T
Ammonia Anhydrous (C2.3)	1005	1,200L (0.82T)	5T
Ammonia Anhydrous (C2.3)	1005	1,200L (0.82T)	5T

1.2 CHEMICAL TRANSPORTATION

Similarly, the screening thresholds for transport of dangerous goods are outlined in *Table 2: Transportation Screening Thresholds* of the *Applying SEPP33 Hazardous and Offensive Development Application Guidelines* (January 2011). **Table 2** demonstrates that the vehicle movements on site containing dangerous goods are well below the thresholds set out in in SEPP33.

Table 2: Transportation of each Dangerous Good Class Measured Against SEPP33 Thresholds

CLASS	SUBSTANCE	UN NUMBER	VEHICLE MOVEMENTS PER ANNUM	TABLE 2 THRESHOLDS
2.1	Petroleum Gas Liquefied	UN1075	156	>500
2.3	Ammonia Anhydrous	UN1003	24	>100
8	Hypochlorite Solution	UN1791	234	>500
8	Sodium Hydroxide Solution/ Sodium Hydroxide	UN1824/ UN1823		

1.3 SEPARATION DISTANCES

The development site is located in a rural zone with very low density of residential dwellings. The nearest residential dwelling 'as the crow flies' is over 1km to the north of the site and the settlement (residential zoned area) is located along Marathon Street approximately 3.8km south east. These separation distances are considered to be extensive and capable of containing the consequences of any incident as a result of dangerous goods on site, from the nearby residential uses.

1.4 SEPP33 SCREENING

In accordance with the requirements of *State Environmental Planning Policy 33* (SEPP33), a screening of storage volumes of dangerous goods was undertaken. The volumes stored and SEPP33 Threshold quantities are also documented in **Table 1**. Based on the screening test, a Preliminary Hazard Analysis is not considered to be required for this Development Application of the following reasons:

- the quantity of dangerous goods stored on site does not exceed the amounts listed in the General Screen Threshold Quantities (Table 3 Applying SEPP33);
- the cumulative and peak vehicle movements do not exceed those listed in the Transportation Screening Thresholds (Table 2 Applying SEPP33);
- separation distances from the between the location of dangerous goods storage and residential development is greater than the distance of the consequences of a possible hazardous incident; and
- the technical and management safeguards available to mitigate hazards involving dangerous substances are considered to be sufficient to avoid significant risk to human health or life, property and the biophysical environment.

Table 1: Proposed Chemical Storage Volumes and Locations

ID	SUBSTANCE	UN NUMBER	QUANTITY	Quantities
1	N2 Gas (C2.2)	1977	10,000L	N/A
2	O2 Gas (C2.2)	1075	10,000L	N/A
3	CO2 Gas	1013	10,000L	N/A
4	Petroleum Gas Liquefied 15 x 40kgs bottles	1075	1,176L (0.6T) 1.176m3	16m³/10T
5	Petroleum Gas Liquefied 3,000ltrs storage	1075	3,000L (1.53T) 3.0m3	16m³/10T
1	Ferric Sulphate	1760	15,000L (19.5T)	50T
2	Sodium Hypochlorite Solution	1791	1,000L (1.2T)	50T
3	Sodium Hypochlorite Solution	1791	1,000L (1.2T)	50T
4	Sodium Hypochlorite Solution	1791	4,000L (6.0T)	50T
5	Sodium Hypochlorite Solution	1791	1,000L (1.2T)	50T
6	Sodium Hypochlorite Solution	1791	2,000L (2.4T)	50T
7	Sodium Hypochlorite Solution	1791	400L (0.48T)	50T
8	Sodium Hypochlorite Solution	1791	2,400L (2.88T)	50T
9	Chlorite Solution	1908	2,000L (2.56T)	25T
1	Sodium Hydroxide Solution	1824	2,000L (3.0T)	50T
2	Sodium Hydroxide Solution	1824	1,000L (1.5T)	25T
3	Sodium Hydroxide Solution	1824	400L (0.6T)	50T
4	Sodium Hydroxide Solution	1824	2,000L (3.0T)	25T
5	Sodium Hydroxide Solution	1824	1,000L (1.5T)	25T
1	Ammonia Anhydrous	1005	3,000L (2.05T)	5T
2	Ammonia Anhydrous	1005	1,200L (0.82T)	5T
3	Ammonia Anhydrous	1005	1,200L (0.82T)	5T
4	Ammonia Anhydrous	1005	1,200L (0.82T)	5T
5	Ammonia Anhydrous	1005	1,200L (0.82T)	5T
6	Ammonia Anhydrous	1005	1,200L (0.82T)	5T
7	Ammonia Anhydrous	1005	1,200L (0.82T)	5T

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ISSUE REV. DESCRIPTION DATE

CLIENT

OAKBURN PROCESSING PLANT

OXLEY HIGHWAY, TAMWORTH

DRAWING TITLE
Chemical Storage Plan

DA SCALE 1:500@A1 JOB NO. DRAWING NO.

ATTACHMENT 6: REVISED ACOUSTIC REPORT

AP06

REVERB ACOUSTICS
Noise and Vibration Consultants

Oakburn Processing Facility & Rendering Plant 1154 Gunnedah Road Westdale NSW

June 2020

Prepared for PSA Consulting Pty Ltd
Report No. 18-2187-R4

Building Acoustics-Council/EPA Submissions-Modelling-Compliance-Certification

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TABLE OF CONTENTS

SECTION 1
Introduction

1.1 INTRODUCTION

Reverb Acoustics has been commissioned to conduct a revised noise impact assessment for relocation of Baiada's Out Street, Tamworth Processing Plant to 1154 Gunnedah Road, Westdale. The new Processing Plant will be capable of processing up to 3 million birds per week and will be located directly south of the existing Rendering Plant, which will also increase production from 120 tonnes to 240 tonnes of finished product per day.

The purpose of the assessment is to determine the noise impact, operation of the site would have on the surrounding rural environment, and to ensure any noise control measures required are incorporated during the design stages. The assessment is to accompany and forms part of an Environmental Impact Statement (EIS) to support Development Consent to the Department of Planning, Industry and Environment (DPIE).

1.2 TECHNICAL REFERENCE / DOCUMENTS

Beranek, L.L and Istvan, L.V. (1992). *Noise and Vibration Control Engineering.* John Wiley and Sons, Inc.

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AS 1055.1.2.3-1997 *"Acoustics – Description and measurement of environmental noise"*.

NSW Environment Protection Authority (2017). *Noise Policy for Industry.*

NSW Environment Protection Authority (1999). *Environmental Criteria for Road Traffic Noise*

NSW Roads and Traffic Authority (2001). *Environmental Noise Management Manual*

HK Clarke & Associates Pty Ltd (1997). *A Noise Impact Assessment for the Proposed Poultry Processing Plant on the Oxley Highway, Tamworth.*

Reverb Acoustics Pty Ltd (October 2018). *Noise Impact Assessment. Increase in Production. Oakburn Rendering Plant. Oxley Highway, Tamworth, NSW (ref: 16-1990-R2)*

A Glossary of commonly used acoustical terms is presented in Appendix A to aid the reader in understanding the Report.

SECTION 2

Project Description
Existing Acoustic Environment
Assessment Criteria

2.1 PROJECT DESCRIPTION

The proposal includes relocation of Baiada's Out Street, Tamworth, Processing Plant to 1154 Gunnedah Road, Westdale, in conjunction with an increase in production to 3 million birds per week, with an increase from 120 tonnes to 240 tonnes of finished product per day at the existing rendering plant. It should be noted that current approved operating hours are 24 hours/day 7 days/week.

Noise sources at the site that must be considered as part of the assessment include fixed and mobile plant and equipment, and truck movements. Other noise sources include general site noise such as employee vehicle movements, delivery vehicles, mechanical equipment and other maintenance machinery. All vehicles and trucks will enter and leave the site via the dedicated access road connecting to Workshop Lane within the Glen Artney industrial estate.

The assessment includes measurement of the existing acoustic environment by Reverb Acoustics to provide baseline data and enable establishment of noise assessment criteria. Noise impacts from trucks are assessed at typical residences along the transport route.

2.2 EXISTING ACOUSTIC ENVIRONMENT

Consideration must be given to the extent of the existing acoustic environment and whether such levels are appropriate for the land use of the receiver area. Nearest residential receivers identified during our site visits are as follows:

R1. Girrawheen: Old Winton Road, 1700m west of the site.
R2. Abbeylands: Bowler's Lane, 1100m north of the site.
R3. The Billabong: Wallamore Road, 1600m east of the site.
R4. Various Residences: New Winton Road (south of airport), 2500m south of the site.

Background noise level surveys were conducted previously for the original assessment at the site in 2007. The data is relatively old therefore, attended background noise level monitoring was conducted at residential receivers during our site visits on 28-29 August 2016 and July 2018 to update the data. To formalise background data long-term monitoring was conducted in July 2018 in Bowlers Lane approximately 600 metres from the Oxley Highway near Girrawheen R1 (Logger Location 1) and at the intersection of Bowlers Lane and Wallamore Road near Abbeylands R2 and The Billabong R3 (Logger Location 2). Table 1 shows a summary of results, with high wind/rain periods excluded prior to analysis, including the Rating Background Level's (RBL's) which were calculated from Assessment Background Levels (ABL's), for the day, evening and night periods, according to the procedures described in the EPA's NPfI and as detailed in Australian Standard AS1055-1997, "Acoustics - Description and Measurement of Environmental Noise, Part 1 General Procedures".

Table 1: Summary of Noise Monitoring Results, dB(A)

Background L90			Ambient Leq		
Day 7am-6pm	Evening 6pm-10pm	Night 10pm-7am	Day 7am-6pm	Evening 6pm-10pm	Night 10pm-7am
Logger Location 1					
31.3	25.1	20.6	57.1	53.0	49.5
Logger Location 2					
29.7	28.5	25.5	51.6	46.3	46.4

The above background (L90) noise levels are below the minimum assumed RBL's specified in Table 2.1 of the NPfI. Therefore, for assessment purposes the minimum RBL's have been adopted in all receiver areas for assessment purposes, i.e. 35dB(A),L90 for day (7am-6pm) and 30dB(A) for the evening and night (6pm -10pm and 10pm-7am).

Figure 1: Site Plan

2.3 CRITERIA

2.3.1 Road Traffic Noise

The Roads and Maritime Services (RMS) base their assessment criteria on those outlined by EPA. Noise reduction measures for new and existing developments should endeavour to meet the noise level targets set out in the EPA's NSW Road Noise Policy (RNP) which contains a number of criteria applied to a variety of road categories (freeway, arterial, sub-arterial and local roads) and situations (new, upgraded roads and new developments affected by road traffic). Table 2 shows the relevant categories, taken from Table 3 of the RNP:

Table 2: - Extract from Table 3 of RNP Showing Relevant Criteria.

Road Category	Day	Night
Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments.	60 LAeq,15hr (external)	55 LAeq,9hr (external)
Existing residences affected by additional traffic on existing local roads generated by land use developments.	55 LAeq,1hr (external)	50 LAeq,1hr (external)

In addition to the assessment criteria detailed above, the increase in total traffic noise must also be considered. Reproduced below in Table 3 are the relative increase criteria that trigger consideration of mitigation measures:

Table 3: - Reproduced Table 6 of RNP
Relative Increase Criteria for Residential Land Uses

Road Category	Type of Project/Development	Total Traffic Noise Level Increase–dB(A)	
		Day (7am-10pm)	Night (10pm-7am)
Freeway/arterial/sub-arterial roads & transitways	New road corridor / redevelopment of existing road/land use development with the potential to generate additional traffic on existing road	Existing traffic LAeq,(15hr)+12dB	Existing traffic LAeq,(9hr)+12dB

Road categories are defined in the RNP are as follows:

Freeway/arterial	Support major regional and inter-regional traffic movement. Freeways and motorways usually feature strict access control via grade separated interchanges.
Sub-arterial	Provide connection between arterial roads and local roads. May provide a support role to arterial roads during peak periods. May have been designed as local streets but can serve major traffic generators or non-local traffic functions. Previously designated as “collector” roads in ECRTN.
Local Road	Provide vehicular access to abutting property and surrounding streets. Provide a network for the movement of pedestrians and cyclists, and enable social interaction in a neighbourhood. Should connect, where practicable, only to sub-arterial roads.

Based on the above definitions, the Oxley Highway is classified as an arterial road.

2.3.2 Site Operation (Planning Noise Levels)

Noise from industrial noise sources scheduled under the Protection of Environment Operations Act is assessed using the EPA’s NPfI. However, local Councils may also apply the criteria for land use planning, compliance and complaints management. The NPfI specifies two separate criteria designed to ensure existing and future developments meet environmental noise objectives. The first limits intrusive noise to 5dB(A) above the background noise level and the other applies to protection of amenity of particular land uses based on the existing (Leq) noise level from industrial and commercial noise sources. Project Specific Noise Levels are established for new developments by applying both criteria to the situation and adopting the more stringent of the two.

The existing L(A)eq for the receiver area is dominated by traffic on nearby roads and natural noise sources and some industrial activity. Reference to Table 2.2 of the NPfI shows that the area is classified as rural, i.e. an area generally characterised by low background noise levels (except in the immediate vicinity of industrial noise sources The Project Amenity Level is derived by subtracting 5dB(A) from the recommended amenity level shown in Table 2.2. A further +3dB(A) adjustment is required to standardise the time periods to LAeq,15 minute. The adjustments are carried out as follows:

Recommended Amenity Noise Level (Table 2.2) – 5dB(A) +3dB(A)

Table 4 below specifies the applicable project intrusiveness and amenity noise trigger levels for the proposed redevelopment.

Table 4: - Base Noise Level Objectives

Period	Intrusiveness Criterion	Amenity Criterion
Day	40 (35+5) #	48 (50-5+3)
Evening	35 (30+5) #	43 (45-5+3)
Night	35 (30+5) #	38 (40-5+3)
Receiver Type: Rural (See EPA's NPfI - Table 2.2)		

Minimum assumed RBL's EPA's NPfI Table 2.1

Project specific noise levels, determined as the more stringent of the intrusiveness criterion and the amenity / high traffic criterion, are as follows:

Day	**40dB LAeq,15 Minute**	7am to 6pm Mon to Sat or 8am to 6pm Sun and Pub Hol.
Evening	**35dB LAeq,15 Minute**	6pm to 10pm.
Night	**35dB LAeq,15 Minute**	10pm to 7am Mon to Sat or 10pm to 8am Sun and Pub Hol.

2.3.3 Child Care Centre

The Association of Australian Acoustic Consultant's (AAAC's) document, *"Technical Guideline. Child Care Centre Noise Assessment"* recommends assessment of the noise impact within indoor play areas and sleeping areas, and outdoor play areas, when the development may be impacted upon by road and, rail traffic and industry . The document specifies the following:

External Noise	Outdoor Play Areas	55dB(A)
Indoor Noise	Play/Sleeping Areas	40dB(A)

2.3.4 Maximum Noise Level Event Assessment - Sleep Arousal

Section 2.5 of EPA's NPfI requires a detailed maximum noise level event assessment to be undertaken where the subject development/premises night-time noise levels (10pm-7am) exceed the following:

- LAeq (15 minute) 40dB(A) or the prevailing RBL plus 5dB whichever is greater, and/or
- LAFmax 52dB(A) or the prevailing RBL plus 15dB, whichever is greater.

The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the RBL, and the number of times this happens during the night period.

2.3.5 Modifying Factors - Tonality

Fact Sheet C of the NPfI defines tonal noise as follows:

Level of 1/3 octave band exceeds the level of the adjacent bands on both sides by:

- 5dB or more if the centre frequency of the band containing the tone is in the range 500-10,000Hz
- 8dB or more if the centre frequency of the band containing the tone is in the range 160-400Hz
- 15B or more if the centre frequency of the band containing the tone is in the range 25-125Hz

2.3.6 Construction Noise

Various authorities have set maximum limits on allowable levels of construction noise in different situations. Arguably the most universally acceptable criteria, and those which will be used in this Report, are taken from the NSW Environment Protection Authority's (EPA's) Interim NSW Construction Noise Guideline (ICNG). Since the project involves a significant period of construction activity, a "quantitative assessment" is required, i.e. comparison of predicted construction noise levels with relevant criteria. For assessment of noise impacts at residential receivers Table 3 of the ICNG is reproduced below in Table 5:

Table 5: - Table 3 of ICNG Showing Relevant Criteria at Residences

Time of Day	Management Level Leq (15min)	How to Apply
Recommended Standard Hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or Public holidays	Noise affected RBL +10dB(A) i.e. **45dB(A) day**	- The noise affected level represents the point above which there may be some community reaction to noise. - Where the predicted or measured LAEQ (15min) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to minimise noise. - The proponent should also inform all potentially impacted residents of the nature of works to be carried out, expected noise levels, duration, and contact details
	Highly noise affected 75dB(A)	- The highly noise affected level represents the point above which there may be strong community reaction to noise. - Where noise is above this level, the proponent should consider very carefully if there is any other feasible and reasonable way to reduce noise to below this level. - If no quieter work method is feasible and reasonable, and the works proceed, the proponent should communicate with the impacted residents by clearly explaining duration and noise level of the works, and by describing any respite periods that will be provided.
Outside recommended Standard hours	Noise affected RBL +5dB(A)	- A strong justification would typically be required for works outside the recommended standard hours. - Proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5dB(A) above the noise affected level, the proponent should negotiate with the community. For guidance on negotiating see Sec 7.2.2

Section 4.2 of the ICNG also specifies the following external noise level limits for commercial and industrial premises.

Industrial premises	**75dB(A),Leq (15 min)**
Offices, retail outlets	**70dB(A),Leq (15 min)**

Construction will only occur during standard construction hours, i.e. 7am to 6pm Monday to Friday and 8am to 1pm on Saturday, with no construction permitted on Sundays or public holidays, unless otherwise agreed with Council. Table 6 relevant for potentially affected existing receivers (also see Figure 1).

Table 6: Criteria Summary

Assessment Location	Standard Construction Hours		Outside Standard Hours
	Noise Affected	Highly Noise Affected	
R3 – Residential Dev'p	45	75	35#
R1,R2 – Commercial Dev'p	70	75	70

#Evening and night periods.

SECTION 3
Noise Impact Assessment

3.1 METHODOLOGY

3.1.1 Road Traffic

Due to the non-continuous nature of traffic flow to and from the site, noise generated by traffic associated with the rendering plant site, on public roads, is assessed using the EPA approved US Environment Protection Agency's Intermittent Traffic Noise guidelines.

Equation 1 outlines the mathematical formula used in calculating the Leq,T noise level for intermittent traffic noise.

Equation 1:

$$L_{eq},T = L_b + 10\log\left[1 + \frac{ND}{T}\left(\frac{10^{(L\max - Lb)/10} - 1}{2.3} - \frac{(L_{\max} - L_b)}{10}\right)\right]$$

Where L_b background noise level (dB(A))
T is the time for each group of vehicles (min)
D is duration of noise of each vehicle (min)
L_{MAX} is vehicle noise (dB(A))
N is number of vehicle trips

Typical vehicle noise levels were sourced from our library of technical data, while background noise levels are those described in Section 2.2. The Lmax vehicle noise levels used in Equation 1 are the maximum predicted noise levels produced at the facade of a typical residence by vehicles entering and departing the site.

3.1.2 Site Activities

Noise levels produced by activities/equipment associated with the existing rendering plant were measured during our site visit on 20 July 2016 and/or sourced from our library of technical data. Noise levels produced by the proposed Processing Plant were measured at Baiada's existing processing plant facilities in Tamworth and Griffith. These noise level measurements were taken with a Svan 912AE Sound and Vibration Analyser. The instrument is Class 1 accuracy, in accordance with the requirements of IEC 61672, and has the capability to measure steady, fluctuating, intermittent and/or impulsive sound, and to compute and display percentile noise levels for the measuring period. A calibration signal was used to align the instrument train prior to measuring and checked at the conclusion. Difference in the two measurements was less than 0.5dB. Each measurement was taken over a representative time period to include all aspects of machine operation, including additional start-up noise where applicable. Items of equipment, which produced a brief burst of noise, such as a truck, were measured for a similarly brief time period to ensure the results were not influenced by long periods of inactivity between operations.

Sound measurements were generally made around all sides of each machine/activity, to enable the acoustic sound power (dB re 1pW) to be calculated. The sound power level of each item is then theoretically propagated to each receiver with allowances made for geometric spreading, directivity, molecular absorption, intervening topography or barriers and ground effects giving the received noise level at the receiver from that particular plant item.

Addition of the received Sound Pressure Level (SPL) for each of the individual operating sources gives the total SPL at each receiver, which is then compared to the relevant criteria. Where noise impacts above the criteria are identified, suitable noise control measures are implemented and reassessed to demonstrate satisfactory received noise levels.

Calculations were performed with RTA Technology Environmental Noise Model computer software, which accepts information on ground type and topography, source and receiver locations, weather details and source sound power spectra. Ground contours were obtained from topographical maps of the site and surrounds. All noise sources at the site were input into our model as point sources using the point calculation mode to determine the noise level at each receiver. Results from the noise model are presented for various scenarios in later Sections of this report.

3.1.3 Atmospheric Conditions

In the Tamworth region atmospheric conditions can exacerbate received noise levels for a percentage of the time. Temperature inversions may be expected in the area during the night and early morning at a frequency of greater than 30% of the time during winter and to a lesser degree in the warmer months. Inversion effects are strongest in the early hours of the morning but tend to weaken rapidly and may be considered to have completely dissipated by 9am or earlier. The ENM model was prepared for the following operating scenarios, as shown below (ref: NPfI Fact Sheet D):

1. Standard meteorological conditions for day/evening/night, i.e. 0.5m/s wind 10m AGL.
2. 3m/sec wind source to receiver (day/evening).
3. F-class temperature inversion of 3°C/100m and 2m/sec source to downhill receiver wind for night. (See Table C2, Appendix C-EPA's INP)

An F-class inversion, i.e. 3°C/100m, is typical in the Tamworth area and slightly weaker inversions are generally expected for coastal areas. Therefore, we have modelled this default inversion strength.

Wind in a particular direction causes increased received noise levels at downwind receivers, therefore the effect of noise enhancement due to wind has been considered. Wind will occur more often in the colder months just before dawn, implying the cause is from inversion build-up at night. The NPfI suggests a 3° inversion with 2m/sec wind downhill for an area with rainfall greater than 500mm/year (See Table C2, Appendix C). Therefore, modelled conditions for night are 3° inversion with 2m/sec wind in each direction. Alternatively, a 3m/sec wind could have been modelled, however, less noise enhancement is given for a wind of this strength in all directions, hence the preferred modelling scenario is the former.

3.1.4 Construction Activities

Future noise and vibration sources on the site cannot be measured at this time, consequently noise and vibration levels produced by plant and machinery to be used on the site have been sourced from manufacturers' data and/or our library of technical data, which has been accumulated from measurements taken in many similar situations on other sites for others.

All noise level measurements were taken with a Svan 912A Sound & Vibration Analyser. This instrument has the capability to measure steady, fluctuating, intermittent and/or impulsive sound, and to compute and display percentile noise levels for the measuring period. A calibration signal was used to align the instrument train prior to measuring and checked at the conclusion. Difference in the two measurements was less than 0.5dB. Each measurement was taken over a representative time period to include all aspects of machine/process operation, including additional start-up noise where applicable. Sound measurements were generally made around all sides of each machine, to enable the acoustic sound power (dB re 1pW) to be calculated. The sound power level is then theoretically propagated to the receiver, with allowances made for spherical spreading.

Atmospheric absorption, directivity and ground absorption have been ignored in the calculations. As a result, predicted received noise levels are expected to slightly overstate actual received levels, thus providing a measure of conservatism. Addition of the received Sound Pressure Level (SPL) for each of the individual operating sources gives the total SPL at each receiver, which is then compared to the criteria. Where noise impacts above the criterion are identified, suitable noise control measures are implemented and reassessed to demonstrate satisfactory received noise levels.

This theoretical assessment is based on a worst-case scenario, where all plant items are operating simultaneously in locations most exposed to the receiver. In reality, most plant will be located in shielded areas, so actual received noise is expected to be less than the predictions shown in this report, or at worst equal to the predicted noise levels for only part of the time.

3.2 ANALYSIS AND DISCUSSION

3.2.1 Received Noise Levels – Road Traffic

Traffic due to the proposal travelling on nearby public roads is assessed separate to site noise and is subject to the criteria described in Section 2.3.1 of this report. Trucks will approach and depart the site from the both directions along the Oxley Highway, however, to provide a measure of conservatism, this assessment assumes all trucks and vehicles will approach and depart the site from the same direction.

Reproduced are traffic data supplied by Transport Planning Pty Ltd for the existing and anticipated vehicle movements for the site.

Table 7: - Oakburn Processing Plant & Render Plant Vehicle Movements

Trip Generator	RENDERING PLANT						PROCESSING PLANT		
	Existing Situation			Interim Modification					
	Light	Heavy	TOTAL	Light	Heavy	TOTAL	Light	Heavy	TOTAL
Staff	30	-	30	30	-	30	1966	-	1966
Render Plant Raw Material	-	58	58	-	70	70	-	40	40
Render Plant Finished Material	-	8	8	-	12	12	-	20	20
General Deliveries & Waste Collection	-	4	4	-	10	10	-	40	40
Live Birds	-	-	-	-	-	-	-	168	168
Finished Product	-	-	-	-	-	-	-	140	140
Daily Total	**30**	**70**	**100**	**30**	**92**	**122**	**1966**	**408**	**2374**
Day (7am-10pm)	**15**	**52**	**67**	**15**	**69**	**84**	**1019**	**290**	**1309**
Night (10pm-7am)	**15**	**18**	**33**	**15**	**23**	**38**	**947**	**118**	**1065**

Truck noise varies from one machine to another, with more modern larger trucks consistently producing a sound power in the range 104 to 108 dB(A) at full power. This assessment assumes a typical truck sound power of 106dB(A), as full engine power is not typically required to approach and depart the site at low speed.

Cars typically produce an average sound power of 92dB(A), however wide variations are noted particularly with smaller modern cars and larger V8 or diesel powered vehicles. Our calculations present the worst case for the situation, as the noise produced by a typical car accelerating at full power is used to determine the received noise level. In reality, many people will not leave the site at full acceleration but will depart more sedately.

Traffic Noise Calculations

The following Tables show results of traffic noise calculations, propagated to a theoretical facade at varying distances from the Oxley Highway (100km/hr zone) for existing and proposed situations. Received noise is the combined noise impact from cars and trucks at the facade of the residence.

Table 8: Traffic Noise Calc's – Oxley Highway, dB(A),Leq
EXISTING OPERATIONS – Rendering Plant

Traffic and Receiver	Day (7am-10pm)		Night (10pm-7am)	
Vehicle Type	Trucks	Cars	Trucks	Cars
Movements per period	69	15	23	15
Vehicle Sound Power	106	92	106	92
Distance to Rec, m	20			
Received Noise Level	45.0	26.3	42.6	28.1
Total Received	**45.1**		**42.8**	
Criteria	**60dB(A),Leq 15hr**		**55dB(A),Leq 9hr**	
Impact	**-**		**-**	
Distance to Rec, m	50			
Received Noise Level	41.1	23.6	38.7	25.0
Total Received	**41.1**		**38.9**	
Criteria	**60dB(A),Leq 15hr**		**55dB(A),Leq 9hr**	
Impact	**-**		**-**	
Distance to Rec, m	100			
Received Noise Level	38.1	22.1	35.7	23.1
Total Received	**38.2**		**36.0**	
Criteria	**60dB(A),Leq 15hr**		**55dB(A),Leq 9hr**	
Impact	**-**		**-**	

Table 9: Traffic Noise Calc's – Oxley Highway, dB(A),Leq
PROPOSED OPERATIONS – Upgraded Rendering Plant + New Processing plant

Traffic and Receiver	Day (7am-10pm)		Night (10pm-7am)	
Vehicle Type	Trucks	Cars	Trucks	Cars
Movements per period	359	1034	141	962
Vehicle Sound Power	106	92	106	92
Distance to Rec, m	20			
Received Noise Level	53.4	43.6	51.6	45.4
Total Received	**53.8**		**52.5**	
Criteria	**60dB(A),Leq 15hr**		**55dB(A),Leq 9hr**	
Impact	**-**		**-**	
Distance to Rec, m	50			
Received Noise Level	49.4	39.6	47.6	41.5
Total Received	**49.9**		**48.5**	
Criteria	**60dB(A),Leq 15hr**		**55dB(A),Leq 9hr**	
Impact	**-**		**-**	
Distance to Rec, m	100			
Received Noise Level	46.4	36.5	44.6	38.4
Total Received	**46.8**		**45.5**	
Criteria	**60dB(A),Leq 15hr**		**55dB(A),Leq 9hr**	
Impact	**-**		**-**	

Results in the above Tables show that noise levels from cars and trucks travelling to and from the site, for existing and proposed operations, along the Oxley Highway are compliant with the RNP day and night criteria for all residences.

The RNP also recommends that the increase in road traffic noise levels due to redevelopment of an existing land use development not exceed 12dB(A) during the day and night for freeways and arterial roads. As can be seen by the results in the above Tables, the relative increase due to the development is not expected to be more than 8.8dB(A) during the day and 9.7dB(A) at night and considered acceptable.

3.2.2 Received Noise Levels – Site Noise

The Sound Power Levels (Lw's) of plant and equipment operating at the site during the day, evening and night for proposed operations, which were input into our computer model, are shown in the following Tables. The Tables give the A-weighted sound power levels for each listed plant item, principally based on our site measurements. Also shown is the number of plant operating at each location on the site for a worst-case situation (see Appendix B).

Table 10: Plant and Equipment – Day/Evening (PROPOSED OPERATIONS)

Machine/Process	Lw dB(A)	Render Plant & Dams	Main Access Rd	Processing Plant	Loop Road
Render Plant South	**100**	1 (S1)			
Render Plant East	**89**	1 (S2)			
Render Plant North	**103**	1 (S3)			
Render Plant West	**104**	1 (S4)			
Truck Driving	**102**		1 (S5)	1 (S15)	3 (S7,S8)
Truck Idling	**90**				1 (S6)
Fork Lift	**98**			1 (S17)	1 (S9)
WWTW Pumps	**94/86**	2 (S10,S22)			
Fork lifts, Trucks, Cooling Fans	**106**			2 (S11)	
Fork Lifts, Trucks, Unload	**104**			2 (S12)	
Processing Plant North	**95**			1 (S13)	
Truck Reverse/Idle	**94**			2 (S14,S15)	
Cold Storage Blg East	**95**			1 (S16)	
Refrig Truck Units x4	**95**			4 ((S18)	
Refrig Truck Reverse	**104**			1 (S19)	
Cold Storage Blg North	**95**			1 (S20)	
Trucks Access Rd/W'bridge	**102**		2 (S21)		
Cars in Carpark	**82**			200(S23,S24)	
Secondary processing pl east	**95**			1 (S25)	
Plant, cooling towers	**108**			2 (S26)	

Table 11: Plant and Equipment – Night (PROPOSED OPERATIONS)

Machine/Process	Lw dB(A)	Render Plant & Dams	Main Access Rd	Processing Plant	Loop Road
Render Plant South	**100**	1 (S1)			
Render Plant East	**89**	1 (S2)			
Render Plant North	**103**	1 (S3)			
Render Plant West	**104**	1 (S4)			
Truck Driving	**102**		1 (S5)	1 (S15)	2 (S7,S8)
Truck Idling	**90**				1 (S6)
Fork Lift	**98**			1 (S17)	
WWTW Pumps	**94/86**	2 (S10,S22)			
Fork lifts, Trucks, Cooling Fans	**106**			2 (S11)	
Fork Lifts, Trucks, Unload	**102**			2 (S12)	
Processing Plant North	**95**			1 (S13)	
Truck Reverse/Idle	**98**			2 (S14,S15)	
Cold Storage Blg East	**95**			1 (S16)	
Refrig Truck Units x4	**95**			4 ((S18)	
Refrig Truck Reverse	**104**			1 (S19)	
Cold Storage Blg North	**95**			1 (S20)	
Trucks Access Rd/W'bridge	**102**		2 (S21)		
Surge Dam Pumps S22	**93**	2 (S22)			
Cars in Carpark	**82**			150 (S23,S24)	
Secondary processing pl east	**95**			1 (S25)	
Plant, cooling towers	**108**			2 (S26)	

Legend of assessed noise sources (see Figure 2):

S1-S4	Render plant operating at full capacity.
S5	Truck driving on main access road
S6	Truck idling in bay
S7	Truck driving on loop road (north)
S8	Truck driving on loop road (south)
S9	Fork lift operating
S10A/B	WWTP operating at full capacity
S11	Live bird fans, trucks, fork lifts
S12	Trucks idling, fork lifts unloading at Live Bird
S13	Processing plant (north)
S14,S15	Truck reverse, idle driving on loop road (south)
S16	Cold storage building (east)
S17	Fork lift operating north side processing plant
S18	Refrigerated truck units at Cold Storage
S19	Refrigerated truck reverse at Cold Storage
S20	Cold storage building (north)
S21	Trucks on main access rd & at weighbridge
S22	Pumps at dams (north)
S23,S24	Cars in main carpark
S25	Secondary processing plant east
S26	Plant, cooling towers

Additional plant and noise sources encountered on the site include split system air conditioners, small pumps, etc, all of which produce a sound power less than 75dB. Collectively, with up to 3 or 4 sources operating simultaneously on occasions, the sum could be as high as 80dB. This overall sum is at least 10dB below significant sources shown in the above Tables, therefore they will not contribute or raise the sound level at nearby receivers.

The following Table shows predicted received noise levels at nearest residential receivers under neutral and noise enhancing atmospheric conditions. Allowances have been made for intervening structures, topographical features in the calculations. Exceedances of the criteria are shown in bold.

Table 12: Received Noise Levels – Render Plant (PROPOSED OPERATIONS) Propagated to Nearest Residential Receivers – No Noise Control

	Received Noise Levels, dB(A),Leq		
Residential Receiver	Neutral Conditions (Day)	3m/sec Wind Source to Rec (Day/Evening)	3°C/100m Inversion (Night)
Girrawheen R1	32	34	35
Abbeylands R2	38	**41**	**40**
The Billabong R3	33	**38**	**37**
Airport South R4	20	25	23

Criteria: All Receivers Day=40, Evening=35, Night=35.

Reference to theoretical results in the above Table shows that site operations are predicted to be compliant with the criteria at Girrawheen, and residences along New Winton Road (airport south). However, under adverse weather conditions exceedances of 2-6dB(A) are predicted at Abbeylands and The Billabong during the night and evening.

Reference to our acoustic model reveals that activities and equipment associated with the Live Bird area (trucks, fork lifts, ventilation fans) are responsible for the exceedances. Several noise control options were investigated with the most economical option detailed below:

- Erect acoustic mound or wall 2700mm above FGL along the west side of the Live Bird Module and Hardstand (see Appendix B).
- Erect acoustic barrier 2100mm above FGL adjacent to Cooling towers and associated pumps, etc, on the north side processing plant (see Appendix B).

The following Table shows recalculation of the predicted received noise levels at nearest residential receivers under neutral and noise enhancing atmospheric conditions with the above noise control modifications and strategies in place.

Table 13: Received Noise Levels – Render Plant (PROPOSED OPERATIONS) Propagated to Nearest Residential Receivers – Noise Control in Place

	Received Noise Levels, dB(A),Leq		
Residential Receiver	**Neutral Conditions (Day)**	**3m/sec Wind Source to Rec (Day/Evening)**	**3°C/100m Inversion (Night)**
Girrawheen	32	34	35
Abbeylands	33	**36**	35
The Billabong	30	35	34
Airport South	20	25	23

Criteria: All Receivers Day=40, Evening=35, Night=35.

The above Table shows that compliance with the criteria is predicted at all nearby receivers, with the exception of a minor 1dB(A) exceedance at Abbeylands under adverse weather conditions, with inclusion of the noise control detailed above. It is highly unlikely that all items included in our acoustic model will be operating simultaneously implying compliance. In saying this, there is some uncertainty in all theoretical calculations, as such, we recommended a noise monitoring program is the commissioning in the early life of the site to verify our theoretical calculations and enable further noise control strategies to be implemented in the event of any non-compliance.

3.2.3 Received Noise Levels – Short-Term Events

Noise levels from short term events such as truck movements have the potential to interrupt the sleep of nearby neighbours in the early hours of the morning. Nearest residential receivers are approximately 1100 metres from the site, with loudest events producing <40dB(A), Lmax at the residential facade, which is below the maximum noise level event limit of 52dB(A),max. Noise from short-term noise events are therefore acceptable and no further noise control is required for these sources.

It should be acknowledged that mobile plant is generally well shielded from residential receivers by intervening structures and buildings on the site and received noise is expected to be substantially lower than our predictions indicate.

3.2.4 Tonal Noise Assessment

Reverb Acoustics has completed detailed noise monitoring assessments over many years at Baiada's Processing Plant in Griffith NSW. Noise monitoring results taken at residences exposed to the sites loudest items, i.e. live bird area and processing plant have been sourced to determine the tonal content or otherwise. Shown below is our assessment of noise tonality for Baiada's plant and activities.

Tonality Assessment – Baiada's Griffith NSW Processing Plant

TONALITY ASSESSMENT																									
Data Input																									
Frequency, Hz	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.3k	1.6k	2k	2.5k	3.2k	4k	5k	6.3k	8k	10k	dB
Measured Spectrum	7.4	11.5	14.3	24.4	24.8	23.7	27.3	25.3	27.2	29.2	29.7	30.3	28.2	27.3	29.7	32.8	29.6	27.5	26.1	26	26.7	25.7	21.7	19.1	41.0
NSW EPA, Noise Policy for Industry 2017																									
Frequency, Hz	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.3k	1.6k	2k	2.5k	3.2k	4k	5k	6.3k	8k	10k	
Spectrum	7.4	11.5	14.3	24.4	24.8	23.7	27.3	25.3	27.2	29.2	29.7	30.3	28.2	27.3	29.7	32.8	29.6	27.5	26.1	26	26.7	25.7	21.7	19.1	41.0
Tonality	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Adjusted Level																									41.0

As can be seen by the above results, noise emissions at nearest receivers are not expected to contain any significant tonal components, in accordance with the requirements of Fact Sheet C of the NPfI. No further adjustments or penalties are therefore required for noise predictions at residential receivers.

3.2.5 Site Child Care Centre

The proposed child care centre will be located on the south side of the processing building. The centre will include indoor areas (i.e. play areas, cot rooms, amenities, etc) and an outdoor play area. Potential noise sources that may impact upon the child care centre are dominated by the closest items of equipment or activity. In this case, only vehicle movements in the carpark (cars driving, reversing, car doors) are noise sources of concern. Long-term monitoring conducted by Reverb Acoustics at the entrance to busy carparks, reveals that average noise levels are as high as 62dB(A),Leq, which is 7dB(A) above the criteria for child care centre outdoor play areas. As such, an acoustic fence will be required at the perimeter of the outdoor area.

The acoustic fence will provide the added advantage of shielding internal areas of the child care centre from intruding industrial noise. The difference between external and internal noise levels is typically 15dB(A) when windows are open for ventilation, for masonry structures. Therefore, based on an external noise level of <55dB(A) with the acoustic fence in place, satisfactory noise levels are expected within indoor areas of the child care centre. In saying this we do recommend that acoustic windows are installed in cot rooms.

We understand that internal areas will be air conditioned, although windows may be open to provide natural ventilation. Consideration should be given to installing ceiling fans to provide additional ventilation when windows are open.

See Section 4 for required acoustic modifications.

3.2.6 Predicted Noise levels - Construction Plant and Equipment

Received noise produced by anticipated construction activities is shown in Table 13 below, for a variety of distances to a typical receiver, with no noise barriers or acoustic shielding in place and with each item of plant operating at full power. Entries in bold type highlight exceedances of the day Noise Affected criteria of **45dB(A),Leq**.

Table 14: Predicted Plant Item Noise Levels, dB(A)Leq

Plant/Activity	(Lw)	Distance to Residence			
		1km	1.5km	2km	3km
Mobile crane	(104)	36	32	30	28
Hammering	(98)	30	26	24	22
Angle grinder	(106)	38	34	32	30
Air wrench (silenced)	(98)	30	26	24	22
Vibrating roller	(108)	40	36	34	32
Road truck	(104)	36	32	30	28
Grader	(106)	38	34	32	30
Air compressor	(98)	30	26	24	22
Concrete Agitator	(112)	44	40	38	36
Concrete Pump	(110)	42	38	36	34
Water cart	(112)	44	40	38	36
Excavator	(102)	34	30	28	26
Bull dozer	(116)	**48**	44	42	40
Rendering plant	(104)	36	32	30	28
Positrack	(106)	38	34	32	30
Circular Saw	(111)	43	39	37	35

Residential receivers are within 1 km of the site and some construction activities are may exceed the criteria, particularly mobile plant. Noise levels above 45dB(A) are possible at closest locations.

The ICNG recommends that as a first course of action, consideration should be given as to whether any alternate feasible or reasonable method of construction is possible. Consultation with the construction contractor confirms that due to the nature of ground conditions there are no quieter alternates available. The ICNG further recommends that when alternate feasible and reasonable options have been considered the proponent then should communicate with the impacted residents by clearly explaining the duration and noise level of the works, and any respite periods that will be provided. These strategies will be discussed in more detail in Section 4.

When earthworks occur noise levels in the order of 48-50dB(A) are possible at nearest locations. To reduce noise levels any appreciable amount a physical barrier would be required to intercept the line of site between the source and receivers. We suggest that temporary earthen mounds utilising available fill on site may be considered. The above strategies may reduce noise levels at residential locations by 5dB(A) or more.

It should be noted that calculations are based on plant items operating in exposed locations and at full power, with no allowances made for intervening topography or shielding provided by intervening structures. Cumulative impacts, from several machines operating simultaneously, may be reduced when machines are operating in shielded areas not wholly visible to receivers. In saying this, if two or more machines were to operate simultaneously on the site, received noise levels would be raised and higher exceedances may occur.

Initial earthworks are expected to employ a bull dozer, excavator, and 1-2 dump trucks. The combined acoustic power level of these machines, assuming normal contractor's machines up to 10 years old in reasonably good condition, is expected to be in the range 108 to 116B(A),Leq.

However, the machines will typically be spread over the site, and noise at any receiver is typically dominated by the few closest machines, such as an excavator loading a truck, while a second truck reverses into position to be loaded by an excavator. With a combined acoustic power level of 108 dB(A) for 3 typical machines operating at full power, 40dB(A) is expected at the closest residence during peak activity.

As previously mentioned, constructing temporary barriers of excess fill, etc, at least 2m high, at the perimeter of the construction site (or at least adjacent to noisy plant items) may be considered for mitigating some of the construction noise at nearest receivers. These barriers will offer the additional benefit of securing the site from unwanted visitors. With barriers in place, worst case construction will reduce by up more than 5dB(A), although, as previously stated, these noise levels are expected to occur for a relatively short time and reduce as work progresses to a new area.

It should be acknowledged that construction activities that produce higher noise for a shorter period are often more desirable than alternate construction techniques that produce lower noise for a much longer period. This combined with noise control strategies discussed in Section 4 will ensure that minimum disruption occurs.

SECTION 4
Summary of Recommended Noise Control

4.1 NOISE CONTROL RECOMMENDATIONS - OPERATION

4.1.1 Noise Mound/Barrier

1. Acoustic mounds or barriers are to be erected at the following locations:

Location	*Height Above FGL (mm)*
West side Live Bird Area and Hardstand	2700
North side Cooling towers & associated plant	2100

An acoustic barrier is one which is impervious from the ground to the recommended height, and is typically constructed from lapped and capped timber, Hebel Power Panel, earthen mound, or a combination of the above. No significant gaps should remain in the barrier to allow the passage of sound below the recommended height. Other construction options are available if desired, providing the mound or wall is impervious and of equivalent or greater surface mass than the above construction options. Also see Appendix B for mound/wall location.

4.1.2 General Noise Control Recommendations

2. The site may operate 24 hours day. Monday to Sunday

3. All access roads should be kept in good condition, i.e. no potholes, etc.

4. Trucks and other machines should not be left idling for extended periods unnecessarily. Machines found to produce excessive noise compared to industry best practice should be removed from the site or stood down until repairs or modifications can be made.

5. A regular maintenance schedule should be adopted for all mobile and fixed plant items. Items found producing high noise should be stood down until repairs are completed.

6. A noise monitoring program, during commissioning, or in the early life of the site is recommended. This program will verify our predictions and in the unlikely event that complaints may arise, enable noise control strategies to be implemented, where required.

A typical noise monitoring program may consist of the following:

- Initial commissioning attended monitoring during the day, evening and night at potentially affected residential receivers, i.e. Girrawheen, Abbeylands, The Billabong, New Winton Road.
- Subsequent bi-annual monitoring at the above locations.
- In the event of any non-compliance(s), provide Noise Reduction Program for the site and additional compliance monitoring at completion of works, or
- If compliance is verified reduce to annual monitoring at receivers.

4.1.3 Site Child Care Centre

7. An acoustic fence 1800mm above FGL is to be erected at the perimeter of the child care centre outdoor area. Acceptable forms of construction include Colorbond, lapped and capped timber, Hebel Powerpanel, , masonry, or a combination of the above. No significant gaps should remain in the fence to allow the passage of sound below the recommended height. Other construction options are available if desired, providing the fence or wall is impervious and of equivalent or greater surface mass than the above construction options.

8. Windows to the Cot Rooms must be upgraded to achieve an acoustic rating of Rw32. This can typically be achieved with the use of laminated glass and Q-Lon seals at sliders.

9. Consideration should be given to installing ceiling fans to supplement air conditioning.

4.2 NOISE CONTROL RECOMMENDATIONS - CONSTRUCTION

4.2.1 Noise Monitoring Program

We recommend that attended noise monitoring should be carried out at commencement of each process/activity that has the potential to produce excessive noise. Attended monitoring offers the advantage of immediate identification of noise exceedances at the receiver and ameliorative action required to minimise the duration of exposure. Unattended long-term monitoring only identifies a problem at a later date and is not recommended.

4.2.2 Acoustic Barriers/Screening

To minimise noise impacts during construction, early work should concentrate on grading and levelling the areas in unshielded locations. In the event of complaints arising from residents, we offer the following additional strategies for consideration:

- Place acoustic enclosures or screens directly adjacent to stationary noise sources such as compressors, generators, drill rigs, etc.

4.2.3 Consultation/Complaints Handling Procedure

The construction contractor should analyse proposed noise control strategies in consultation with the Acoustic Consultant as part of project pre-planning. This will identify potential noise problems and eliminate them in the planning phase prior to site works commencing.

Occupants of adjacent properties should be notified of the intended construction timetable and kept up to date as work progresses, particularly as work changes from one set of machines and processes to another. In particular, occupants should understand how long they will be exposed to each source of noise and be given the opportunity to inspect plans of the completed development. Encouraging resident understanding and "participation" gives the local community a sense of ownership in the development and promotes a good working relationship with construction staff. Programming noisy activities (such as earthworks) outside critical times should be considered.

We recommend that construction noise management strategies should be implemented to ensure disruption to the occupants of nearby buildings is kept to a minimum. Noise control strategies include co-ordination between the construction team and residents to ensure the timetable for noisy activities does not coincide with sensitive activities.

The site manager/environmental officer and construction contractor should take responsibility and be available to consult with community representatives, perhaps only during working hours. Response to complaints or comments should be made in a timely manner and action reported to the concerned party.

All staff and employees directly involved with the construction project should receive informal training with regard to noise control procedures. Additional ongoing on the job environmental training should be incorporated with the introduction of any new process or procedure. This training should flow down contractually to all sub-contractors.

4.2.4 Equipment Selection

All combustion engine plant, such as generators, compressors and welders, should be carefully checked to ensure they produce minimal noise, with particular attention to residential grade exhaust silencers and shielding around motors.

Trucks and other machines should not be left idling unnecessarily, particularly when close to residences. Machines found to produce excessive noise compared to industry best practice should be removed from the site or stood down until repairs or modifications can be made. Framing guns and impact wrenches should be used sparingly, particularly in elevated locations, with assembly of modules on the ground preferred. Table 15 shows some common construction equipment, together with noise control options and possible alternatives.

Table 15- Noise Control, Common Noise Sources

Equipment / Process	Noise Source	Noise Control	Possible Alternatives
Compressor Generator	Engine	Fit residential muffler. Acoustic enclosure.	Electric in preference to petrol/diesel. Plant to be Located outside building Centralised system.
	Casing	Shielding around motor.	
Concrete breaking Drilling Core Holing	Hand piece	Fit silencer, reduces noise but not efficiency Enclosure / Screening	Use rotary drill or thermic lance (used to burn holes in and cut concrete) Laser cutting technology
	Bit	Dampened bit to eliminate ringing. Once surface broken, noise reduces. Enclosure / Screening.	
	Air line	Seal air leaks, lag joints	
	Motor	Fit residential mufflers.	
Drop/Circular saw Brick saw	Vibration of blade/product.	Use sharp saws. Dampen blade. Clamp product.	Use handsaws where possible. Retro-fitting.
Hammering	Impact on nail		Screws
Brick bolster	Impact on brick	Rubber matting under brick	Shielded area.
Explosive tools (i.e. ramset gun)	Cartridge explosion	Use silenced gun	Drill fixing.
Material handling	Material impact	Cushioning by placing mattresses, foam, waffle matting on floor. Acoustic screening.	
Waste disposal	Dropping material in bin, trolley wheels.	Internally line bins/chutes with insertion rubber, conveyor belting, or similar.	
Dozer, Excavator, Truck, Grader, Crane	Engine, track noise	Residential mufflers, shielding around engine, rubber tyred machinery.	
Pile driving/boring	Hammer impact engine	Shipping containers between pile & receiver	Manual boring techniques

Note: Generally, noise reductions of 7-10dB will be achieved with the use of barriers, 15-30dB by enclosures, 5-10dB from silencers and up to 20-25dB by substitution with an alternate process.

4.2.5 Risk Assessment

A risk assessment should be undertaken for all noisy activities and at the change of each process. This will help identify the degree of noise and/or vibration impact at nearby receivers and ameliorative action necessary. A sample Risk Assessment Check Sheet is included in Appendix C as a guide.

SECTION 5
Conclusion

5 CONCLUSION

A revised noise impact assessment for Baiada's Oakburn Processing Facility and Rendering Plant, has been completed. The report has shown that providing recommendations detailed in this report are implemented, noise levels from the upgraded site will be compliant with the EPA's NPfI requirements at all nearby residential receivers during the day, evening and night, for neutral and worst-case atmospheric conditions. Noise emissions from activities associated with the site will be either within the criteria or generally below the existing background noise level in the area for the majority of the time.

Considering the abundance of industrial/commercial premises already in the area and relatively constant traffic on nearby roads, noise generated by the site may be audible at times but not intrusive at any nearby residence. Since the character and amplitude of activities associated with the site will be similar to those already impacting the area, it will be less intrusive than an unfamiliar introduced source.

During construction the total impact at each receiver is related to the received noise level and the duration of excessive noise. Generally, construction noise will comply with the criteria, however, during major construction activities some exceedances may occur. However, nearby neighbours should accept some periods of high noise, considering the relatively short-term nature of louder construction activities.

To reduce the impact in the area during construction, we recommend that louder construction activities, should be completed with the minimum of undue delay. In any case, all reasonable attempts should be made to complete significant noisy activities within as short a time as possible.

As previously stated, construction activities that produce higher noise for a shorter period are often more desirable than alternate construction techniques that produce lower noise for a much longer period

Construction activities should generally be restricted to the nominated hours. If construction does occur outside the standard hours, it is vital that the local community be informed of the construction timetable with letter drops, meetings, etc.

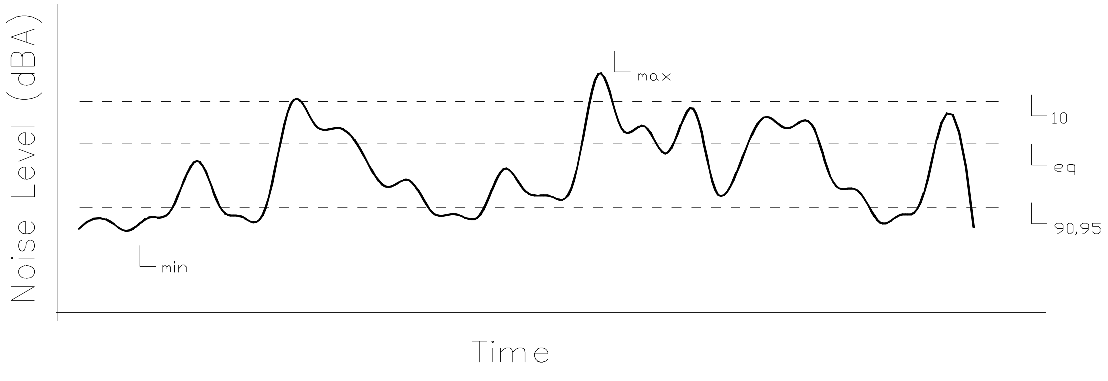
In conclusion, operation and construction of the Oakburn site will not cause any long term excessive environmental noise at any residential properties. We therefore see no acoustic reason why the proposal should be denied.

Steve Brady M.A.S.A. A.A.A.S.
Principal Consultant

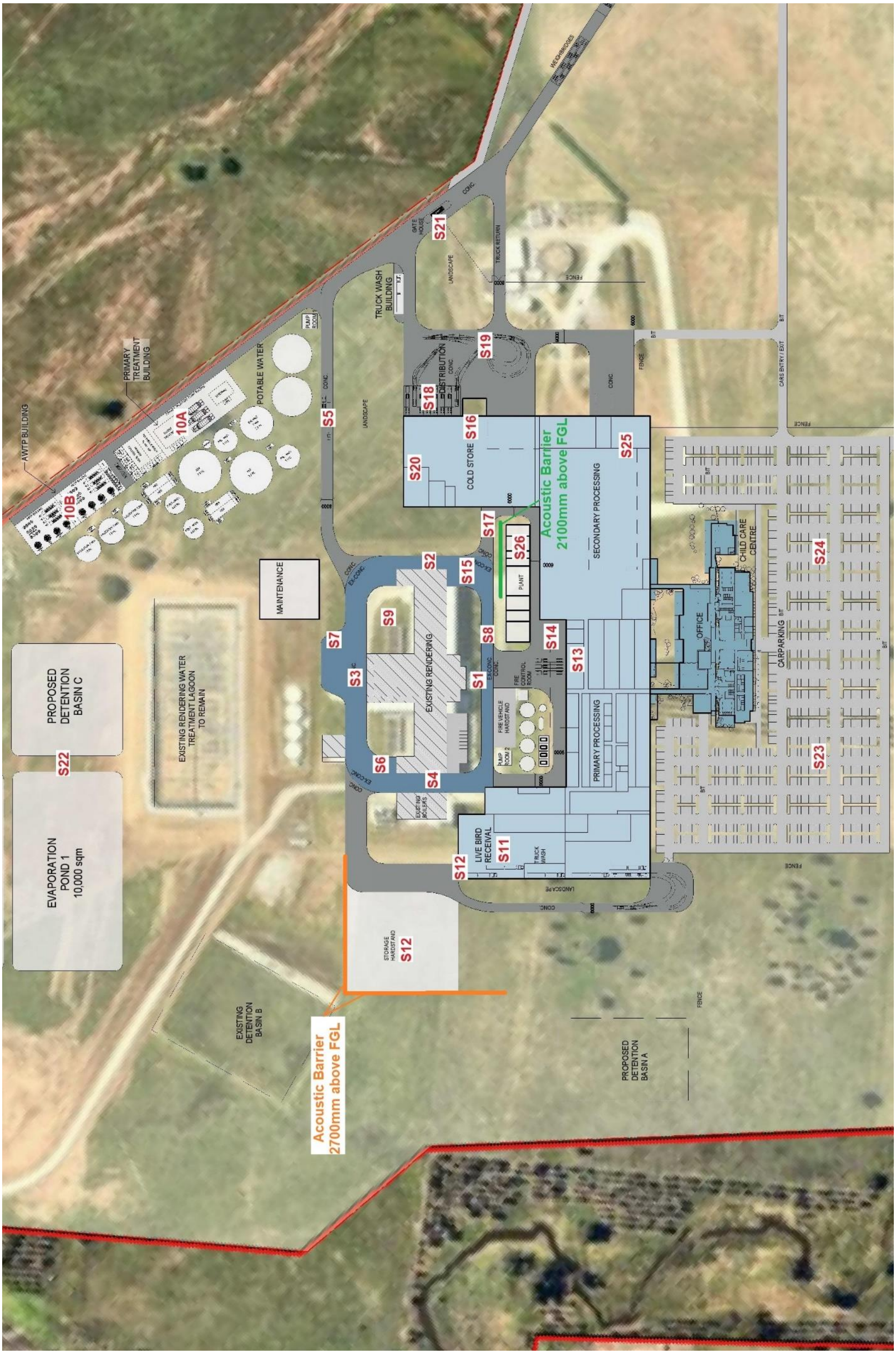
APPENDIX A
Definition of Acoustic Terms

Definition of Acoustic Terms

Term	Definition
dB(A)	A unit of measurement in decibels (A), of sound pressure level which has its frequency characteristics modified by a filter ("A-weighted") so as to more closely approximate the frequency response of the human ear.
ABL	*Assessment Background Level* – A single figure representing each individual assessment period (day, evening, night). Determined as the L90 of the L90's for each separate period.
RBL	*Rating Background Level* – The overall single figure background level for each assessment period (day, evening, night) over the entire monitoring period.
Leq	Equivalent Continuous Noise Level - which, lasting for as long as a given noise event has the same amount of acoustic energy as the given event.
L90	The noise level which is equalled or exceeded for 90% of the measurement period. An indicator of the mean minimum noise level, and is used in Australia as the descriptor for background or ambient noise (usually in dBA).
L10	The noise level which is equalled or exceeded for 10% of the measurement period. L_{10} is an indicator of the mean maximum noise level, and was previously used in Australia as the descriptor for intrusive noise (usually in dBA).



APPENDIX B
Noise Source Locations
Acoustic Mound/Barrier



REVERB ACOUSTICS

APPENDIX C
Risk Assessment Checklist

Risk Assessment Checklist

Item/Date	Risk Identified (Yes/No)	Risk Level (H/M/L)	Noise Control Required (Yes/No)	Noise Control Strategy

ATTACHMENT 7: REVISED ODOUR IMPACT ASSESSMENT AND ODOUR MANAGEMENT PLAN

AP07

PSA CONSULTING

Baiada Poultry Pty Ltd –

Proposed Poultry Processing Facility Odour Impact Assessment

Oakburn, NSW

Final Report

Version 2 - July 2020

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Report Version	**Date**	**Description**
0.1 (Draft)	21.01.19	For internal review.
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1.0	06.06.19	Final report issued to client.
2.0	26.06.20	Draft revision internal review
2.1	30.06.20	Draft issued to PSA Consulting Australia
2.2	03.07.20	Minor edits. Final report issued.
Report Preparation		
Report Prepared By: S. Munro & S. Hayes	**Reviewed & Approved By**: M. Assal	
Report Title: Baiada Poultry, Oakburn - Proposed Poultry Processing Facility Odour Impact Assessment		

EXECUTIVE SUMMARY

The Odour Unit Pty Ltd (**TOU**) was commissioned by PSA Consulting (Australia) Pty Ltd (**PSA**) on behalf of Baiada Poultry Pty Ltd (**Baiada**) to carry out an odour impact assessment (**OIA**) for the proposed integrated Poultry Processing Facility (**PPF**) to be sited adjacent to the Oakburn Protein Recovery Plant (**PRP**) near Oxley Highway, Westdale, New South Wales (Lot 100 on DP1097471). The proposed PPF is to replace the existing abattoir located at Out Street, Tamworth, New South Wales.

Odour Dispersion Modelling Approach

The OIA assessment was carried out using the CALPUFF Modelling System with use of odour emissions estimates based upon measurements collected by TOU at Oakburn PRP, Baiada Hanwood Processing Plant and at the Out Street, Tamworth abattoir. All Oakburn odour sources have been assessed as a combined impact and separately grouped by origin: PRP, PPF and wastewater treatment plant (**WWTP**) (i.e. inclusive of the advanced wastewater treatment plant (**AWTP**)). The odour impact from the PRP biofilters was included for conservatism despite being a treated emission source. All modelling was undertaken in accordance with the New South Wales Environment Protection Authority guidelines (**NSW EPA**).

It should be noted that the meteorology developed for the modelling overpredicted calm and light wind conditions, particularly from the south-south-westerly direction. This would have a conservative effect on the results, that is overpredicting the extent and magnitude of odour concentration projections, especially north-north-westwards from the site.

Odour Dispersion Modelling Findings

The OIA modelling findings indicating the following:

- The addition of the proposed PPF modelled alone shows predicted odour impact does not largely exceed the NSW EPA odour IAC of 5 ou beyond the Oakburn site boundary;
- The results show that the predicted odour impact for PRP and PPF WWTPs is below the NSW EPA odour IAC under the assumption that SBR night-time filling would be avoided and the PTB is mechanically ventilated by roof fans;
- Overall, the results are below the odour IAC at the nearest sensitive receptor. The cumulative 5 ou contour encroaches beyond the site boundary marginally to the north and marginally to the south. Therefore, it has been found that the proposed PPF is unlikely to cause adverse odour impacts under normal conditions; and
- The results for the proposed childcare centre show that for both a 24 hour per day operation and a long-day operation, the odour IAC is predicted to be exceeded. The perceived sensitivity of the ancillary childcare centre to odour from the proposed PPF is debateable. Based upon the context and function of the proposal (i.e. employee family welfare), community expectations and

recommended odour risk reduction measures for the ancillary childcare centre as part of an Odour Management Plan (**OMP**), the residual odour annoyance risk at this location could be reduced significantly compared with a nearby stand-alone childcare facility without the recommended odour risk reduction measures implemented and having no commercial or functional relationship with Baiada. With due consideration to the information provided associated OMP, the residual odour impact risk rating for the ancillary childcare is considered to be low.

<u>Sensitive Analysis Findings</u>

A sensitivity modelling analysis for the proposed PPF indicated the following:

- Cumulative odour effects from the proposed PPF with three poultry farms located to the northwest demonstrates that there the model is sensitive to the presence of these sources; and

- However, prediction of cumulative effects is almost certainly overstated as it considers all Oakburn sources including treated odours (e.g. biofilter, etc) and odours of different characters (e.g. rendering, wastewater, etc) that do not combine in the atmosphere and tend to be observed as individually identifiable odour characters in the field.

<u>Other Air Quality Impact Findings</u>

For the proposed PPF, other air quality impact findings are as follows:

- The composition of the natural gas to be used by the boilers will contain negligible levels of sulphur and other contaminants that may affect efficient combustion performance and emissions discharge to air from the boiler stacks. As such, air quality impact from the boiler operations at the proposed PPF are assessed to be negligible; and

- With due consideration to the operational analysis for the proposed PPF, it is TOU's assessment that the risk level of adverse dust impact is of very low potential; and that a refined quantitative assessment is not required.

<u>Concluding Remarks</u>

Given the complexity and scale of the proposed PPF operations, a modelling based OIA is not an ideal tool to help form a contingency plan for unpredicted operational odour impacts or adequately predict the real-world impacts from measures designed to avoid, mitigate, manage and/or offset impacts (typical examples that support this position are the characteristics associated with treated quality emissions from a biofilter or aerobic wastewater treatment source, which in the OIA have been modelled and contributed to the cumulative odour impact prediction profile). These matters are best addressed by sufficient odour separation distances (i.e. odour buffers, when possible) and a site-specific OMP. A site-specific OMP is an important tool that facilitates in contextualising the modelling findings and give due consideration to the residual odour risk rating from the proposed engineered controls, monitoring and management protocols, and standard operating procedures that will support the proposed PPF operations. As such, on the basis that the proposed management practices and controls are implemented to that documented in the associated OMP, the residual odour impact risks for the proposed PPF operations will be significantly minimised to the degree that odour impacts in practice are unlikely.

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FIGURES AND TABLES

FIGURES

TABLES

LIST OF ABBREVIATIONS & DEFINITIONS

AWTP	Advanced Water Treatment Plant
Baiada	Baiada Poultry Pty Ltd
BOM	Bureau of Meteorology
BPIP	Building Profile Input Program
CAL	covered anaerobic lagoon
CW	clear wells
DAF	dissolved air flotation
DEM	digital elevation model
DPE	Department of Planning & Environment
HTR	High-Temperature Rendering
Hydroflux	Hydroflux Industrial Pty Ltd
IAC	impact assessment criteria
LBR	live bird reception
LTR	Low-Temperature Rendering
MBR	membrane bioreactor
NSW EPA	New South Wales Environment Protection Authority
OER	odour emission rate
OIA	Odour Impact Assessment
OMP	Odour Management Plan
P/M	peak-to-mean ratio
POEO Act	Protection of the Environment Operations Act 1997
PPF	Poultry Processing Facility
PRP	Protein Recovery Plant
PSA	PSA Consulting (Australia) Pty Ltd
PTB	Primary Treatment Building
RDC	Research and Development Corporation

SBR	sequencing batch reactor
SCADA	supervisory control and data acquisition
SEARs	Secretary's Environmental Assessment Requirements
SOER	specific odour emission rate
SRTM	Shuttle Radar Topography Mission
TAPM	The Air Pollution Model
TOU	The Odour Unit Pty Ltd
USGS	United States Geological Survey
WWTP	Wastewater Treatment Plant
YSTW	Tamworth Airport AWS

UNITS OF MEASUREMENTS

km	Kilometres
m	metres
m/s	metres per second
m^3/h	cubic metres per hour
m^3/s	cubic metres per second
ML	megalitres
MW	megawatts
^oC	degrees Celsius
ou	odour units
ou.m^3/m^2.s	odour units by cubic metre per square metre by second
ou.m^3/s	odour units cubic metre per second
Pa	Pascals
ppm	parts per million, by volume

AIR POLLUTANTS AND CHEMICAL NOMENCLATURE

CO	carbon monoxide

CO_2	carbon dioxide
NO_X	oxides of nitrogen
SO_2	sulphur dioxide

1 INTRODUCTION

1.1 BACKGROUND

The Odour Unit Pty Ltd (**TOU**) was commissioned by PSA Consulting (Australia) Pty Ltd (**PSA**) on behalf of Baiada Poultry Pty Ltd (**Baiada**) to carry out an odour impact assessment (**OIA**) for the proposed integrated Poultry Processing Facility (**PPF**) to be sited adjacent to the existing Oakburn Protein Recovery Plant (**PRP**) near Oxley Highway, Westdale, New South Wales (Lot 100 on DP1097471), as shown in **Figure 2.1**. The proposed PPF is to replace the existing abattoir located at Out Street, Tamworth, New South Wales.

1.2 PURPOSE OF OIA

The aim of OIA for the proposed PPF is to address key issues raised in the Department of Planning & Environment (**DPE**) Secretary's Environmental Assessment Requirements (**SEARs**) Baiada Oakburn Poultry Processing Facility (SSD 9394) document. The key issues in the SEARs were related to potential impacts of the proposed PPF and measures to avoid, mitigate, manage and/or offset impacts.

The matters to be addressed specific to odour impacts in the SEARs include:

- *"a quantitative odour and air quality impact assessment in accordance with the relevant Environment Protection Authority (EPA) guidelines. This assessment must include:*
  - *an investigation and assessment of odour impacts on all identified and potential receivers including, but not limited to, the adjacent rural residences and the Tamworth Regional Airport;*
  - *an assessment of the cumulative air quality and odour impacts of the development, taking into account existing and proposed livestock intensive industries in the surrounding area;*
  - *evidence of appropriate meteorological data for use in air dispersion modelling, using real meteorological data where possible;*
  - *inclusion of 'worst case' emission scenarios and sensitivity analyses;*
  - *a contingency plan to address unpredicted operational odour impacts;*
  - *a description and appraisal of air quality and odour impact monitoring, emission control techniques and mitigation measures."*

It is proposed to operate a childcare centre on-site. Odour impacts have been considered as recommended by *Child Care Planning Guideline – Delivering quality child care for NSW, 2017*. As such, the OIA has given due consideration to C28 of this guideline document, which states that:

> *"A suitably qualified air quality professional should prepare an air quality assessment report to demonstrate that proposed child care facilities close to*

major roads or industrial developments can meet air quality standards in accordance with relevant legislation and guidelines".

Furthermore, the New South Wales Environment Protection Authority (**NSW EPA**) key information requirements (notice number 1566238) also include:

"an adequate assessment of dust generated and management of potential impacts on adjacent rural residences during the construction and operational phases"

The dust impact potential is addressed in **Section 2.4**. The boiler air quality impact is addressed in **Section 2.5**.

In September 2019, TOU was provided with comments and feedback on the first version of the OIA report dated 6 June 2019, which was received during the notification period of the PPF for response and addressed in this second version of the OIA report.

The OIA report contains the methodology, results and findings for the proposed PPF as conducted by TOU.

1.3 RELEVANT DOCUMENTATION

A site-specific Odour Management Plan (**OMP**) has been prepared TOU to supplement the OIA conducted for the proposed PPF. An OMP is a documented operational management system and a 'live' manual that is changed as required, to reflect the current practices and odour controls prevalent at a facility. The sole purpose of an OMP is to eliminate, prevent or minimise the potential for odour generation through a hierarchy of controls, in the form of, but not limited to, engineered, administration and/or management practices. An OMP seeks to find a reasonably practical balance between maintaining the quality of process operations designed to yield a high-quality end-product and the ability to control odour emission generation. Put simply, the OMP describes the measures that will facilitate in preventing, mitigating, managing and/or offsetting odour impacts risks from the proposed PPF. As such, the OMP should be read in conjunction with the OIA report prepared for the proposed PPF.

2 SITE DESCRIPTION

2.1 SITE SURROUNDS

An aerial map of the PPF and its surroundings is shown in **Figure 2.1**.

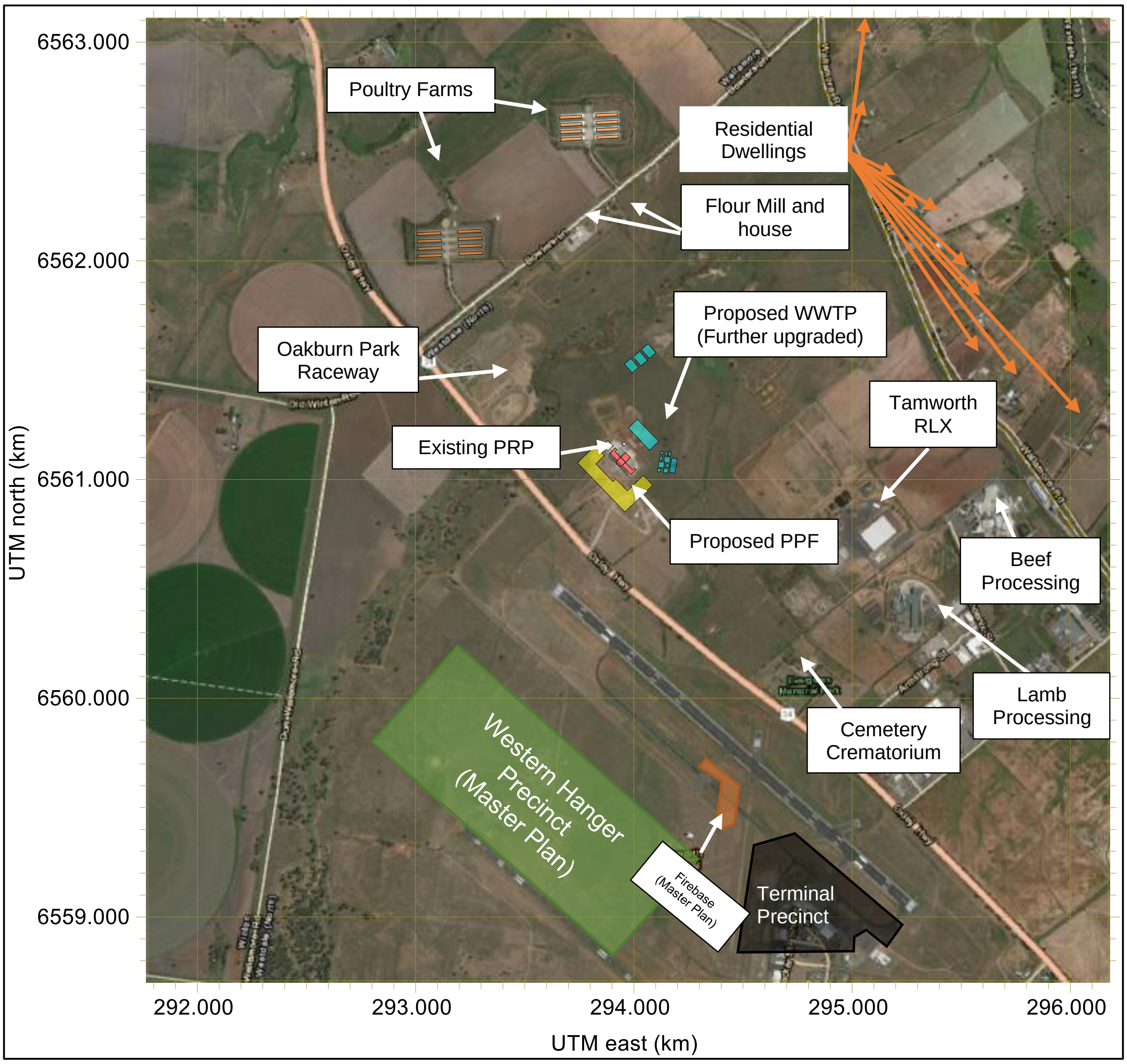


Figure 2.1 – Site location and surrounds

From an odour viewpoint, the surrounding features of interest to the proposed PPF include:

- Oakburn Park Raceway;
- Tamworth Regional Livestock Exchange;
- Tamworth Regional Airport;
- Sensitive places including eleven dwellings along Wallamore Road and Bowlers Lane;

- The dwelling on Bowlers Lane is understood to be owned by Tamworth Regional Council and will be removed as part of the proposed PPF; and

- The other land uses include beef processing, lamb processing, poultry farming, flour milling and a cemetery-crematorium.

The near-field topography surrounding the proposed PPF could be described as a flat rural floodplain. Further afield there is a slightly elevated ridgeline that runs along Bowlers Lane from the north to the southwest. The Peel River valley is to the northeast.

2.2 OAKBURN PROPOSED POULTRY PROCESSING FACILITY DESCRIPTION

The proposed PPF has been described by Baiada in their request for SEARs (Boulton & Ireland, 2018):

> *"Baiada is proposing a new, integrated poultry processing plant on the site consisting of the following items:*
>
> - *Construction of an integrated poultry processing plant consisting of:*
>   - *36,000 m² of Gross Floor Area providing for live bird storage, processing, chilling, cold store and distribution facilities;*
>   - *1,600 m² workshop and store building;*
>   - *4,100 m² of ancillary administration, staff amenities and childcare space;*
>   - *Wastewater Treatment Plant (**WWTP**) and Advanced Water Treatment Plant (**AWTP**); and*
>   - *Installation of ancillary infrastructure, landscaping and services.*
> - *Increase the approved level of poultry processing on the site to a maximum of 3 million birds per week;*
> - *Increase production at the existing rendering plant to a maximum of 1,680 tonnes of finished product per week (240 tonnes / day 7 days a week); and*
> - *Operation of all aspects of the site facility up to 24 hours per day, 7 days a week with no restrictions."*

Since lodgement of the OIA and Environmental Impact Statement, and receipt of submissions, Baiada proceeded with further detailed design and planning of the proposed PPF, which has resulted in an amended development layout, as follows:

- Total ground floor area: 39,810 m²;

- Processing area: 30,273 m²;

- Office area: 4,848 m²;

- Child care area: 346 m^2;
- Maintenance 1,118 m^2; and
- Wastewater Treatment area: 3,225 m^2.

While the design of the facility has been amended, the operational aspects of the proposed PPF operations (i.e. production volumes and processes, etc.) generally remain consistent with the previously submitted OIA and Environmental Impact Statement.

The potential key odour emission sources from the proposed PPF and an on-site sensitive receiver have been described in **Section 2.3**.

2.3 PROPOSED PPF ODOUR SOURCES

Based on the ground floor plan shown in **Figure 2.3**, the key odour sources derived for the proposed PPF are as follows:

- Receival of live birds into the reception hall ventilation comprising of five roof fans; and
- Processing Lines 1 & 2, which consist of seventeen roof fans, ventilating process areas including but not limited to:
  - Receival of live birds into the reception hall via trucks;
  - Livestock preparation including stunning, shackling and kill;
  - Scalding and de-feathering;
  - Evisceration and inspection;
  - Removal and transport of offal, co-products and by-products to the PRP; and
  - Primary treatment, processing pumps, waste staging and crate wash.

2.3.1 Ancillary Childcare Centre

It is proposed to operate a childcare centre on-site at the location indicated in **Figure 2.2.**

2.3.2 WWTP Odour Sources

A WWTP and AWTP concept process design for the PPF was completed by Hydroflux Industrial Pty Ltd (**Hydroflux**) that proposed to treat up to 8 million litres (**ML**) of wastewater from the PPF and allow recovery for up to 7.2 ML for reuse as potable water per day. All wastewater from the PRP will be treated separately by the operational WWTP, which is designed to accommodate up to 3 million birds per week with a contingency buffer (Hydroflux Industrial, 2020).

The PRP wastewater would continue to be screened within the PRP where it is sent to be treated in a 25 ML Covered Anaerobic Lagoon (**CAL**) before being polished in a 5 ML Sequencing Batch Reactor (**SBR**). The liquid is discharged into two 5 ML Clear Wells (**CW**) before discharge to sewer. All wastewater from the PRP is currently operational and has been designed to accommodate additional volumes associated with the PPF. The treated wastewater from the PRP based operations will continue to be discharged to the sewer. An odour impact assessment for the PRP WWTP upgrade was completed by TOU in March 2018 (Hayes & Munro, 2018) and have been included as odour sources in this OIA report.

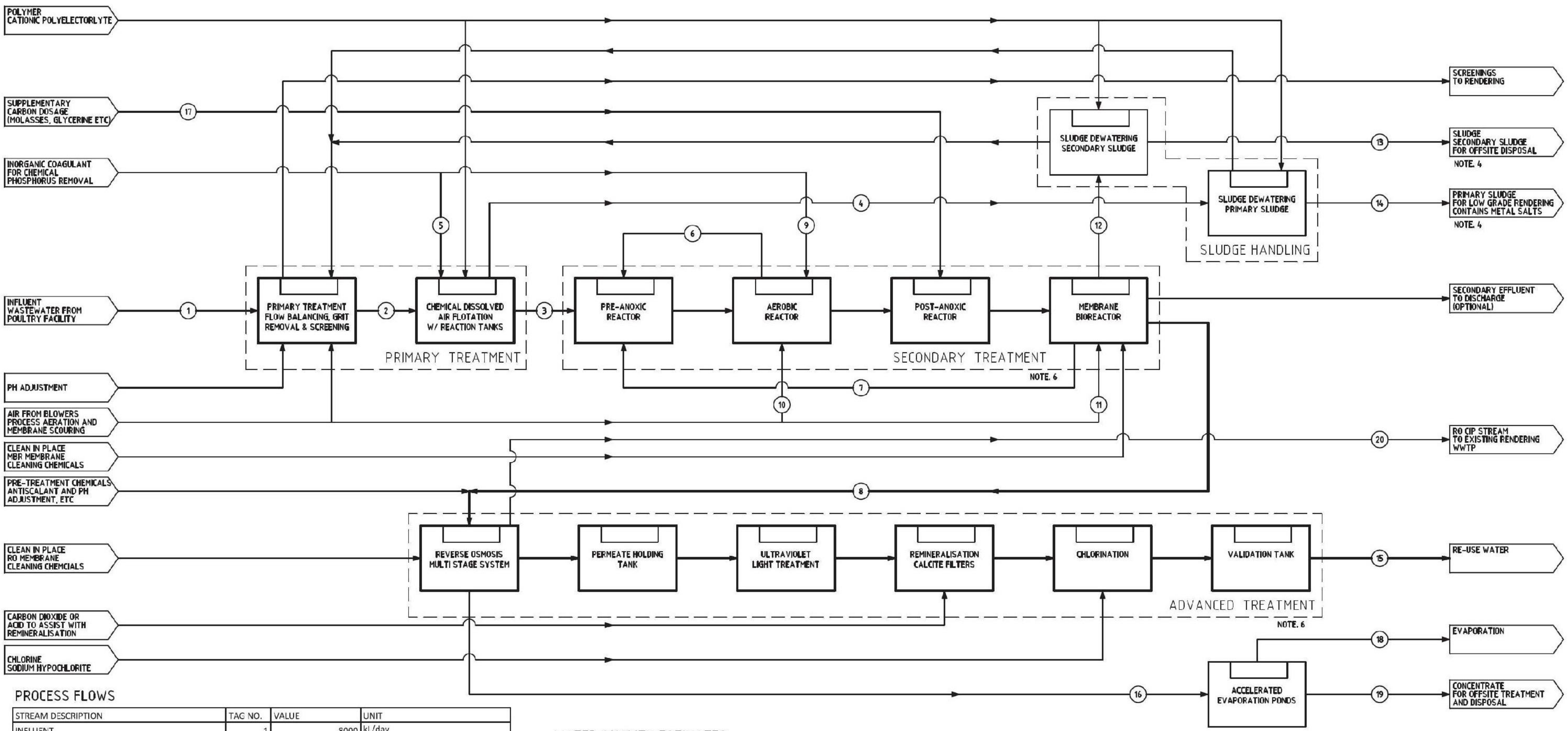
The wastewater from the proposed PPF will be treated with primary and secondary treatment processes by the WWTP involving dissolved air floatation (**DAF**) and a membrane bioreactor (**MBR**). The 8 ML/day design is expected to contain five membrane train. The effluent from the MBR is then further treated by the AWTP for reuse at the PPF by reverse osmosis, chlorination, ultraviolet light and remineralisation processes designed to exceed reuse water quality standards set out by various authorities (Hydroflux Industrial, 2020). The layout of the WWTP and AWTP is illustrated in **Figure 2.3**, and process flow diagram is available in **Figure 2.4**.

For this OIA report, the primary and secondary treatment stages of the WWTP process are considered to contribute significantly to the odour emission profile for the proposed PPF. The tertiary treatment process, including the AWTP process units, will be negligible odour emission contributors and have not been given any further consideration. The key odour sources from the WWTP include:

- Primary Treatment Building (**PTB**) comprising of grit removal, screening, DAF and sludge treatment;
- A balance tank;
- Two pre-anoxic tanks;
- Two aerobic tanks;
- Two post-anoxic tanks; and
- Two MBR trains.

Figure 2.2 – Site plan for the proposed PPF

Figure 2.3 – Ground floor layout of the integrated PPF operations



PROCESS FLOWS

STREAM DESCRIPTION	TAG NO.	VALUE	UNIT
INFLUENT	1	8000	kL/day
BALANCED FEED TO DAF	2	8000	kL/day
FEED TO SECONDARY TREATMENT	3	8000	kL/day
PRIMARY SLUDGE TO DEWATERING - NOTE 1	4	10502.4	kg TSS/day
COAGULANT TO DAF - NOTE. 2	5	4998.2	kg/day Ferric Chloride 42%
MIXED LIQUOR RETURN	6	32,000 - 64,000	kL/day
RETURN ACTIVATED SLUDGE	7	8000	kL/day
MEMBRANE BIOREACTOR EFFLUENT	8	7943.2	kL/day
COAGULANT TO SECONDARY TREATMENT - NOTE. 2	9	1249.6	kg/day Ferric Chloride 42%
AERATION FOR AEROBIC REACTOR	10	31960	Nm3/hr @ 620 mBar.g
AERATION FOR MEMBRANE SCOUR	11	13000	Nm3/hr @ 570 mBar.g
WASTE ACTIVATED SLUDGE - NOTE. 1	12	3077.6	kg TSS/day
DEWATERED SECONDARY SLUDGE	13	2923.7	kg TSS/day
DEWATED PRIMARY SLUDGE	14	9977.3	kg TSS/day
TREATED WATER FOR RECYCLING	15	7200	kL/day
RESERVE OSMOSIS CONCENTRATE	16	800	kL/day
SUPPLEMENTARY CARBON - NOTE 3.	17	AS REQUIRED FOR DENITRIFICATION PERFORMANCE.	
EVAPORATION OF CONCENTRATE	18	720	kL/day
CONCENTRATE POST EVAPORATION	19	80	kL/day
REVERSE OSMOSIS CIP STREAM TO EXISTING WWTP	20	40	kL/month

WATER QUALITY ESTIMATES

STREAM DESCRIPTION	TAG NO.	VOLUMETRIC FLOW	COD	BOD	TN	TKN	TP	PO4-P	TS	TSS	TDS
-	#	kL/day	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
INFLUENT	1	8000	3970	2380	210	210	40	36	2700	1300	1400
FEED TO SECONDARY TREATMENT	3	8000	1500	899	210	210	10	10	1600	200	1400
MEMBRANE BIOREACTOR EFFLUENT	8	8000	50	20	21	15	1	1	1405	5	1400
TREATED WATER FOR RECYCLING	15	7200	-	-	-	-	-	-	50 - 200	-	50 - 200
RESERVE OSMOSIS CONCENTRATE	16	800	250	200	210	150	312	272	13600	50	13550
CONCENTRATE POST EVAPORATION	19	80	2500	2000	2100	1500	3120	2720	136000	500	135500

NOTE. 5

NOTES:

1. PRELIMINARY CALCULATIONS SUGGEST 1,041 KG TSS IS PRECIPITATED DUE TO CHEMICAL P REMOVAL. FOR DESIGN PURPOSES IT HAS BEEN ASSUMED THAT 80% OF THIS SLUDGE IS PRODUCED DURING PRIMARY TREATMENT, WITH THE RESIDUAL PRODUCED IN THE SECONDARY TREATMENT PROCESS.
2. ESTIMATED FERRIC CHLORIDE DOSAGE IS 3,123.9 KG/DAY AS 42% SOLUTION. ASSUMPTION HAS BEEN MADE THAT THIS IS DOSED 4:1 INTO PRIMARY AND SECONDARY TREATMENT STAGES. MOLAR RATIO OF 2:1 [METAL]:[PHOSPHATE] USED FOR CALCULATIONS.
3. SUPPLEMENTARY CARBON DOSAGE MAY BE REQUIRED TO ACHIEVE TARGET TOTAL NITROGEN VALUES IN THE EFFLUENT.
4. WATER CONTENT OF DEWATERED SLUDGE HAS NOT BEEN CONSIDERED IN THE MASS BALANCE.
5. IMPACT OF CHEMICAL DOSING FOR PH CORRECTION, DISINFECTION AND CLEANING HAS NOT BEEN CONSIDERED IN THIS MASS BALANCE.
6. SECONDARY AND ADVANCED TREATMENT SPLIT INTO TWO PARALLEL TREATMENT TRAINS

Figure 2.4 – Process flow diagram of PPF WWTP and AWTP

2.3.3 Existing Protein Recovery Plant Odour Sources

The odour sources assumed for the existing PRP are the same as those used for the previous TOU odour impact assessment report for the Stage One WWTP upgrade (Hayes & Munro, 2018). The PRP odour sources assessed were:

- High-Temperature Rendering (**HTR**), namely:
  - Processing, and
  - Storage/dispatch;
- Low-Temperature Rendering (LTR), namely:
  - Processing; and
  - Storage/dispatch;
- Raw materials receival area/loading bay;
- HTR processing biofilter system; and
- LTR processing biofilter system.

The fugitive (non-biofilter) odour emissions from the PRP building were updated from measurements taken by TOU on 8 August 2018.

2.4 POTENTIAL FOR DUST IMPACTS

Based on TOU's experience with poultry processing facilities across Australia, processing, rendering and wastewater sources are high in moisture and low in particulate emissions. Moreover, it is inferred from the low odour concentrations measured from live bird storage at the Out Street facility that the particulate levels will be correspondingly low given the accepted nexus between odour and dust across many industries. Consequently, TOU's analysis of dust impacts is as follows:

- the nature of all processing, rendering and wastewater sources of the proposed facility is not high risk (compared with, for example, feed mills);
- the site car-parks and roadways will be sealed; and
- there is a large separation distance to the nearest residential dwellings;

With due consideration to the above operational analysis for the proposed PPF, it is TOU's assessment that the risk level of adverse dust impact is of very low potential; and that a refined quantitative assessment is not required.

2.5 POTENTIAL FOR AIR QUALITY IMPACT FROM BOILERS

To satisfy the process demands of the operations for the proposed PPF, two existing 10 megawatts (**MW**) and one existing 15 MW natural gas-fired boilers will be employed. It is well established that the combustion of fuels in equipment such as boilers results in atmospheric emissions of substances. The volume and nature of emissions depend on several factors including fuel composition and consumption, boiler design and operation, as well as pollution control devices. It is understood that all previous tests and results commissioned by Baiada to date are well under the POEO (Clean Air) Regulation 2010, Group 6 emission standards for the three existing boilers. If required, any new boiler acquired for the new processing will also be natural gas-fired, sized similarly and with an equivalent emission performance specification.

It should be noted that emission factor for sulphur dioxide (**SO_2**) is dependent on the amount of sulphur in the fuel gases. For the proposed PPF, it is understood that the composition of the natural gas to be used by the boilers will contain negligible levels of sulphur and other contaminants that may affect efficient combustion performance and emissions discharge to air from the boiler stacks. This is supported by results of previous testing of the boilers completed in February 2016, shown in **Table 2.1**.

Table 2.1 – Boiler testing results: February 2016

Analyte	Boiler 1 Low fire	Boiler 1 High fire	Boiler 2 Low fire	Boiler 2 High fire	Boiler 3 Low Fire	Boiler 3 High fire
CO_2%	5.9	9.5	7.5	9.2	6.3	9.5
O_2	10.6	4.1	7.7	4.6	9.8	4.1
CO (ppm)	166	30	52	35	264	23
Temp (°C)	109	134	105	126	96	133
NO_x (ppm)	2	34	17	37	1	17

If secondary fuel such as biogas from the CAL (or an alternative energy source other than natural gas) is to be used, an on-site assessment will need to be conducted upon commissioning to validate the air emissions performance from the boiler stacks are complaint with under POEO (Clean Air) Regulation 2010, Group 6 emission standards. However, with regards to the large separation distances to nearest sensitive residences the boiler emissions are unlikely to cause adverse effects.

3 ODOUR SOURCES AND EMISSIONS INVENTORY

The odour emission rates (**OER**) used in the modelling scenarios are shown in the following sections. The odour concentration measurement reports upon which these OERs are derived can be provided upon request.

3.1 POINT SOURCES

The odour emission inventory for point sources was developed with a set of design parameters provided by Baiada and as outlined in **Table 3.1**.

Table 3.1 – Design parameters used for the calculation of OER

Parameter	Units	Value
LBR capacity	birds	90,000
Ventilation rate	m^3/h.bird	10
Total flow discharged from LBR	m^3/h	900,000
Roof vent discharge velocity	m/s	15
Processing room air exchange rate	/h	15
Line 1 Scaling and Defeathering Room	m^3	4,929
Line 2 Scaling and Defeathering Room	m^3	4,929
Line 1 Evisceration Room	m^3	3,738
Line 2 Evisceration Room	m^3	3,738
Line 1 Offal Processing Room	m^3	1,122
Line 2 Offal Processing Room	m^3	1,122
Line 1 Foot Processing Room	m^3	781
Line 2 Foot Processing Room	m^3	781
By-products Prep & Pack Room	m^3	1,080
Pet Food Prep & Pack Room	m^3	2,080
Primary Plant Room	m^3	1,128
Primary Waste Staging Room	m^3	768
Secondary Waste Staging Room	m^3	720
Crate Washroom	m^3	3,270
Live bird odour emissions factor	ou.m^3/s.bird	0.35
Hanwood PP vents mean measured odour concentration	ou	240
Biofilter surface area	m^2	160
Biofilter design flowrate	m^3/h	30,000
Biofilter surface area per cell	m^2	53
Biofilter design flowrate per cell	m^3/h	10,000
Biofilter discharge odour concentration	ou	500
PTB	m^3	10,062
PTB air exchange rate	/h	15

3.1.1 PRP Biofilters

The biofilter cells were modelled as individual low exit velocity, wide diameter and wake-affected point sources. The locations of the point sources representing the biofilter cells are shown in **Figure 3.1**. The point source release parameters and OERs are given in **Table 3.2**.

The treated odour level exiting the PRP biofilters is expected to range from a mean of 200 odour units (**ou**) upon commissioning to a concentration discharge mean of 500 ou to a maximum of 500 ou as the medium degrades. The PRP biofilters were modelled based upon the concentration discharge mean of 500 ou for biofilters with medium near its end-of-life.

3.1.2 Live Bird Reception Ventilation

The live bird reception (**LBR**) point sources were modelled using an odour emission factor of 0.35 ou.m^3/s.bird. This factor is based on TOU's odour emissions database, compiled over many years of measurement and confirmed again on 8 August 2018 from the Baiada Out St live bird storage area. The ventilation rate used was 900,000 m^3/h, based upon a design factor of 10 m^3/h per bird and a maximum capacity of 90,000 birds per hour. The actual numbers are likely to be lower and fluctuate as trucks arrive and birds are processed over time. Birds were assumed to be present between 1 am and 9 pm. Three million birds a week equates to approximately 21,500 birds per hour over 20 hours per day, 7 days per week. Therefore, a ventilation rate based upon a peak capacity of 90,000 birds is considered conservative and worst-case under normal operations. The locations of the point sources representing the LBR ventilation are shown in **Figure 3.1**. The point source release parameters and OERs are given in **Table 3.2**.

3.1.3 PPF ventilation

The PPF processing line roof vents were modelled using OER data collected by TOU on 16 November 2011 from Baiada's Hanwood poultry processing facility (Munro & Hayes, 2018). The ventilation rates were estimated by multiplying the volume of each process room by a nominal 15 air changes per hour. The discharge odour concentration used was the mean measured value of 220 ou based upon measurements from the Hanwood Processing Plant roof vents. For the modelling, each processing line was assumed to be under constant 24 hour per day operation. The locations of the point sources representing the PPF ventilation shown in **Figure 3.1**. The point source release parameters and OERs are given in **Table 3.2**.

3.1.4 PTB ventilation

The PTB ventilation point sources were modelled using OER data. TOU has assumed that the total OER discharged from the building is the same as that reported from the old PRP DAF building and reported in 2016 (Boddy, 2016).

3.2 AREA SOURCES

3.2.1 Wastewater Treatment Plants

The operational PRP WWTP area sources, except for the CAL, have been modelled using data collected from the Baiada Hanwood WWTP.

For the CAL, an OER was derived from TOU's database. In the absence of relevant data from a poultry processing plant, a maximum emission rate from an uncovered anaerobic pond servicing a red meat abattoir was used for this application. The red meat abattoir utilised a similar wastewater process with an SBR and settling ponds downstream of the uncovered anaerobic pond. The biogas capture rate from the proposed CALs was assumed to be 99.9%.

The proposed phasing of the SBR cycles was modelled under the assumption that filling during night-time hours should be avoided. However, this practice can be reassessed following commissioning of the proposed PPF with the OMP updated to reflect the revised operating protocol. As a worst-case scenario, the SBR was set at the fill emission rate for day-time hours between 8 am and 5 pm with the aeration and settling emission rates set overnight. It is understood in practice that the fill phase should only take approximately one hour, followed by the aeration and settling phases.

The proposed PPF WWTP area sources, except for the balance tank has been modelled under a conservative assumption that SOERs through the treatment train would be similar to what was from the Baiada Hanwood SBR-based WWTP system. This is despite the advanced MBR technology that is proposed to be deployed that will most likely result in lower odour emissions.

For the balance tank, TOU has assumed that the SOER is the same as that reported from the old PRP WWTP measured and reported in 2016 (Boddy, 2016).

The locations of the point sources representing the PRP and PPF WWTP odour sources are shown in **Figure 3.2**. The area source OERs are shown in **Table 3.3**.

3.3 VOLUME SOURCES

3.3.1 Protein Recovery Plant

Fugitive odour emissions from the PRP have been calculated from actual measurements collected from the PRP building by TOU on 8 August 2018. It has been estimated that there were approximately three air changes per hour of room air ventilation occurring at the time of measurement.

Five volume sources were input into the model to represent each major section of the structure with OERs proportionally assigned by the estimated volume of each section. The volume source settings within the model have considered that fugitive process emissions are released at a high level via vents that are either naturally or mechanically aided by roof fans. The theoretical maximum production rates have been used for 24 hours, 7 days per week. The locations of the volume sources representing the PRP fugitive emissions are shown in **Figure 3.1**. The volume source release parameters are available in **Table 3.4**.

The relatively low OER values for the Low-Temperature and High-Temperature Processing and Storage areas reflect the excellent odour capture experienced during the August 2018 testing, arising from the fully enclosed nature of the rendering processes. Consistent with measurement and observations made by TOU at the PRP, the raw material loading bay OER was estimated by multiplying the mean measured odour concentration from the Low-Temperature and High-Temperature Processing and Storage areas by a ventilation rate of three air changes per hour.

Figure 3.1 – Point and volume source locations

Figure 3.2 – Area source locations

Table 3.2 – Point source odour emissions inventory

Description	Source ID	UTM east (km)	UTM north (km)	Height (m)	Elevation (m)	Diameter (m)	Velocity (m/s)	Temperature (K)	Flowrate (m^3/h)	OER (ou.m^3/s)	OER P/M60 (2.3) (ou.m^3/s)
Live Bird Reception Roof Vent 1	LB01	293.8332	6561.1371	13.0	388.0	2.06	15.0	293.15	180,000	6,300	14,490
Live Bird Reception Roof Vent 2	LB02	293.8213	6561.1249	13.0	388.0	2.06	15.0	293.15	180,000	6,300	14,490
Live Bird Reception Roof Vent 3	LB03	293.8090	6561.1118	13.0	388.0	2.06	15.0	293.15	180,000	6,300	14,490
Live Bird Reception Roof Vent 4	LB04	293.7831	6561.0935	13.0	388.0	2.06	15.0	293.15	180,000	6,300	14,490
Live Bird Reception Roof Vent 5	LB05	293.7666	6561.0759	13.0	388.0	2.06	15.0	293.15	180,000	6,300	14,490
Scalding and Defeather Roof Vent 1	DF01	293.8466	6561.1074	13.0	388.0	0.93	15.0	293.15	36,968	2,465	5,668
Scalding and Defeather Roof Vent 2	DF02	293.8249	6561.0866	13.0	388.0	0.93	15.0	293.15	36,968	2,465	5,668
Scalding and Defeather Roof Vent 3	DF03	293.8058	6561.0685	13.0	388.0	0.93	15.0	293.15	36,968	2,465	5,668
Scalding and Defeather Roof Vent 4	DF04	293.7845	6561.0476	13.0	388.0	0.93	15.0	293.15	36,968	2,465	5,668
Evisceration Roof Vent 1	EV01	293.8236	6561.0378	13.0	388.0	1.15	15.0	293.15	56,070	3,738	8,597
Evisceration Roof Vent 2	EV02	293.8074	6561.0189	13.0	388.0	1.15	15.0	293.15	56,070	3,738	8,597
Offal Processing Roof Vent 1	OF01	293.8455	6561.0141	13.0	388.0	0.63	15.0	293.15	16,830	1,122	2,581
Offal Processing Roof Vent 2	OF02	293.8301	6560.9976	13.0	388.0	0.63	15.0	293.15	16,830	1,122	2,581
Foot Processing Roof Vent 1	FT01	293.8414	6561.0096	13.0	388.0	0.53	15.0	293.15	11,715	781	1,796
Foot Processing Roof Vent 2	FT02	293.8363	6561.0038	13.0	388.0	0.53	15.0	293.15	11,715	781	1,796
By-products Roof Vent 1	BP01	293.8615	6561.0279	13.0	388.0	0.62	15.0	293.15	16,200	1,080	2,484
Pet Food Roof Vent 1	PF01	293.8816	6561.0054	13.0	388.0	0.86	15.0	293.15	31,200	2,080	4,784
Primary Plant Roof Vent 1	PP01	293.8324	6561.0580	13.0	388.0	0.63	15.0	293.15	16,920	1,128	2,594
Primary Waste Staging Roof Vent 1	PW01	293.8403	6561.0487	13.0	388.0	0.52	15.0	293.15	11,520	768	1,766
Secondary Waste Staging Roof Vent 1	SW01	293.8949	6560.9846	13.0	388.0	0.50	15.0	293.15	10,800	720	1,656
Crate Wash Roof Vent 1	CR01	293.9677	6560.8752	13.0	388.0	0.76	15.0	293.15	24,525	1,635	3,761
Crate Wash Roof Vent 2	CR02	293.9546	6560.8624	13.0	388.0	0.76	15.0	293.15	24,525	1,635	3,761
HTR Biofilter Cell 1	BF1C1	293.9443	6561.1196	2.0	385.0	8.24	0.052	313.15	10,000	1,389	3,194
HTR Biofilter Cell 2	BF1C2	293.9372	6561.1254	2.0	385.0	8.24	0.052	313.15	10,000	1,389	3,194
HTR Biofilter Cell 3	BF1C3	293.9322	6561.1313	2.0	385.0	8.24	0.052	313.15	10,000	1,389	3,194
LTR Biofilter Cell 1	BF2C1	293.9752	6561.0864	2.0	385.0	8.24	0.052	313.15	10,000	1,389	3,194
LTR Biofilter Cell 2	BF2C2	293.9802	6561.0805	2.0	385.0	8.24	0.052	313.15	10,000	1,389	3,194
LTR Biofilter Cell 3	BF2C3	293.9852	6561.0756	2.0	385.0	8.24	0.052	313.15	10,000	1,389	3,194
Primary Building (Screen Section)	SCR	294.1772	6561.0418	6.0	384.3	1.09	15.0	273.15	50,310	2,960	6,808
Primary Building (DAF Section)	DAF	294.1808	6561.0639	6.0	384.3	1.09	15.0	273.15	50,310	2,970	6,831
Primary Building (Sludge Section)	SLG	294.1844	6561.0860	6.0	384.3	1.09	15.0	273.15	50,310	2,960	6,808

Table 3.3 – Area source odour emissions inventory

Description	Source ID	Elevation (m)	Area (m^2)	UTM east (km)	UTM north (km)	SOER (ou.m^3/m^2.s)	SOER P/M60 (2.3) (ou.m^3/m^2.s)	SOER P/M60 (1.9) (ou.m^3/m^2.s)	OER (ou.m^3/s)	OER P/M60 (2.3) (ou.m^3/s)	OER P/M60 (1.9) (ou.m^3/s)
Clear Well #1	CW1	380.8	2,167	294.0274 294.0624 294.0324 293.9964	6561.586 6561.544 6561.519 6561.56	0.141	0.324	0.268	306	703	581
Covered Anaerobic Lagoon	CAL1	385	8,242	294.0162 294.1141 294.0723 293.9744	6561.275 6561.174 6561.133 6561.234	0.0518	0.119	0.098	427	982	811
Clear Well #2	CW2	380.8	2,167	293.9868 294.0218 293.9918 293.9558	6561.554 6561.512 6561.487 6561.528	0.141	0.324	0.268	306	703	581
Sequential Batch Reactor (Fill)	SBR1	380.8	2,167	294.0657 294.1007 294.0707 294.0347	6561.62 6561.578 6561.553 6561.594	3.89	8.95	7.39	8,430	19,388	16,016
Sequential Batch Reactor (Start cycle)	SBR1	380.8	2,167	294.0657 294.1007 294.0707 294.0347	6561.62 6561.578 6561.553 6561.594	0.224	0.52	0.43	485	1,116	922
Sequential Batch Reactor (Mid cycle)	SBR1	380.8	2,167	294.0657 294.1007 294.0707 294.0347	6561.62 6561.578 6561.553 6561.594	0.082	0.19	0.16	178	409	338
Sequential Batch Reactor (End cycle)	SBR1	380.8	2,167	294.0657 294.1007 294.0707 294.0347	6561.62 6561.578 6561.553 6561.594	0.03	0.069	0.057	65	150	124
Sequential Batch Reactor (Settling/Decant)	SBR1	380.8	2,167	294.0657 294.1007 294.0707 294.0347	6561.62 6561.578 6561.553 6561.594	0.018	0.041	0.034	39	90	74
Balance Tank	BAL1	384.3	416	294.1366 294.157 294.157 294.1366	6561.05 6561.05 6561.03 6561.03	0.3	0.69	0.57	125	287	237
Pre-anoxic Tank #1	PRAX1	384.3	213	294.1464 294.161 294.161 294.1464	6561.071 6561.071 6561.056 6561.056	0.224	0.515	0.426	48	110	91

Table 3.3 (continued) – Area source odour emissions inventory

Description	Source ID	Elevation (m)	Area (m^2)	UTM east (km)	UTM north (km)	SOER ($ou.m^3/m^2.s$)	SOER P/M60 (2.3) ($ou.m^3/m^2.s$)	SOER P/M60 (1.9) ($ou.m^3/m^2.s$)	OER ($ou.m^3/s$)	OER P/M60 (2.3) ($ou.m^3/s$)	OER P/M60 (1.9) ($ou.m^3/s$)
Pre-anoxic Tank #2	PRAX2	384.3	213	294.1083	6561.049	0.224	0.515	0.426	48	110	91
				294.1229	6561.049						
				294.1229	6561.035						
				294.1083	6561.035						
Aerobic Tank #1	AER1	384.3	676	294.1394	6561.103	0.082	0.189	0.156	55	127	105
				294.1654	6561.103						
				294.1654	6561.077						
				294.1394	6561.077						
Aerobic Tank #2	AER2	384.3	676	294.1128	6561.08	0.082	0.189	0.156	55	127	105
				294.1388	6561.08						
				294.1388	6561.054						
				294.1128	6561.054						
Post-anoxic Tank #1	POAX1	384.3	161	294.1425	6561.124	0.03	0.069	0.057	5	11	9
				294.1552	6561.124						
				294.1552	6561.111						
				294.1425	6561.111						
Post-anoxic Tank #2	POAX2	384.3	161	294.1216	6561.127	0.03	0.069	0.057	5	11	
				294.1343	6561.127						
				294.1343	6561.115						
				294.1216	6561.115						
Membrane Bioreactor #1	MBR1	384.3	210	294.1603	6561.128	0.018	0.0414	0.0342	4	9	7
				294.1706	6561.126						
				294.1674	6561.107						
				294.157	6561.108						
Membrane Bioreactor #2	MBR2	384.3	210	294.1211	6561.107	0.018	0.0414	0.0342	4	9	7
				294.1314	6561.106						
				294.1282	6561.086						
				294.1178	6561.088						

Table 3.4 – Volume source odour emissions inventory

Description	Source ID	UTM east (km)	UTM north (km)	Height (m)	Elevation (m)	Sigma Y (m)	Sigma Z (m)	OER ($ou.m^3/s$)	OER P/M60 (2.3) ($ou.m^3/s$)
HTR Storage	HST	293.905	6561.11	6.4	385	12.06	5.95	84	193
HTR Processing	HPR	293.922	6561.1	6.4	385	12.06	5.95	390	897
LTR Processing	LPR	293.96	6561.06	6.4	385	12.06	5.95	540	1,242
LTR Storage	LST	293.976	6561.04	6.4	385	12.06	5.95	100	230
Loading Bay	LOAD	293.959	6561.1	7.2	385	12.06	6.7	334	769
Primary Building (Screen Section)	SCR	294.177	6561.04	3	384.3	10.37	2.79	2,960	6,808
Primary Building (DAF Section)	DAF	294.181	6561.06	3	384.3	10.37	2.79	2,970	6,831
Primary Building (Sludge Section)	SLG	294.184	6561.09	3	384.3	10.37	2.79	2,960	6,808

3.4 CUMULATIVE ODOUR EFFECTS

The cumulative odour effects from the proposed PPF have been assessed by combining all Oakburn odour sources into a single grouped impact and separately grouped by origin, namely: PRP, PPF and WWTP (i.e. inclusive of the AWTP). In TOU's experience, multiple odour plumes of distinctly different odour characters do not combine in the atmosphere and tend to be observed as individually identifiable odour characters in the field, even well downwind of the sources. Furthermore, treated odour emissions from an effective biofilter remove almost all process odour, having an 'earthy, musty' odour character. Moreover, in TOU's opinion, odour impacts from biofilters and other proven odour control systems should be modelled as a non-cumulative impact (or completely removed from the dispersion modelling process).

The cumulative odour effects from the proposed PPF with three poultry farms located to the northwest have been considered in the form of a sensitivity analysis. This is in response to comments received from NSW EPA during the notification phase of the proposed PPF development.

3.4.1 Bowlers Lane Poultry Farms

There are three poultry farms located along Bowlers Lane to the northwest of the proposed PPF development, as indicated in **Figure 2.1**. Each farm comprises of eight tunnel-ventilated, climate-controlled, metal structure sheds with side curtains. The key farm operational parameters are given in **Table 3.5**. The hourly varying odour emissions from the farms were estimated with the use of the 'K-factor' poultry farm odour emissions model (Ormerod & Holmes, 2005) based upon:

- Bird population;
- Stocking density as a function of the bird population, age and shed size;
- Ventilation rate as a function of bird age and ambient temperature; and
- Farm operational parameters.

Table 3.5 – Operational parameters of Bowlers Lane poultry farms			
Parameter	**BOWLERS 1**	**BOWLERS 2**	**BOWLERS 3**
No batches litter used	1	1	1
Drinking system	Nipple	Nipple	Nipple
Automated shed environmental control with alarm	Yes	Yes	Yes
Inspect and replace wet litter daily	Yes	Yes	Yes
Max shed WS > 2.5m/s	No	No	No
Externally accredited management system	Yes	Yes	Yes
Litter type	Shavings	Shavings	Shavings
Floor-type	Earth	Earth	Earth
Foggers installed	No	No	No
Sheds dimensions	Sheds 1,2,3 & 8: 105 m long, 14 m wide, 3m high, 4.8 apex. Sheds 4,5,6 & 7: 107 m long, 12.6 m wide, 3 m high, 3.8 m apex	100 m long, 13.85 m wide, 2.8 high. 4.5 m apex	110 m long, 13.5 m wide, 2.1 m high, 4.2 apex
Specifications of fans	4 Tunnel Fans / Shed (Running at ~22,000 CFM)	8 Tunnel Fans / Shed (Running at ~22,000 CFM)	6 Tunnel Fans / Shed (Running at ~27,000 CFM)
Number of birds placed per batch	171,000 birds	220,000 birds	220,000 birds
Typical annual batch cycle regime	52 days cycle with 8-10 days farm empty	52 days cycle with 8-10 days farm empty	52 days cycle with 8-10 days farm empty
Thin-out/ pick up regime	3 thin outs then empty days 31, 38, 44-49	3 thin outs then empty days 31, 38, 44-49	3 thin outs then empty days 31, 38, 44-49

3.4.2 Odour Emissions Estimation

Standardised hourly varying OERs were predicted by use of the following equation:

$$OERs = 0.025\, K\, V^{0.5} \qquad \textbf{Equation 3.1}$$

where:

OER_S = standardised OER (ou.m³/s) per unit shed area (m²) per unit of bird density (in kg/m²);

V = ventilation rate (m^3/s); and

K = scaling factor between 1 and 5.

Based upon the operational parameters of the farms in **Table 3.5**, a scaling factor of 2 was selected plus an additional 10% (i.e. K = 2.2) to account for inherent uncertainties in the odour emission model predictions (PAEHolmes, 2011).

The hourly varying ventilation rates were estimated by *Fan Activity Prediction Model 2* with *Farm C* coefficients and Cobb500 chicken breed described in the Rural Industries Research and Development Corporation (**RIRDC**) report: *Monitoring mechanical ventilation rates in poultry buildings* (Dunlop & Duperouzel, 2014).

To complete the process, the standardised OER is multiplied by the shed live bird weight to produce a shed OER for every hour of the batch cycle. The performance objectives supplied by Baiada for the Cobb500 breed of chicken that is grown at the farms are shown in **Figure 3.3**. These were used to estimate the total shed live bird weight based on operational parameters described in **Table 3.5**. For conservatism, TOU has assumed that the batch cycle for each shed begins on the same day.

The locations of the points sources representing the tunnel fan discharges for each shed are shown in **Figure 3.1**. The point source release parameters are available in **Table 3.6**. Each point source was placed approximately 30 meters downstream of the tunnel fans, the diameter was set to represent the vertical cross-sectional area of each shed discharge end, and vertical momentum was set to zero to represent the horizontal discharge from the end of the sheds.

An example of hourly varying shed OER over the course of 2017 has been shown below in **Figure 3.5**. This shows the OER variation based on day-to-day conditions, bird age, thin-outs, clean-outs and between batches across different seasons of the year.

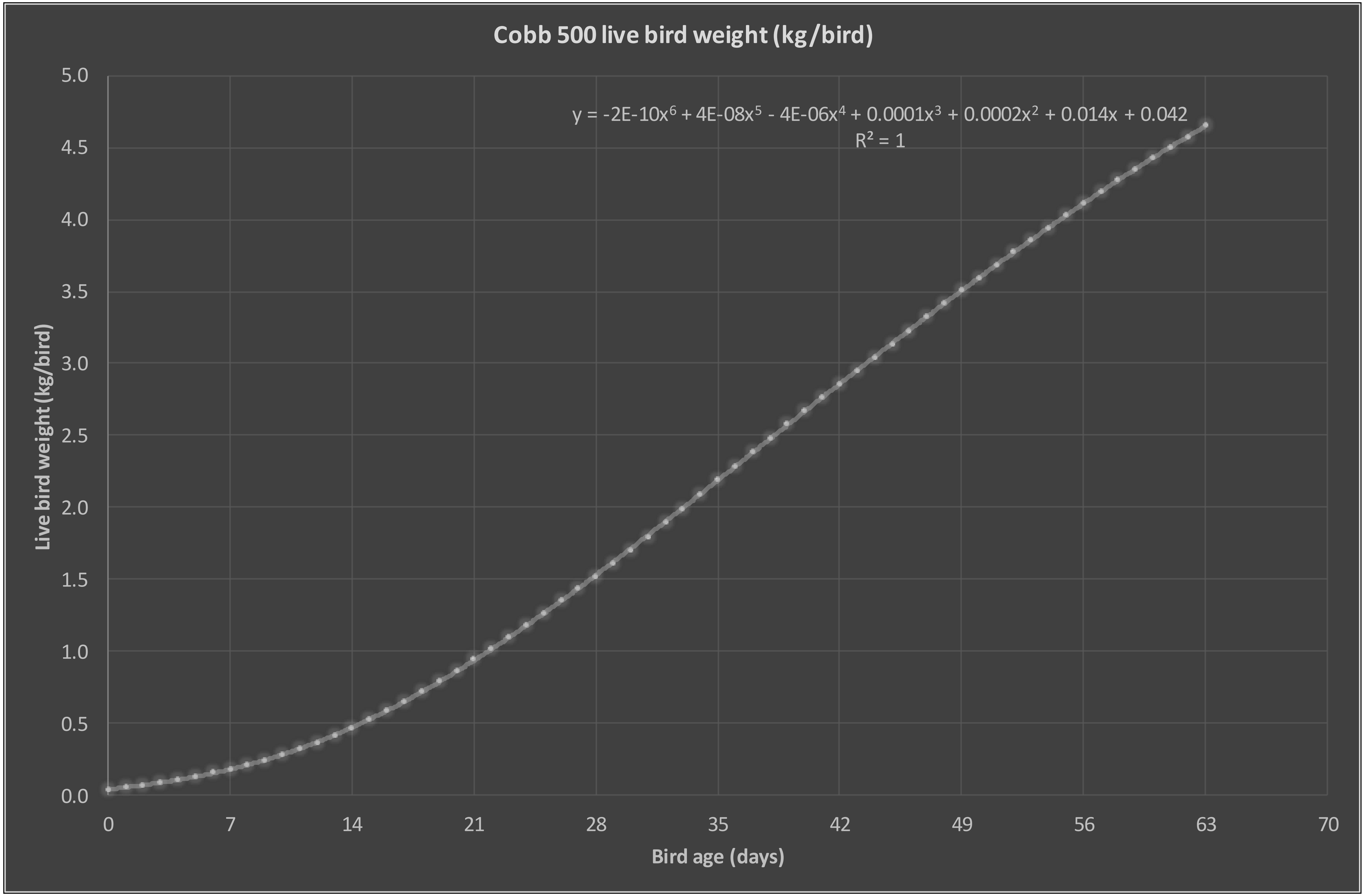


Figure 3.3 – Cobb 500 live bird weight performance objective (Source: supplied)

Figure 3.4 – Bowlers Lane poultry farms point source locations

Table 3.6 – Bowlers Lane poultry farm point source release parameters

Description	Source ID	UTM east (km)	UTM north (km)	Height (m)	Elevation (m)	Diameter (m)
Bowlers Lane 1 Shed 1	F1S1	294.7517	6563.42	1	379	8.20
Bowlers Lane 1 Shed 2	F1S2	294.7145	6563.384	1	377.8	8.20
Bowlers Lane 1 Shed 3	F1S3	294.6755	6563.348	1	377.8	8.20
Bowlers Lane 1 Shed 4	F1S4	294.6329	6563.314	1	382.1	7.89
Bowlers Lane 1 Shed 5	F1S5	294.5943	6563.277	1	382.1	7.89
Bowlers Lane 1 Shed 6	F1S6	294.5453	6563.229	1	382.1	7.89
Bowlers Lane 1 Shed 7	F1S7	294.5063	6563.193	1	381.5	7.89
Bowlers Lane 1 Shed 8	F1S8	294.4728	6563.159	1	384.1	8.20
Bowlers Lane 2 Shed 1	F2S1	293.9604	6562.57	1	394.8	7.93
Bowlers Lane 2 Shed 2	F2S2	293.9577	6562.604	1	394.8	7.93
Bowlers Lane 2 Shed 3	F2S3	293.9567	6562.638	1	394.9	7.93
Bowlers Lane 2 Shed 4	F2S4	293.9547	6562.67	1	394.9	7.93
Bowlers Lane 2 Shed 5	F2S5	293.6332	6562.553	1	397.3	7.93
Bowlers Lane 2 Shed 6	F2S6	293.6322	6562.586	1	397.3	7.93
Bowlers Lane 2 Shed 7	F2S7	293.6322	6562.619	1	393	7.93
Bowlers Lane 2 Shed 8	F2S8	293.6307	6562.653	1	393	7.93
Bowlers Lane 3 Shed 1	F3S1	293.3382	6562.038	1	397.8	7.93
Bowlers Lane 3 Shed 2	F3S2	293.3355	6562.071	1	397.8	7.93
Bowlers Lane 3 Shed 3	F3S3	293.3345	6562.105	1	397.8	7.93
Bowlers Lane 3 Shed 4	F3S4	293.3318	6562.138	1	397.8	7.93
Bowlers Lane 3 Shed 5	F3S5	292.9815	6562.019	1	392.7	7.93
Bowlers Lane 3 Shed 6	F3S6	292.9799	6562.053	1	392.7	7.93
Bowlers Lane 3 Shed 7	F3S7	292.9783	6562.087	1	392.7	7.93
Bowlers Lane 3 Shed 8	F3S8	292.9762	6562.121	1	392.7	7.93

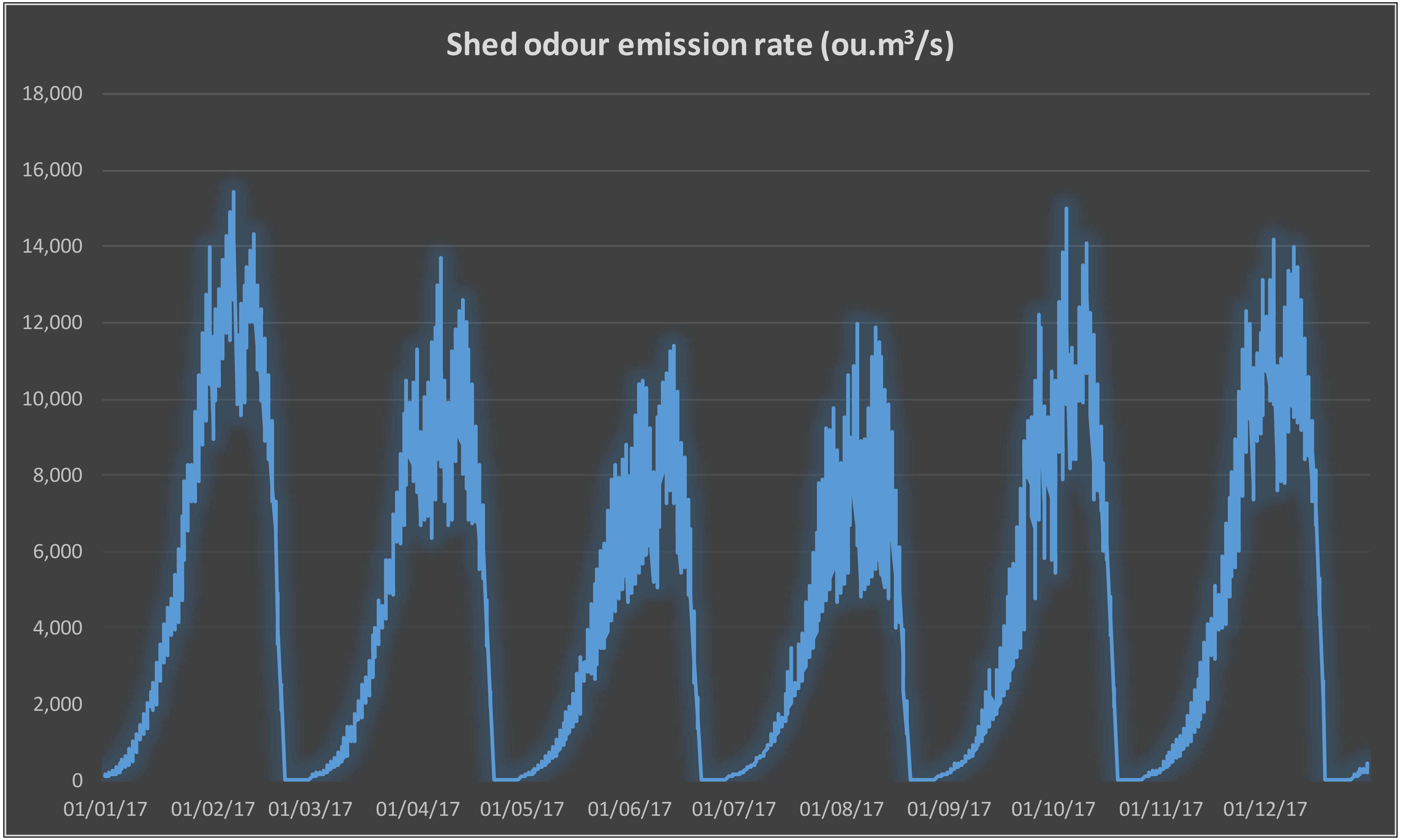


Figure 3.5 – Example of hourly varying shed OER for 2017

4 ODOUR DISPERSION MODELLING APPROACH

4.1 NSW ODOUR CRITERIA AND DISPERSION MODEL GUIDELINES

The applicable guidelines for the OIA report conducted for the proposed PPF operations include:

- NSW EPA, 2016, *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (Environment Protection Authority, 2017);
- NSW EPA, 2006, *Technical framework (and notes): assessment and management of odour from stationary sources in NSW* (Environment Protection Authority, 2006a & b); and
- Barclay and Scire, 2011, Generic Guidance and Optimum Model Settings for the CALPUFF Modeling System for Inclusion into the 'Approved Methods for the Modeling and Assessments of Air Pollutants in NSW, Australia' (Barclay & Scire, 2011)

The documents specify that the odour modelling for Level 3 impact assessments upon which this study has been conducted be based on the use of:

- 99.0th percentile dispersion model predictions;
- 1-hour averaging times with built-in peak-to-mean ratios to adjust the averaging time to a 1-second nose-response-time;
- The peak-to-mean ratios in the far-field for wake-affected point sources is 2.3;
- The peak-to-mean ratios in the far-field for volume sources is 2.3;
- The peak-to-mean ratios in the far-field for area sources is 2.3 for stability classes A to D and 1.9 for stability classes E and F; and
- The appropriate odour unit performance criterion based on the population of the affected community in the vicinity of the development.

The impact assessment criteria (**IAC**) for complex mixtures of odours are designed to include receptors with a range of sensitivities. Therefore, a statistical approach is used to determine the acceptable ground level concentration of odour at the nearest sensitive receptor. This criterion is determined by the following equation outlined on page 35 of NSW EPA Modelling Methods (Environment Protection Authority, 2017):

$$IAC = \frac{log_{10}(p) - 4.5}{-0.6}$$ **Equation 4.1**

where:

IAC **=** Impact Assessment Criterion (ou); and p = population.

Based on **Equation 4.1**, **Table 4.1** outlines the odour performance criteria for six different affected population density categories and is reproduced from NSW EPA Modelling Methods (Environment Protection Authority, 2017). It states that higher odour concentrations are permitted in lower population density applications.

Table 4.1 – Impact assessment criteria for complex mixtures of odorous air pollutants (nose response-time average, 99th percentile)

Population of affected community	Impact assessment criteria for complex mixtures of odorous air pollutants (OU)
Urban Area (≥ ~2000) and/or schools or hospitals	2.0
~500	3.0
~125	4.0
~30	5.0
~10	6.0
Single rural residence (≤ ~2)	7.0

Source: *Table 7.5* of the NSW EPA 2016 Methods

It is understood that there are up to 11 sensitive residences present along Wallamore Road, based upon Census 2016 (SA2) household size of 2.7 this equates to an approximate population of 30. Therefore, the preliminary IAC adopted for this odour impact assessment study is **5.0 ou** and is consistent with a long-standing criterion that has been successfully applied for the Westdale region. This will be discussed further from the population predicted to be affected by the results of the modelling.

4.2 DISPERSION MODELLING

4.2.1 The Odour Dispersion Model

The odour dispersion modelling assessment was carried out using the CALPUFF Modelling System. The main system programs used were:

- CALPUFF - Version 7.2.1 (Level 150618);
- CALMET - Version 6.5.0 (Level 150223); and
- CALPOST - Version 7.1.0 (Level 141010).

CALPUFF is a multi-layer, multi-species, non-steady-state puff dispersion model that can simulate the effects of time- and space-varying meteorological conditions on pollutant transport (Environment Protection Authority, 2017). CALMET is a meteorological model that produces three-dimensional gridded wind and temperature fields to be fed into CALPUFF. The primary output from CALPUFF is hourly pollutant concentrations evaluated at gridded and/or discrete receptor locations. CALPOST processes the hourly pollutant concentration output to produce tables at each receptor and contour plots across the modelling domain. The result is a summary of pollutant concentrations at various time averages and percentiles or a tally of hours where a pollutant has exceeded a pre-determined concentration. For further technical information about the CALPUFF modelling system refer to the document *CALPUFF Modeling System Version 6 User Instructions* (Atmospheric Studies Group, 2011).

The CALPUFF system can account for a variety of effects such as non-steady-state meteorological conditions, complex terrain, varying land uses, plume fumigation and low wind speed dispersion (Environment Protection Authority, 2017). CALPUFF is considered an appropriate dispersion model for air impact assessments, as outlined in the NSW EPA modelling methods, in one or more of the following applications:

- complex terrain, non-steady-state conditions,
- buoyant line plumes,
- coastal effects such as fumigation,
- high frequency of stable calm night-time conditions,
- high frequency of calm conditions, and
- inversion break-up fumigation conditions.

In the case of this assessment, CALPUFF was required in order to handle the moderate complexity of terrain surrounding Oakburn PRP. The terrain may induce deflection or channelling of odour plumes. Also, the high incidence of calm and very light winds (modelled 40.2% annual frequency < 2.0 m/s) and very stable night-time conditions (modelled 35.9% modelled F-class) were likely to induce non-steady-state conditions such as accumulation of odour and/or downslope movement with drainage airflow.

For the OIA for the proposed PPF, the air contaminant was **odour** and ground-level concentrations in ou have been projected.

4.2.2 Geophysical and Meteorological Configuration

A CALMET hybrid three-dimensional meteorological data file for Oakburn PRP was produced that incorporated gridded numerical meteorological data supplemented with surface observation data, topography and land use over the domain area.

4.2.3 Terrain Configuration

Terrain elevations were sourced from 1 Second Shuttle Radar Topography Mission (**SRTM**) Derived Smoothed Digital Elevation Model (DEM-S). The SRTM data has been treated with several processes including but not limited to removal of stripes, void filling, tree offset removal and adaptive smoothing (Gallant, et al., 2011). The DEM-S was used as input into TERREL processor to produce a 30 km by 30 km grid at 0.20 km resolution. A map of the terrain, including site and the meteorological station is shown in **Figure 4.1**.

4.2.4 Land Use Configuration

Land use was sourced from the United States Geological Survey (**USGS**) Global Land Cover Characteristics Data Base for the Australia-Pacific Region (United States

Geological Survey, 1997). The data was used as input into CTGPROC processor to produce a 30 km by 30 km grid at 0.20 km resolution. A map of the land, including the Oakburn site and the meteorological station, is shown in **Figure 4.2**.

4.2.5 Geophysical Configuration

The geophysical data file was created using the MAKEGEO processor. Land use data from CTGPROC and terrain data from TERREL was used as input to produce a 30 km by 30 km geophysical grid at 0.20 km resolution.

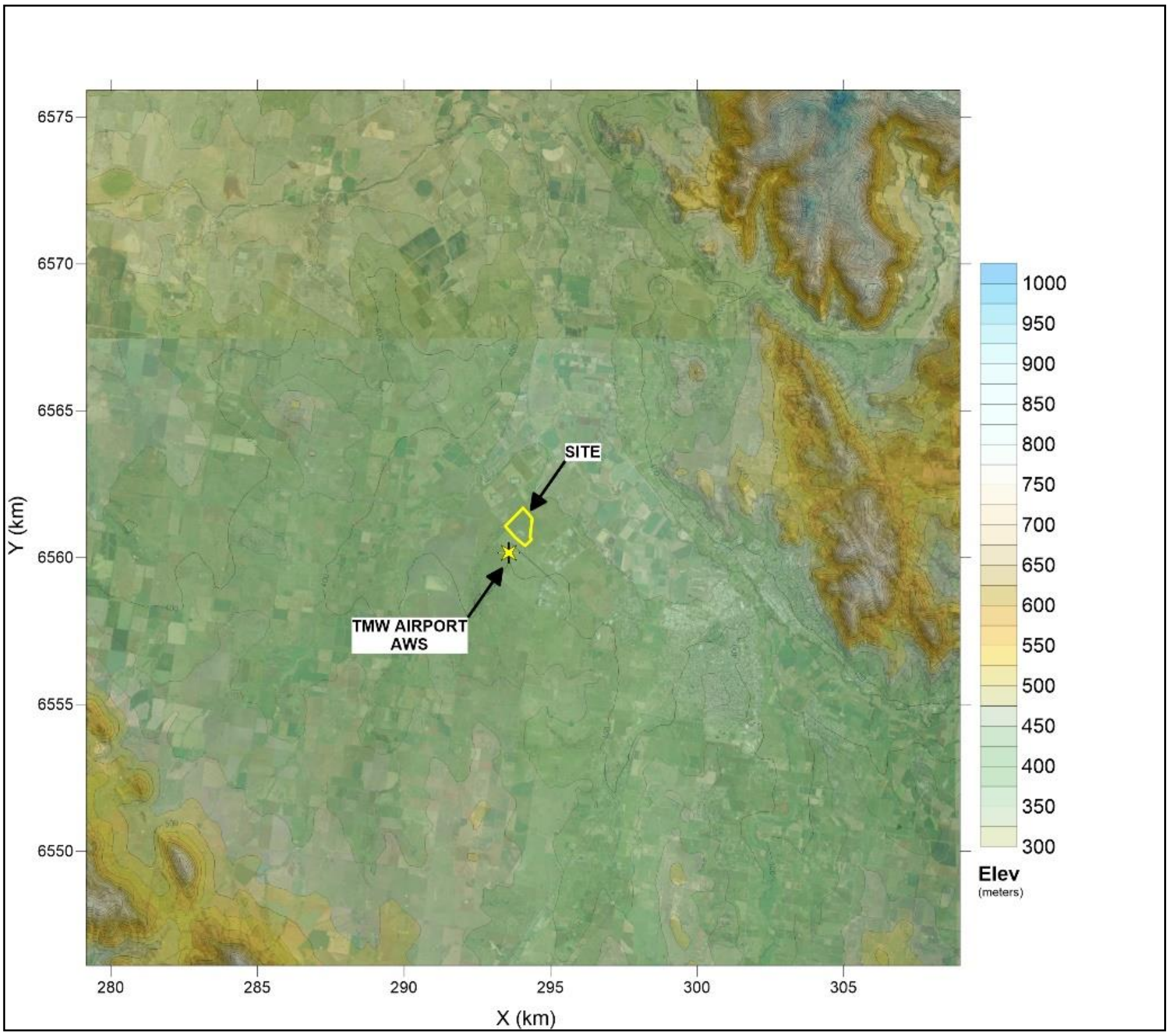


Figure 4.1 – Terrain dataset of Oakburn PRP and surrounds

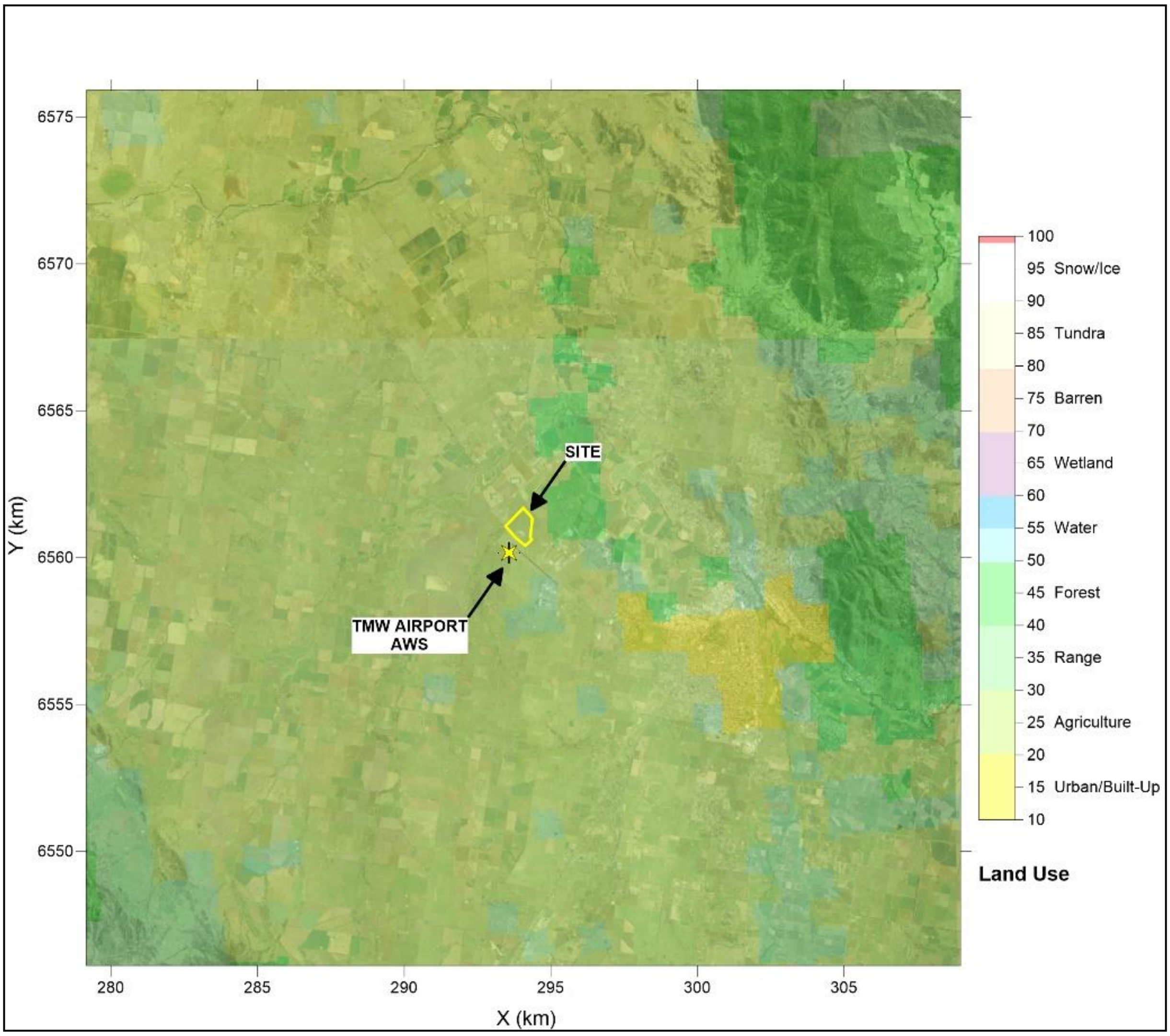


Figure 4.2 – Land use dataset of Oakburn PRP and surrounds

4.2.6 Meteorological Input Data

One-hour average observed meteorological surface data for 2017 was sourced from Tamworth Airport AWS (**YSTW**) maintained by the Bureau of Meteorology (**BOM**). The BOM data was formatted into a generic format and was processed with SMERGE to produce a surface meteorological data file. A small number of single hour gap-fills were carried out by interpolation.

Numerical meteorological data was produced as a 3D data tile from The Air Pollution Model (v4.0.5) and processed it with CALTAPM (v7.0.0) into a suitable format. TAPM was run using multiple nested grids—at least three nests and 35 vertical levels. The nested grid resolutions were close to a ratio of three as possible. The innermost nest was 33 km by 33 km at 1 km resolution.

4.2.7 Meteorological Model Configuration

CALMET was run with the hybrid option that uses geophysical data, surface station data and upper-air data. The data was used to initialise the diagnostic functions of the CALMET module to produce a full 3D meteorology data for input into CALPUFF. **Table 4.2** shows the key variables selected.

Table 4.2 – CALMET key variable fields

Grid Configuration (WGS-84 UTM Zone 56S)		
150		**NX Cells**
150		**NY Cells**
0.20		**Cell Size (km)**
279.073	6546.008	**SW Corner (km)**
11		**Vertical Layers**

ZFACE (m)	0	20	40	80	160	320	640	1000	1500	2000	2500	3000
LAYER	1	2	3	4	5	6	7	8	9	10	11	
MID-PT (m)	10	30	60	120	240	480	820	1250	1750	2250	2750	

Critical Wind Field Settings

Value	Found	Typical	Values
TERRAD	2	None	Terrain scale (km) for terrain effects
IEXTRP	-4	4, -4	Similarity extrap. of wind (-4 ignore upper stn sfc)
ICALM	0	0	Do Not extrapolate calm winds
RMAX1	6	None	MAX radius of influence over land in layer 1 (km)
RMAX2	7	None	MAX radius of influence over land aloft (km)
R1	0.1	None	Distance (km) where OBS wt = IGF wt in layer 1
R2	0.1	None	Distance (km) where OBS wt = IGF wt aloft

4.2.8 Meteorological Data Analysis

Observed 2017 BOM surface data was compared with longer-term climate (2013 – 2017) from YSTW to gauge how representative and suitable the year is for air quality dispersion modelling. The annual wind roses (**Figure 4.3** and **Figure 4.4**) show very good agreement. The reported annual frequency of calms (< 0.5 m/s) was at 3.5% and 3.2% respectively and very light winds (0.5 – 2 m/s) occurred 22.1% and 22.8% of the time – a total frequency of 25.6% and 26.0% respectively.

The modelled meteorological surface data (**Figure 4.5**) was extracted from the nearest grid point to the YSTW location for comparison with the observed readings. The annual wind roses show acceptable correlations except for overprediction of winds from the south-south-easterly direction (20.6% compared with 15.6% recent climate) and underpredicted south-easterly direction (9.1% versus 15.5%). There was an overprediction of modelled annual frequency of calms at 4.4% and very light winds at 35.8% - a total of 40.2% (over predicted by 11 percentage points). This would have a conservative effect on the modelling, that is a positive bias towards the extent and magnitude of odour concentration projections, especially north-north-westwards from Oakburn PRP.

The monthly average (**Figure 4.6**) show that January and February were warmer in 2017 than usual, and April, July and November were cooler than the longer-term climate. The diurnal temperature (**Figure 4.7**) profile showed good agreement, but there are slightly warmer daytime temperatures indicated for 2017 than the longer-term climate. Diurnal mixing heights and stability class frequencies are shown in **Figure 4.8** and **Figure 4.9,** respectively. Poor for odour dispersion is stable calm night-time conditions, represented within the F-class, occurring 35.9% of the hours during 2017.

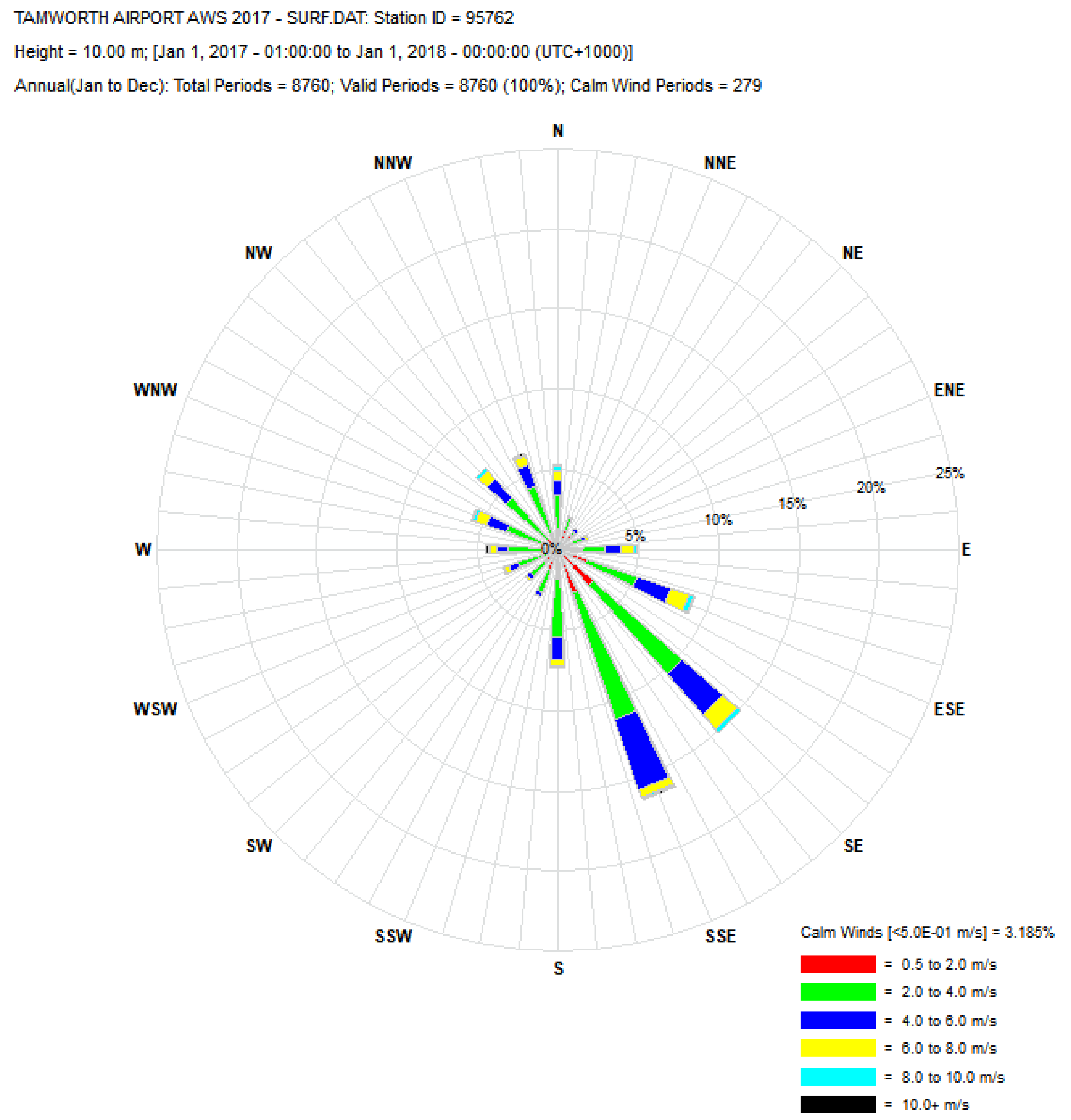


Figure 4.3 – Annual wind rose for YSTW 2017

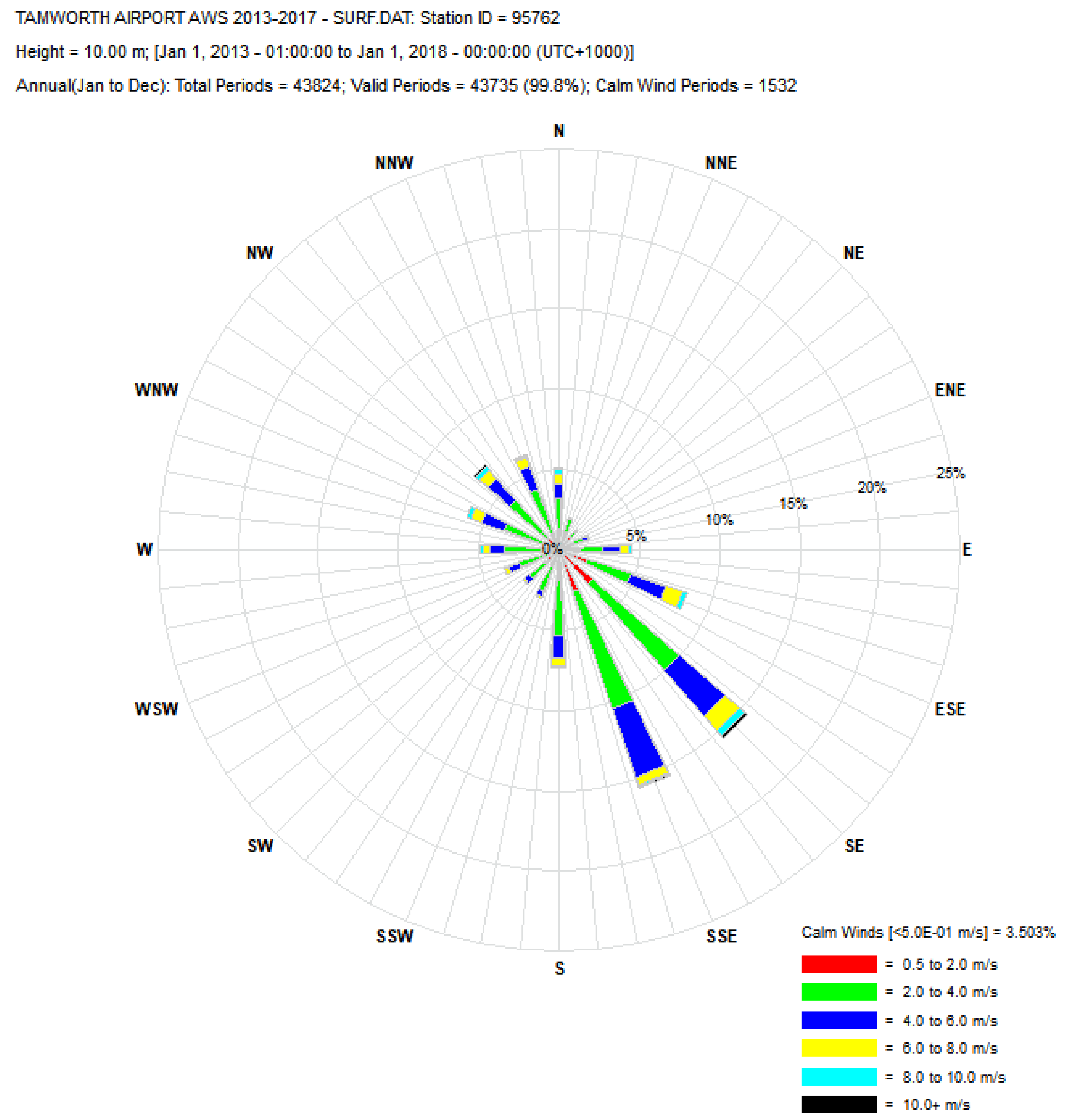


Figure 4.4 – Annual wind rose for YSTW 2013-2017

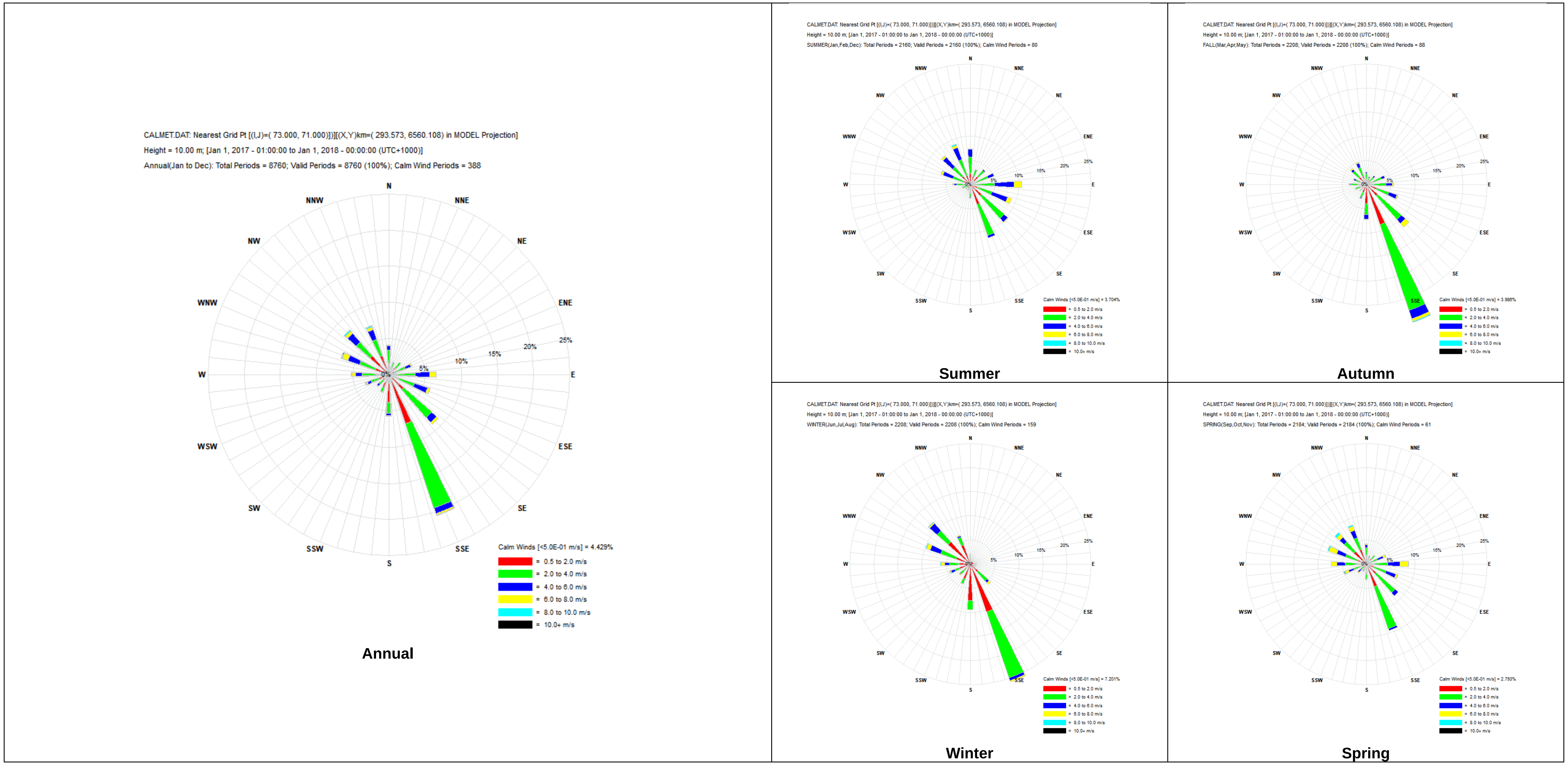


Figure 4.5 – Annual wind rose for nearest CALMET grid point to YSTW

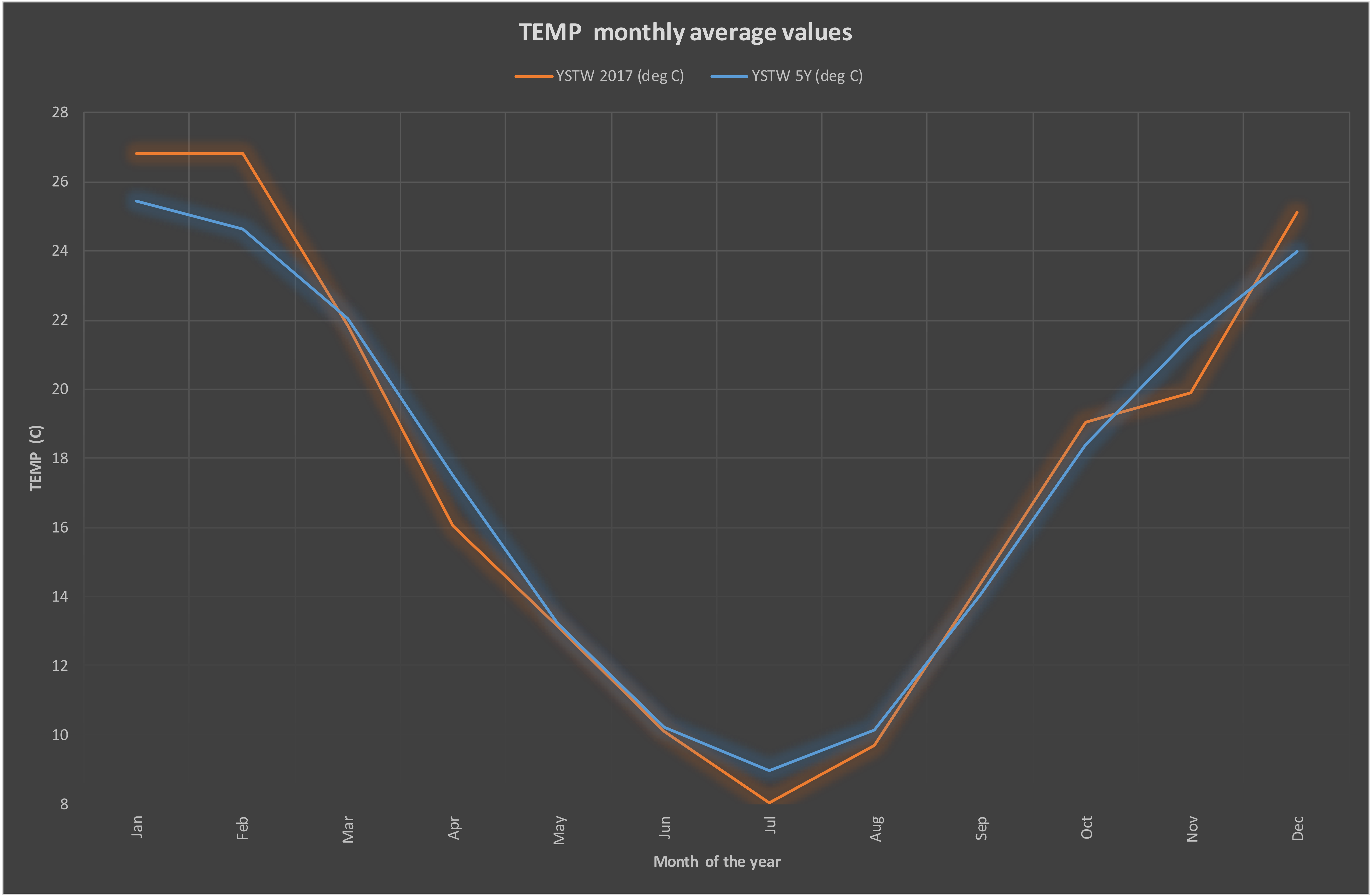


Figure 4.6 – Monthly average temperatures for YSTW 2017 and recent 5-years

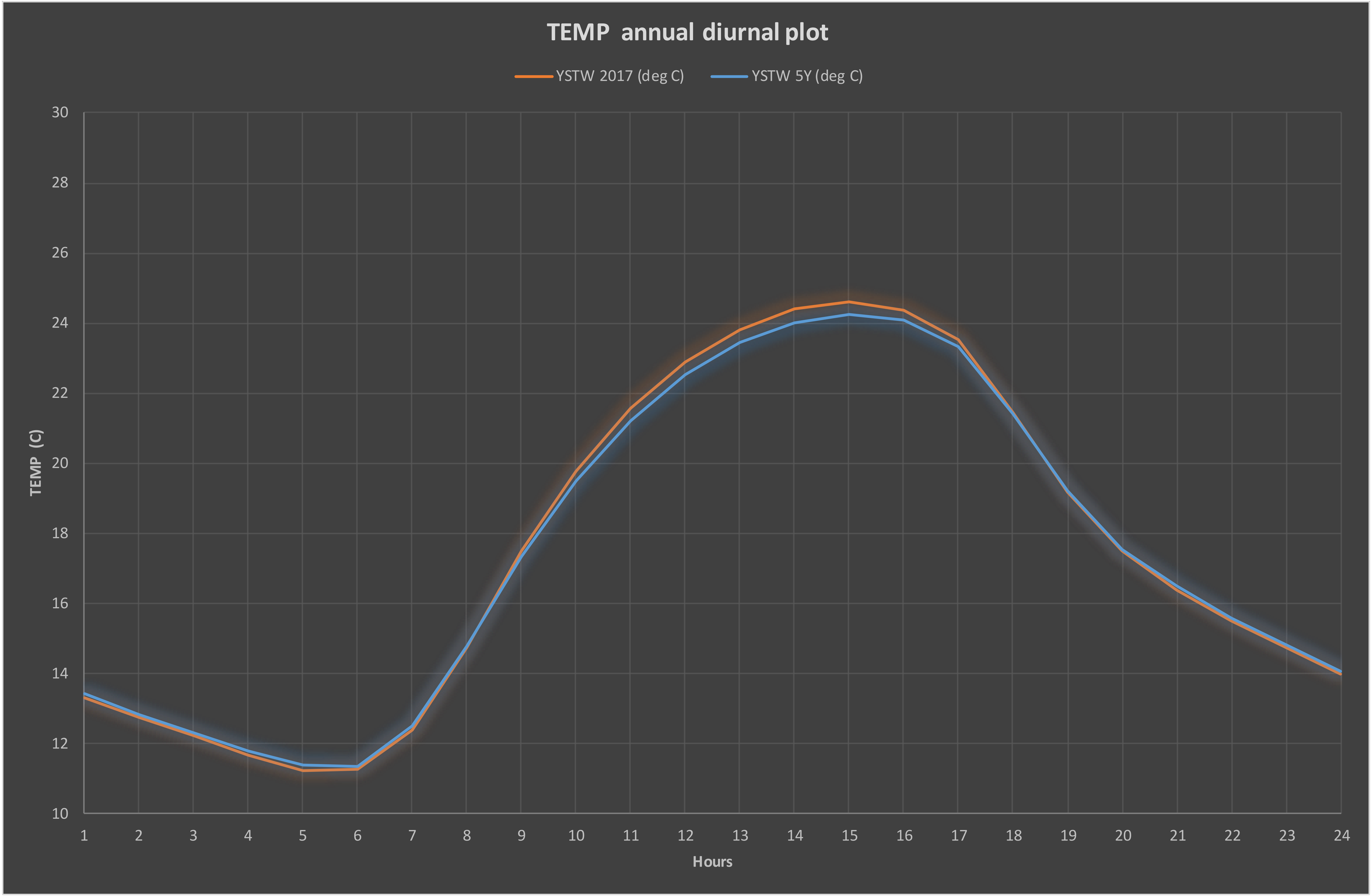


Figure 4.7 – Annual diurnal temperature for YSTW 2017 and 5-years

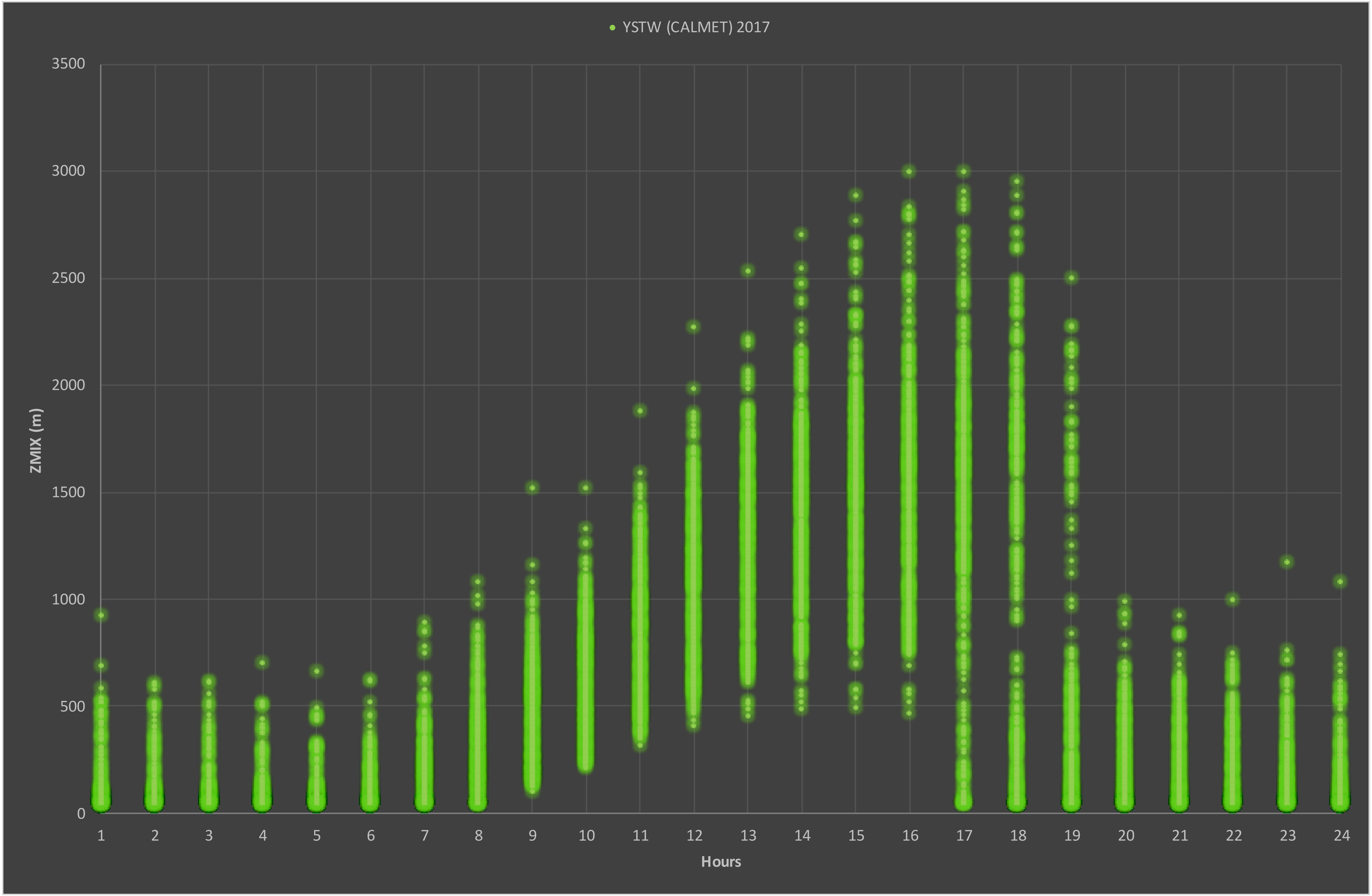


Figure 4.8 – Annual X-Y scatter plot diurnal mixing height for YSTW (CALMET) 2017

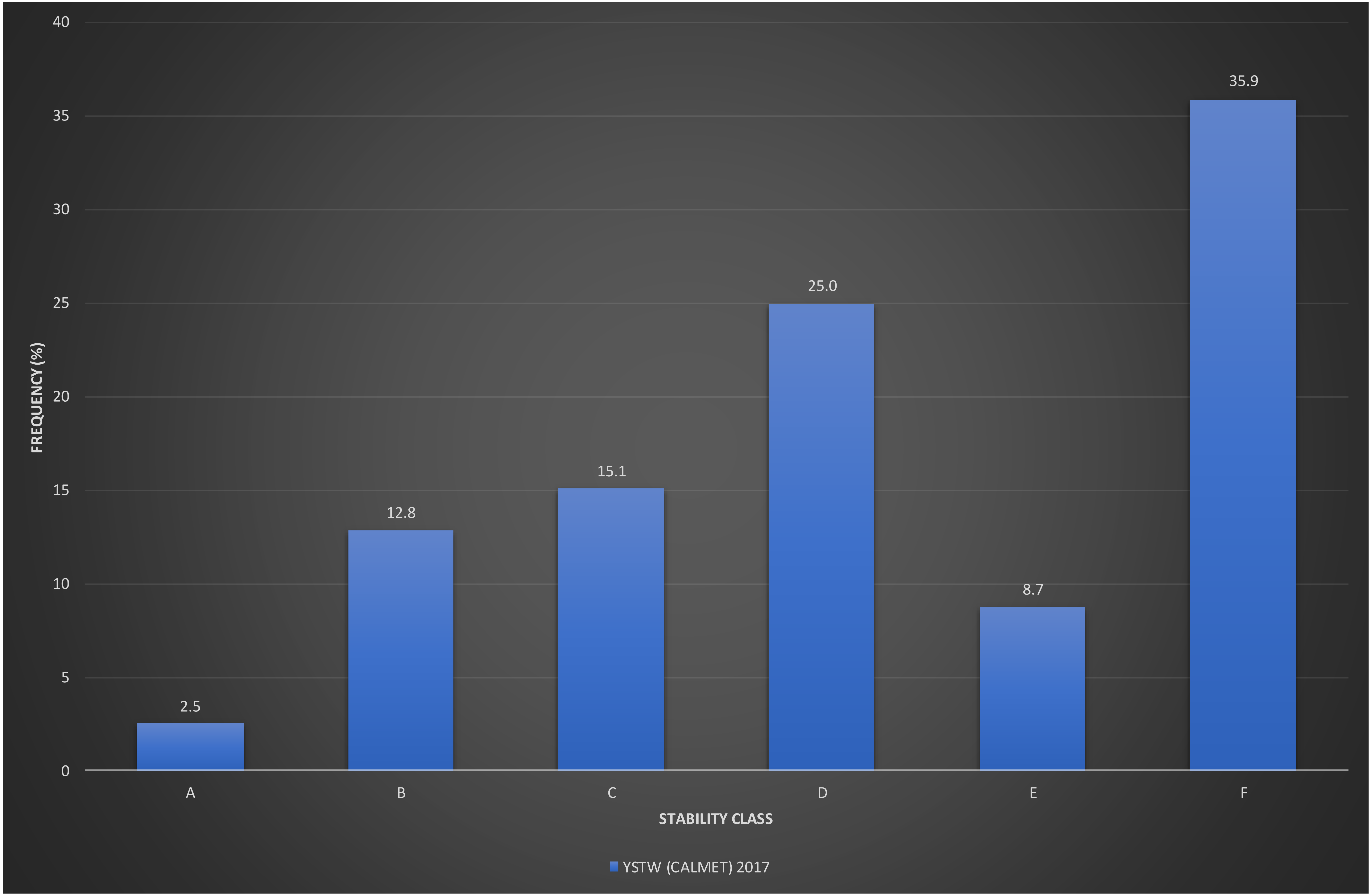


Figure 4.9 – Annual stability class frequency for YSTW (CALMET) 2017

4.2.9 CALPUFF Computational Domain and Receptor Configuration

The computational domain was set at 10 km by 10 km centred over Oakburn PRP. A receptor grid was created with a 4.4 km by 4.4 km by 0.05 km spacing centred over Oakburn PRP.

For the ancillary childcare centre, the 99th percentile odour concentrations were obtained from its location for both 24 hours per day operation and 14 hours per day operation (nominally from 5 am to 7 pm).

4.2.10 CALPUFF Source and Emission Configuration

Full odour source and emission configurations are available upon request.

4.2.11 CALPUFF Model Options

CALPUFF default model options were set except for the following as recommended in *Table A*-4 contained and explained within *Barclay & Scire, 2011*:

- Dispersion coefficients (MDISP) = dispersion coefficients from internally calculated sigma v, sigma w using micrometeorological variables (2);
- Probability Density Function used for dispersion under convective conditions (MPDF) = Yes (1); and
- Minimum turbulence velocities sigma v for each stability class over land and water (SVMIN) = 0.2 m/s for A, B, C, D, E, F (0.200, 0.200, …, 0.200).

Further model configurations are available upon request.

4.3 ODOUR DISPERSION MODELLING SCENARIOS

The odour dispersion modelling scenario undertaken in the OIA are as follows:

- **Scenario 1** – Projected 5 ou (99%, 1-second) impact from all existing and proposed sources; and
- **Scenario 2** – Sensitivity Analysis: Cumulative odour effects from Oakburn and Bowlers Lane poultry farms.

5 ODOUR DISPERSION MODELLING RESULTS

5.1 ODOUR IAC

The procedure prescribed by NSW EPA during the notification phase of the proposed PPF to calculate the Odour IAC has been considered, namely:

> *"The AQR needs to be revised to include a 2 OU contour. The odour assessment criteria must then be based on the population within that 2 OU contour, including maximum capacity of the childcare centre. The maximum capacity of the Tamworth Regional Airport should be considered if it falls within the 2 OU contour."*

The predicted 2.0 ou (99%, P/M60) contour for the has been plotted in **Figure 5.1** It can be seen that the sensitive residences along Wallamore Road there were identified in the preliminary stages are not within the 2.0 ou contour and therefore unaffected according to NSW EPA procedure. The single rural residence to the north along Bowlers Lane is understood to be owned by TRC and will be removed and redeveloped into a compatible land use for the Westdale primary industry precinct. The remainder of the affected land uses intended for primary industry (i.e. agricultural/industrial) or non-passenger aviation, which are considered compatible.

The perceived sensitivity of the ancillary childcare centre to odour from the proposed PPF is debateable. Based upon the context and function of the proposal (i.e. employee family welfare), community expectations and recommended odour risk reduction measures for the ancillary childcare centre as part of an OMP, the residual odour annoyance risk at this location could be reduced significantly compared with a nearby stand-alone childcare facility without the recommended odour risk reduction measures implemented and having no commercial or functional relationship with Baiada.

Therefore, with all things considered including the history of IACs used for previous odour assessments for industries around the Westdale primary industry precinct, TOU considers that maintaining an odour IAC 5.0 ou (99%, P/M60) is the most appropriate and reasonable approach for this OIA and the proposed PPF.

5.2 RESULTS

The results in **Figure 5.1** reflect all sources at the 5.0 ou contour (99%, P/M60), specifically:

- Yellow contour – Proposed PPF including LBR and processing lines ventilation;
- Blue contour – Operational PRP WWTP and Proposed PPF WWTP sources;
- Red contour – Existing PRP fugitive and biofilter sources;
- White contour – All Oakburn (PRP, PPF and WWTP sources) combined;
- Dashed white contour – All PRP, PPF and WWTP sources combined (2 ou contour); and

- The results for the ancillary childcare centre location are shown in **Table 5.1** below. It should be noted the results do not consider the recommended odour risk reduction measures documented as part of the OMP for the proposed PPF, which is not quantifiable by odour dispersion modelling.

Table 5.1 – Projected ground level concentration at onsite childcare centre			
UTM east coordinate (km)	**UTM north coordinate (km)**	**24 hours operation (ou, 99%, P/M60)**	**5am to 7pm operation (ou, 99%, P/M60)**
293.873	6560.858	9.2	7.0

The results in **Figure 3.2** reflects a sensitivity analysis for the 5.0 ou contour (99%, P/M60), where the cumulative odour effects are considered from Bowlers Lane poultry farms, namely:

- Solid white contour – All Oakburn site sources combined;
- Dashed yellow contour – Contribution from the LBR;
- Solid orange contour – Bowlers Lane Poultry Farms;
- Dashed contour – Cumulative effect of Oakburn site sources and poultry farms;
- It should be noted that the prediction of cumulative effects shown is almost certainly overstated as it considers all Oakburn sources including treated odours (e.g. biofilter, etc.) and odours of different characters (e.g. rendering, wastewater, etc.) that do not combine in the atmosphere and tend to be observed as individually identifiable odour characters in the field (as previously outlined in **Section 3.4**); and
- A more realistic analysis consistent with TOU's expectations of odour impact risk would consider the cumulative effect of the poultry farm (orange) contour with the LBR (dashed yellow) contour that has a similar live bird odour character.

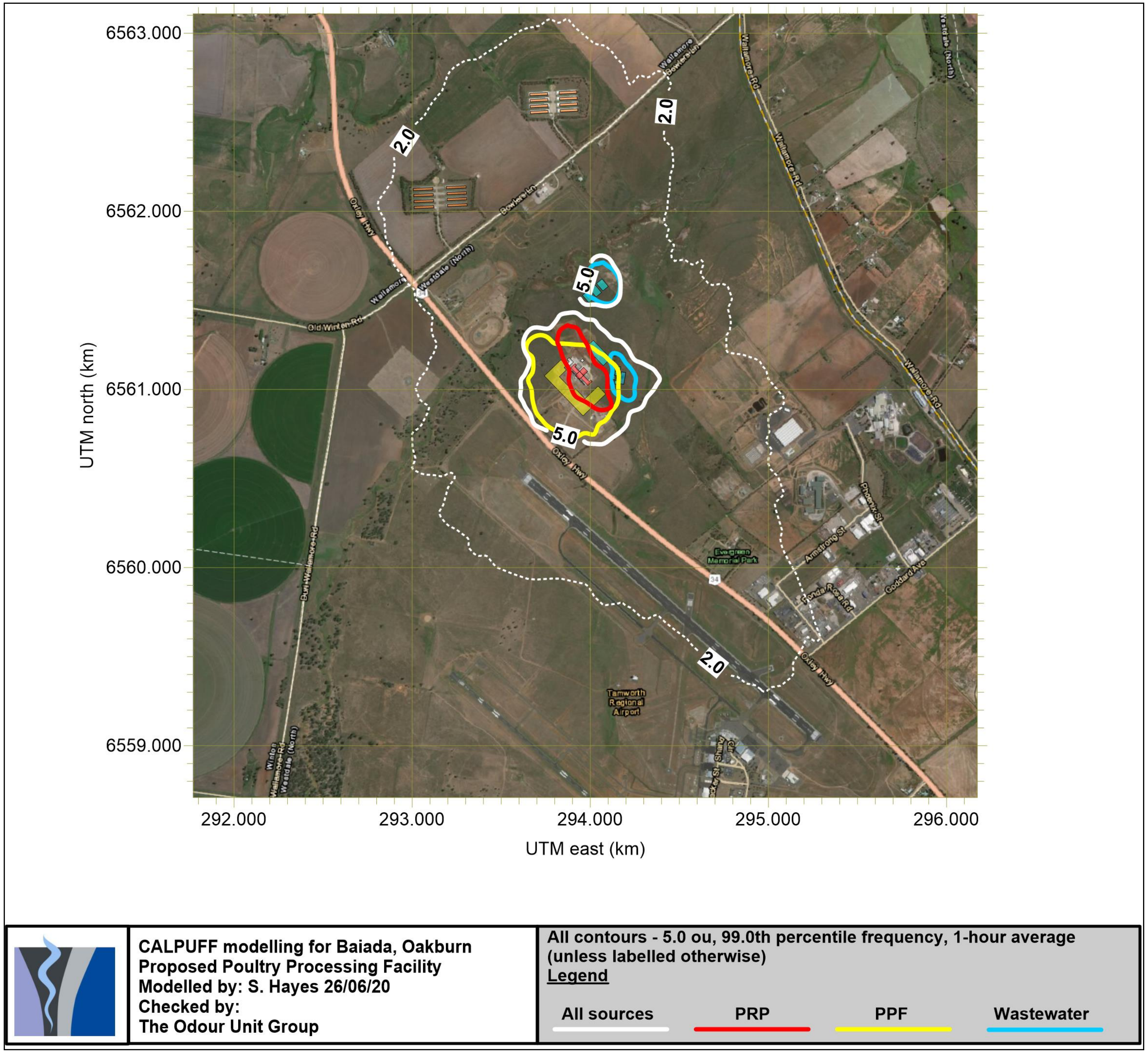
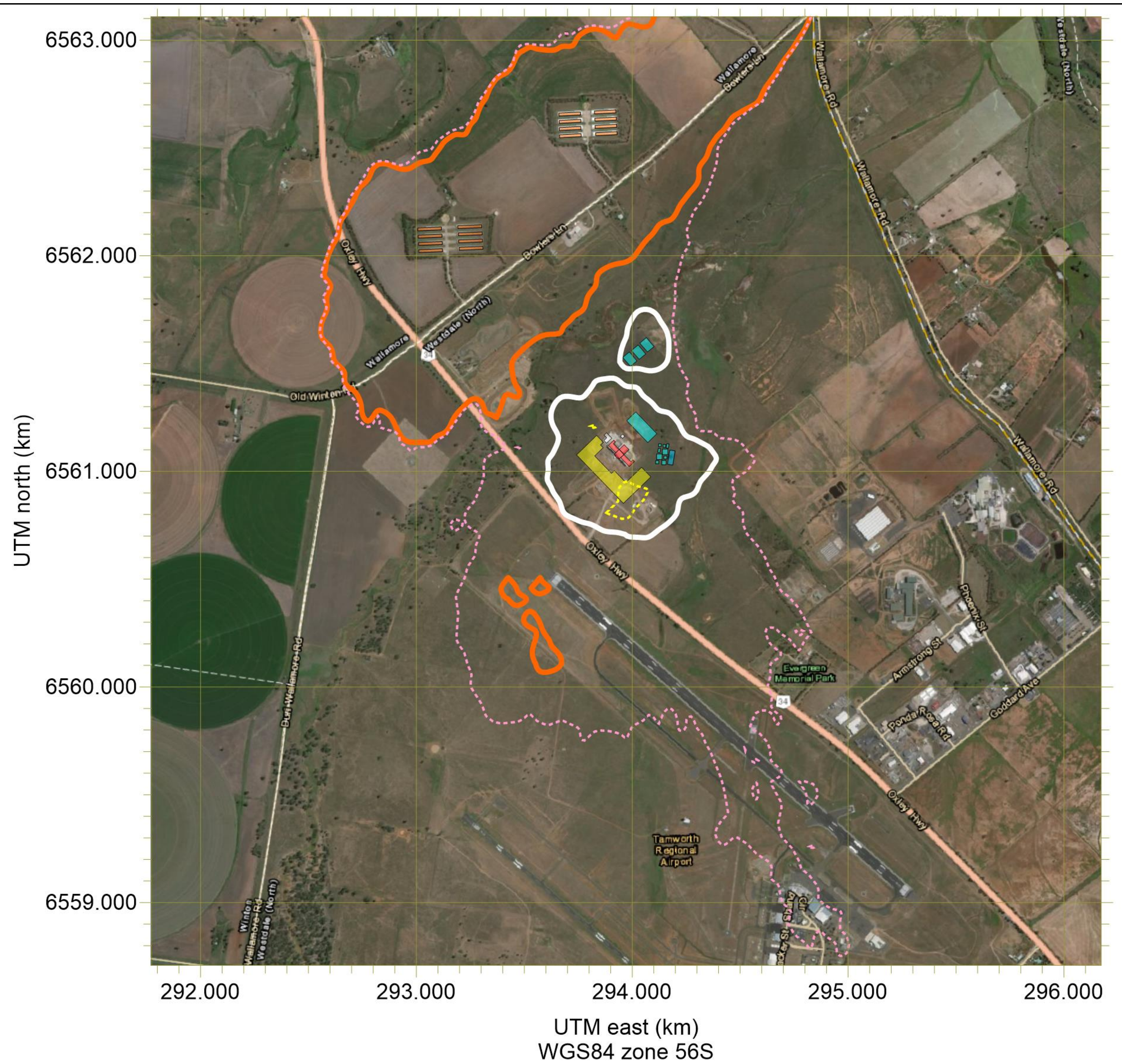


Figure 5.1 – Predicted ground level odour concentration – All sources



CALPUFF modelling for Baiada, Oakburn Proposed Poultry Processing Facility Modelled by: S. Hayes 26/06/20 Checked by: The Odour Unit Group	All contours - 5.0 ou, 99.0th percentile frequency, 1-hour average Legend All Sources Live Bird Reception Poultry Farms Cumulative

Figure 5.2 – Predicted ground level odour concentration – Sensitivity Analysis

6 FINDINGS AND CONCLUSIONS

The following section documents the findings and conclusions from the odour modelling process undertaken in the OIA for the proposed PPF. It should be read in conjunction with the modelling results provided in **Section 5**.

6.1 ODOUR MODELLING FINDINGS

The odour dispersion modelling assessment was carried out using the CALPUFF Modelling System with use of odour emissions estimates based upon measurements collected by TOU at Oakburn PRP, Baiada Hanwood Processing Plant and at the Out Street, Tamworth abattoir. All Oakburn odour sources have been assessed as a combined impact and separately grouped by origin: PRP, PPF and WWTP (i.e. inclusive of the AWTP). The odour impact from the PRP biofilters was included for conservatism despite being a treated emission.

It should be noted that the meteorology developed for the modelling overpredicted calm and light wind conditions, particularly from the south-south-westerly direction. This would have a conservative effect on the results, that is overpredicting the extent and magnitude of odour concentration projections, especially north-north-westwards from the site.

It is found that the addition of the proposed PPF modelled alone shows that the predicted odour impact does not largely exceed the NSW EPA odour IAC of 5 ou beyond the Oakburn site boundary as shown in **Figure 5.1**. The results show that the predicted odour impact for PRP and PPF WWTPs is below the NSW EPA odour IAC under the assumption that SBR night-time filling would be avoided and the PTB is mechanically ventilated by roof fans.

Overall, the results are below the odour IAC at the nearest sensitive receptor. The cumulative 5 ou contour encroaches beyond the site boundary marginally to the north and marginally to the south. Therefore, it has been found that the proposed PPF is unlikely to cause adverse odour impacts under normal conditions within the assumptions made for this assessment.

6.1.1 Childcare Findings

The results for the proposed childcare centre show that for both a 24 hour per day operation and a long-day operation, the odour IAC is predicted to be exceeded. The perceived sensitivity of the ancillary childcare centre to odour from the proposed PPF is debateable. Based upon the context and function of the proposal (i.e. employee family welfare), community expectations and recommended odour risk reduction measures for the ancillary childcare centre as part of an OMP, the residual odour annoyance risk at this location could be reduced significantly compared with a nearby stand-alone childcare facility without the recommended odour risk reduction measures implemented and having no commercial or functional relationship with Baiada. With due consideration to the information provided associated OMP, the residual odour impact risk rating for the ancillary childcare is considered to be low.

6.1.2 Sensitivity Analysis

The sensitivity analysis scenario, which assessed the cumulative odour effects from the proposed PPF with three poultry farms located to the northwest, demonstrates that there the model is sensitive to the presence of these sources. However, prediction of cumulative effects shown in **Figure 5.2** is almost certainly overstated as it considers all Oakburn sources including treated odours (e.g. biofilter, etc.) and odours of different characters (e.g. rendering, wastewater, etc.) that do not combine in the atmosphere and tend to be observed as individually identifiable odour characters in the field (as previously outlined in **Section 3.4**).

6.2 CONCLUDING REMARKS

Given the complexity and scale of the proposed PPF operations, a modelling based OIA is not an ideal tool to help form a contingency plan for unpredicted operational odour impacts or adequately predict the real-world impacts from measures designed to avoid, mitigate, manage and/or offset impacts (typical examples that support this position are the characteristics associated with treated quality emissions from a biofilter or aerobic wastewater treatment source, which in the OIA have been modelled and contributed to the cumulative odour impact prediction profile). These matters are best addressed by sufficient odour separation distances (i.e. odour buffers, when possible) and a site-specific OMP. A site-specific OMP is an important tool that facilitates in contextualising the modelling findings and give due consideration to the residual odour risk rating from the proposed engineered controls, monitoring and management protocols, and standard operating procedures that will support the proposed PPF operations. As such, on the basis that the proposed management practices and controls are implemented to that documented in the associated OMP, the residual odour impact risks for the proposed PPF operations will be significantly minimised to the degree that odour impacts in practice are unlikely.

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End of Document

Baiada Poultry Pty Ltd

Proposed Oakburn Poultry Processing Facility –

Odour Management Plan

Oakburn, NSW

Version 0

July 2020

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Project Number: N2243L.02

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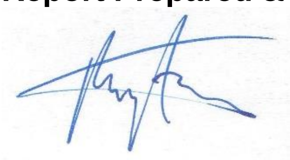
Report Version	**Date**	**Description**
Version 0 (Draft)	30.06.2020	Draft issued to PSA Consulting Australia
Version 0 (Final)	03.07.2020	Minor edits. Final issued.
Report Preparation		

Report Prepared & Approved By:



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Report Title: Baiada Poultry Pty Ltd: Proposed Oakburn Poultry Processing Facility – Odour Management Plan – Version 0 - June 2020

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LIST OF ABBREVIATIONS & DEFINITIONS

AS	Australia Standards
AWTP	Advanced Water Treatment Plant
Baiada	Baiada Poultry Pty Ltd
CAL	covered anaerobic lagoon
CW	clear wells
DAF	dissolved air floatation
EPL	environment protection licence
FAOA	Field Ambient Odour Assessment
FOG	fats, oils and grease
HT	high temperature
Hydroflux	Hydroflux Industrial Pty Ltd
LRV	log reduction values
LT	low temperature
MBR	membrane bioreactor tank
NSW EPA	New South Wales Environment Protection Authority
OMP	Odour Management Plan
POEO Act	Protection of the Environment Operations Act 1997
PPF	Poultry Processing Facility
PRP	Protein Recovery Plant
RMS	risk management strategy
RO	reverse osmosis
SBR	sequencing batch reactor
SCADA	supervisory control and data acquisition
SOP	standard operating procedures

the July 2020 Report	*Baiada Poultry, Oakburn – Proposed Poultry Processing Facility Odour Impact Assessment* dated 3 July 2020
the OCS Manual	Baiada Poultry Pty Ltd – Biofilter System Operating Manual, Tamworth, NSW dated 2 April 2015
TOU	The Odour Unit Pty Ltd
WWTP	Wastewater Treatment Plant

UNITS OF MEASUREMENTS

m/s	metres per second
m^2	square metres
m^3/hr	cubic metres per hour, at standard conditions
ML	megalitres

1 INTRODUCTION

The following document is the Odour Management Plan (**OMP**) for the proposed integrated poultry processing facility (**PPF**) to be sited adjacent to the Oakburn Protein Recovery Plant (**PRP**) near Oxley Highway, Westdale, New South Wales (Lot 100 on DP1097471).

1.1 DOCUMENT CONTROL PROTOCOL

This is Version 0 of the OMP. The OMP should be regarded as a 'live' manual that is changed as required, to reflect the active practices and odour controls prevalent at the PPF. All updates/modifications to the OMP should be recorded in the *Document Revisions* table on the second page of this document, approved by Baiada Poultry Pty Ltd (**Baiada**) and TOU. Given that the OMP has been prepared in advance to the detailed design, construction and commissioning of the PPF operations, this OMP is subject to variations and updates following optimisation and attainment of steady-state conditions (see **Section 7**).

1.2 RELEVANT DOCUMENTATION

The OMP has been prepared by The Odour Unit Pty Ltd (**TOU**) to supplement the odour modelling assessment study conducted for the PPF. As such, the OMP should be read in conjunction with the corresponding report titled *Baiada Poultry, Oakburn – Proposed Poultry Processing Facility Odour Impact Assessment* dated 3 July 2020 (**the July 2020 Report**).

1.3 RELEVANT BACKGROUND AND SITE CONTEXT

The intent of the proposed PPF is to replace the existing abattoir operations located at Out Street, Tamworth, New South Wales. In conjunction with the July 2020 Report, the aim of the OMP is to identify and characterise all potential odour impacts of the proposed PPF and required level of measures to avoid, mitigate, manage and/or offset impacts.

1.3.1 Site Context and Surroundings

An aerial map of the PPF and its surroundings is shown in **Figure 1.1**. From an odour viewpoint, the surrounding features of interest to the proposed PPF include:

- Oakburn Park Raceway;
- Tamworth Regional Livestock Exchange;
- Tamworth Regional Airport;
- Sensitive places including eleven dwellings along Wallamore Road and Bowlers Lane;
- The dwelling on Bowlers Lane is understood to be owned by Tamworth Regional Council and will be removed as part of the proposed PPF; and
- The other land uses include beef processing, lamb processing, poultry farming, flour milling and a cemetery-crematorium.

The near-field topography surrounding the PPF could be described as a flat rural floodplain. Further afield there is a slightly elevated ridgeline that runs along Bowlers Lane from the north to the southwest. The Peel River valley is to the northeast.

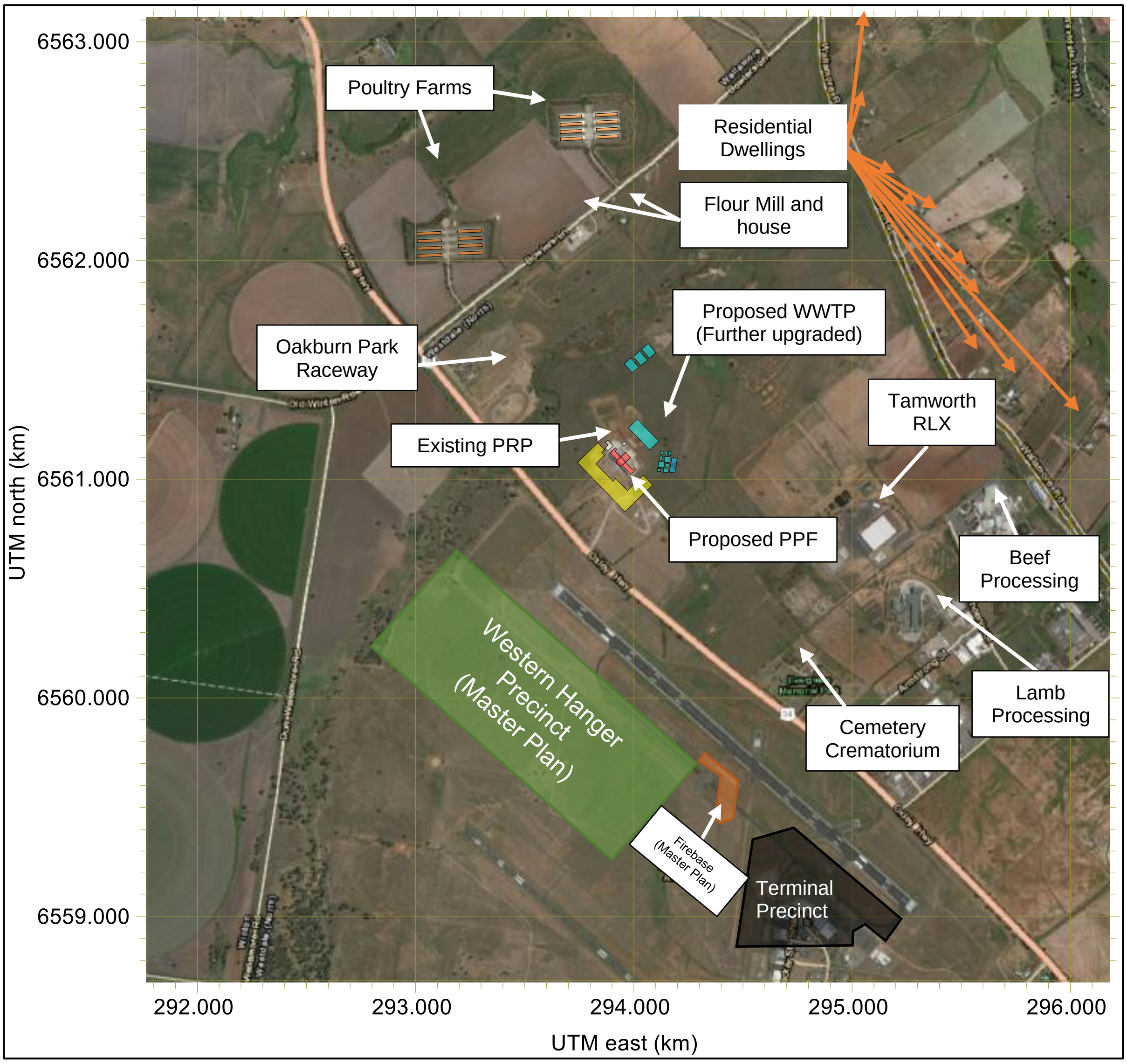


Figure 1.1 – Proposed PPF location, context and surrounds

1.4 PURPOSE OF THIS ODOUR MANAGEMENT PLAN

The OMP is a documented operational management system for the PPF detailing:

1. Proposed activities for approval by the New South Wales Environment Protection Authority (**NSW EPA**);

2. Preliminary standard operating procedures (**SOP**) employed in each key process area to anticipate the formation of odour, and minimise their release to the extent that adverse odour is very likely;

3. An outline of how the production and migration of odour is minimised, including design (where applicable) and operational practices;

4. The monitoring and control protocols required to assist in the management of odour;

5. Critical odour emissions risk and control points;

6. A description of the wastewater management system and its operation in the context of odour emissions and management, noting that this is a significant feature of the PPF;

7. An outline of the key staff and responsibilities with respect to odour management, including:

    a. Chief Operating Officer;

    b. Plant Manager; and

    c. Environment Manager.

8. An outline of the reporting requirements with respect to odour; and

Put simply, the sole purpose of the OMP is to eliminate, prevent or minimise the potential for odour generation at the PPF through a hierarchy of controls, in the form of, but not limited to, engineered, administration and/or management practices, as illustrated in **Figure 1.2**. The OMP seeks to find a practical balance between maintaining the quality and efficiency of process operations and the ability to control odour emission generation.

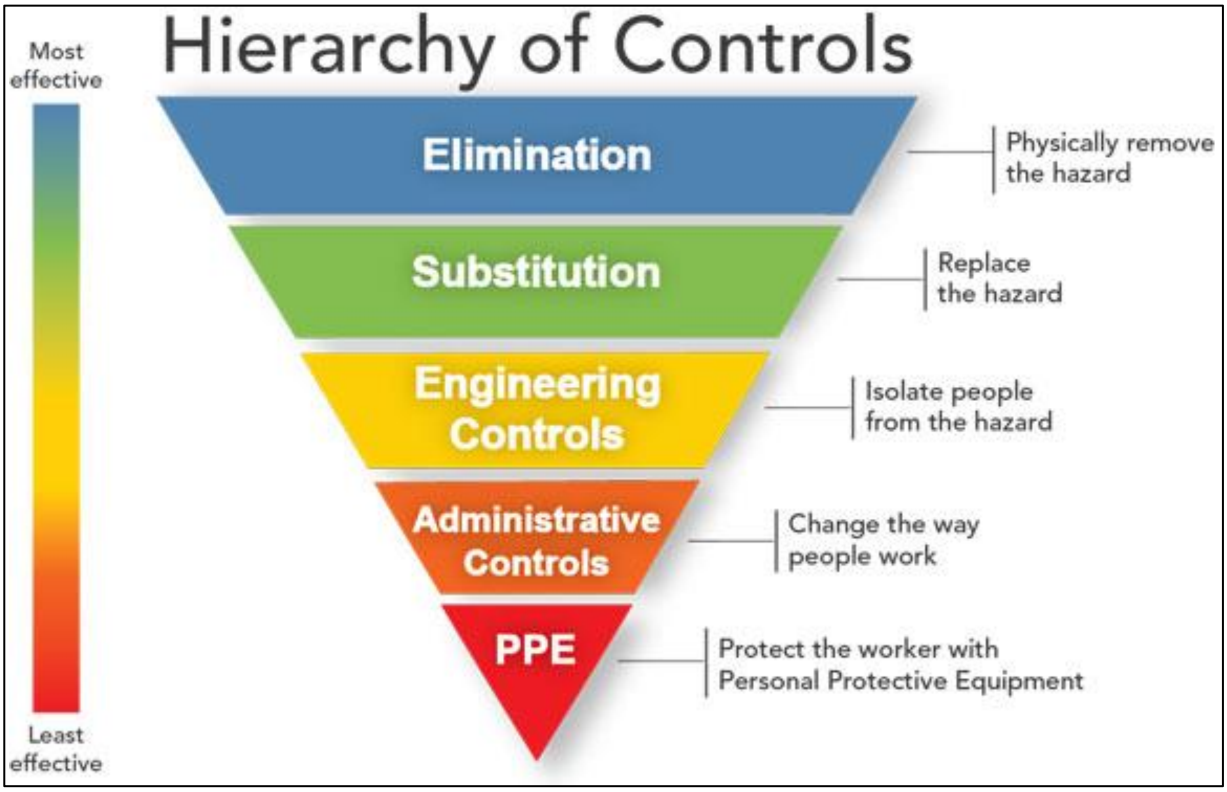


Figure 1.2 - Hierarchy of controls for the proposed PPF

1.4.1 Exclusions

The OMP is specific to the PPF operations and does **not** include or address the operations relating to the PRP to any significant detail, other than the interaction between the PPF and PRP and its relationship to odour management. The PRP operations are covered by existing documentation not relevant to the proposed PPF operations.

1.5 STATEMENT OF COMMITMENTS

The OMP is developed to fulfil the relevant legal and regulatory requirement, namely:

Protection of the Environment Operations Act 1997 No 156 – Section 129 Emission of odours from premises licensed for scheduled activities

(1) The occupier of any premises at which scheduled activities are carried on under the authority conferred by a licence must not cause or permit the emission of any offensive odour from the premises to which the licence applies.

(2) It is a defence in proceedings against a person for an offence against this section if the person establishes that—

(a) the emission is identified in the relevant environment protection licence as a potentially offensive odour and the odour was emitted in accordance with the conditions of the licence directed at minimising the odour, or

(b) the only persons affected by the odour were persons engaged in the management or operation of the premises.

(3) A person who contravenes this section is guilty of an offence.

1.6 ENVIRONMENT PROTECTION LICENCE CONDITIONS

The operations being undertaken at the will be governed by a separate Environment Protection Licence yet to be finalised and issued by NSW EPA. A copy of the EPL will be made available in electronic form the following web address:

https://apps.epa.nsw.gov.au/prpoeoapp/

1.7 PROPOSED LICENCED ACTIVITIES

At the time of writing this OMP, Baiada was obtaining regulatory approval for the PPF that will enable the processing capability of up to three million live birds per week, an on-site wastewater treatment, recovery and recycling facility, and the corresponding increase yield in protein recovery utilising the existing PRP achieved via optimisation of operational hours.

The process operations for the PPF and associated areas are described in **Section 2**.

2 DESCRIPTION OF PROCESS OPERATIONS

2.1 SITE DESCRIPTION AND LAYOUT

A view of the PPF site layout is shown in **Figure 2.1,** with a ground floor plan shown in **Figure 2.2**. As shown in **Figure 2.1**, Baiada is proposing a PPF that will consist of the following items:

- An integrated PPF consisting of:
    - 39,810 square metres (**m^2**) of gross floor area providing for live bird storage, processing, chilling, cold store and distribution facilities;
    - 1118 m^2 workshop and store building;
    - 4,848 m^2 of ancillary administration, staff amenities and childcare space;
    - Wastewater Treatment Plant (**WWTP**) and Advanced Water Treatment Plant (**AWTP**); and
    - Installation of ancillary infrastructure, landscaping and services.
- A poultry processing capability of three million birds per week;
- The realisation of operational capability at the PRP to enable the production of a maximum of 1,680 tonnes of finished product per week (240 tonnes/day, 7 days a week). As will be noted in **Section 2.2.3**, this will not require a modification to the existing equipment infrastructure but an increase to the permitted operating hours to realise this increase in yield; and
- The operational capability for all aspects of the integrated site facility to 24 hours per day, 7 days a week with no restrictions.

2.2 PROCESS FLOW DESCRIPTION

The integrated site plan for the PPF is illustrated in **Figure 2.1**. The activities will be a feature of the PPF include:

- Receival of live birds into the reception hall via trucks;
- Processing Lines 1 and 2, which consist of:
    a. Livestock preparation including stunning, shackling and kill;
    b. Scalding and de-feathering;
    c. Evisceration and inspection;
    d. Removal and transport of offal, co-products and by-products to the PRP; and

e. Processing pumps, waste staging, crate wash and chillers

- A WWTP and AWTP.

Each of the key process flow operations is described in the following sections of this OMP, respectively. The odour management protocol for these areas is described in **Section 3.2**.

2.2.1 Live Bird Receival

The live bird receival area is an enclosed building area for temporary storage prior to stunning, shackling, and killing. The ventilation rate used is 900,000 cubic metres per hour (**m^3/hr**) based upon a design factor of 10 m^3/hr per bird and a maximum capacity of 90,000 birds per hour. The actual numbers are likely to be lower and fluctuate as trucks arrive and birds are processed over time. The live birds will be typically present between 0100 hrs and 2100 hrs. Under these production times, the processing of three million birds per week will require a production rate of approximately 21,500 birds per hour over 20 hours per day, seven days per week. On this basis, the design ventilation rate is based upon a peak capacity of 90,000 birds, which will maintain a level of contingency in operational capability at the PPF.

2.2.2 Processing Lines 1 & 2

As outlined in **Figure 2.2**, there are multiple areas that will be ventilated and managed via the dilution and dispersion system for the PPF. These areas include livestock preparation including stunning, shackling and kill; scalding and de-feathering; evisceration and inspection; and removal and transport of offal, co-products and by-products to the PRP; and processing pumps, waste staging, crate wash and chillers. Each of the areas is based on an air exchange rate of 15 air changes per hour, design to lead to containment, a good level of ventilation flux, and maximisation of plume dispersion from the roof ventilation fans servicing each area. The expected odour characters from the roof ventilation fans are expected to be of a neutral character that will tend to readily dispersion and adsorption in the natural environment prior to ground level detection at sensitive receptors, including the on-site childcare centre and nearby residential dwelling. This is supported by the risk assessment process conducted by the dispersion modelling in the July 2020 Report.

The chillers do not represent a significant source of odour at the PPF and are excluded from further analysis in the OMP. This effect is due to the cool environment in which material is stored, that facilitates in Baiada providing a high standard of product quality to the consumer.

2.2.3 PRP

The PRP consists of both low temperature (**LT**) and high temperature (**HT**) rendering systems, housed at either end of the PRP building. The HT plant is located at the western end of the PRP building, with the LT plant at the eastern end. Each rendering system consists of an odour collection and biofilter-based odour control system. The PRP will service the integrated PPF operations via an increase to the capability of the operational hours to 24 hours, 7 days per week. As such, no modifications or alterations to the PRP building infrastructure are required. Accordingly, the existing biofilter-based odour control system for the PRP will be adequate for the proposed PPF operations.

The documented operational management system for the biofilter-based odour control system is outlined in a TOU report titled *Baiada Poultry Pty Ltd – Biofilter System Operating Manual, Tamworth, NSW* dated 2 April 2015 (**the OCS Manual**).

2.2.4 WWTP and AWTP

A WWTP and AWTP concept process design for the PPF was completed by Hydroflux Industrial Pty Ltd (**Hydroflux**) that proposed to treat up to 8 million litres (**ML**) of wastewater from the PPF and allow recovery for up to 7.2 ML for reuse as potable water per day. All wastewater from the PRP will be treated separately by the operational WWTP, which is designed to accommodate up to 3 million birds per week with a contingency buffer.

The PRP wastewater would continue to be screened within the PRP where it is sent to be treated in a 25 ML Covered Anaerobic Lagoon (**CAL**) before being polished in a 5 ML Sequencing Batch Reactor (**SBR**). The liquid is discharged into two 5 ML Clear Wells (**CW**) before discharge to sewer. All wastewater from the PRP is currently operational and has been designed to accommodate additional volumes associated with the PPF. The treated wastewater from the PRP based operations will continue to be discharged to the sewer.

The wastewater from the proposed PPF will be treated with primary and secondary treatment processes by the WWTP involving dissolved air floatation (**DAF**) and a membrane bioreactor (**MBR**). The 8 ML/day design is expected to contain five membrane train. The effluent from the MBR is then further treated by the AWTP for reuse at the PPF by reverse osmosis, chlorination, ultraviolet light and remineralisation processes designed to exceed reuse water quality standards set out by various authorities. The layout of the WWTP and AWTP is illustrated in **Figure 2.3**, and process flow diagram is available in **Figure 2.4**.

From an odour management perspective, the primary and secondary treatment stages of the WWTP process are considered to have a moderate risk in generating and releasing odour emissions under normal operating circumstances. The tertiary treatment process including the AWTP process units will be negligible odour emission contributors and have not been given any further consideration, as the concentrations of primary suspended solids, organics and nutrients would be significantly reduced and stabilised to a level suitable for tertiary treatment processing.

As highlighted by Hydroflux, the proposed wastewater technology for the PPF is dissolved air flotation (**DAF**) to remove fats, oils and grease (**FOG**) and suspended solids (**TSS**), followed by a membrane bioreactor (**MBR**) designed to remove organics and nutrients such as nitrogen and phosphorus to target levels. The membrane bioreactor combines the features of a conventional bioreactor, combined with the water quality of an ultrafiltration membrane. Chemical phosphorus removal will be employed in both the primary and secondary treatment with the addition of an inorganic coagulant.

2.2.4.1 Effluent Characteristic and Quality

The effluent from the MBR will then be suitable for discharge, irrigation and or further treatment for re-use.

The effluent intended for reuse will then be treated by Reverse Osmosis (**RO**) to reduce the levels of dissolved solids. Following additional treatment, the RO permeate will be suitable for reuse. The additional treatment will consist of:

- Chlorination;
- Ultraviolet light; and
- Remineralisation.

Put simply, the WWTP and AWTP system will be designed by Hydroflux to meet and exceed the reuse water quality standards, including the log reduction values (**LVR**) of pathogens, as outlined in relevance documentation, namely:

- NSW Food Authority – Water Reuse Guideline – May 2008;
- NSW Government – Management of private recycle water schemes – May 2008;
- NSW Department of Primary Industries – Recycled Water Management Systems – May 2015; and
- Australian Government – NHMRC – NRMMC – Australian Drinking Water Guidelines 6 – 2011.

A RO concentrate stream will also be produced, this stream will have a high concentration of dissolved salts and is intended to be further treated via accelerated evaporation and with final disposal off-site as a concentrated brine. On this basis, the treated wastewater from evaporation will not represent a significant source of odour emissions, based on the effluent performance parameter provided by Hydroflux. Moreover, Hydroflux has indicated that the AWTP process is proven and has been operating successfully at two poultry processing plants in Australia for over ten years, further supporting its suitability for the proposed PPF operations.

Figure 2.1 – Aerial view of the integrated PPF operations

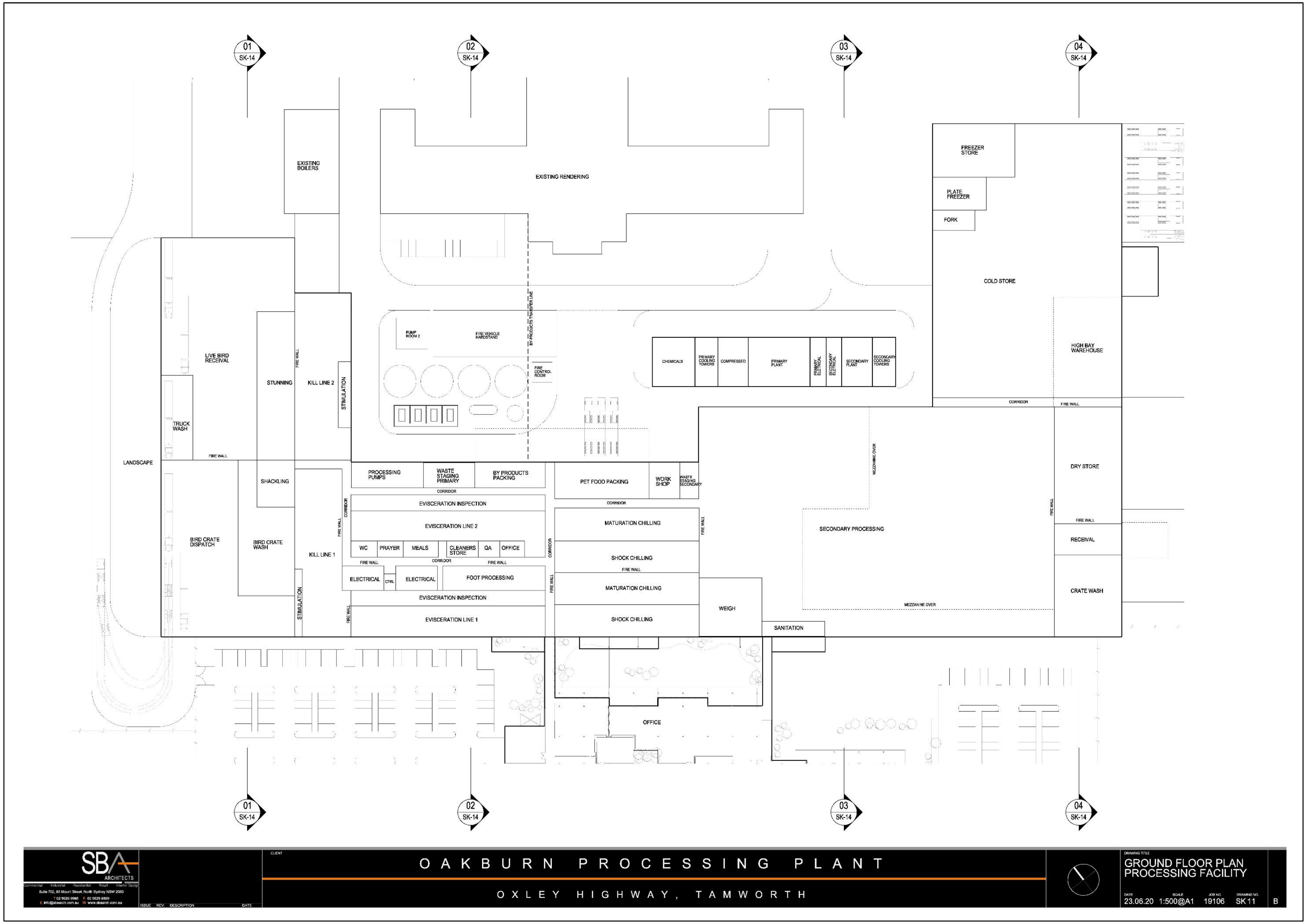


Figure 2.2 – Ground floor layout of the integrated PPF operations

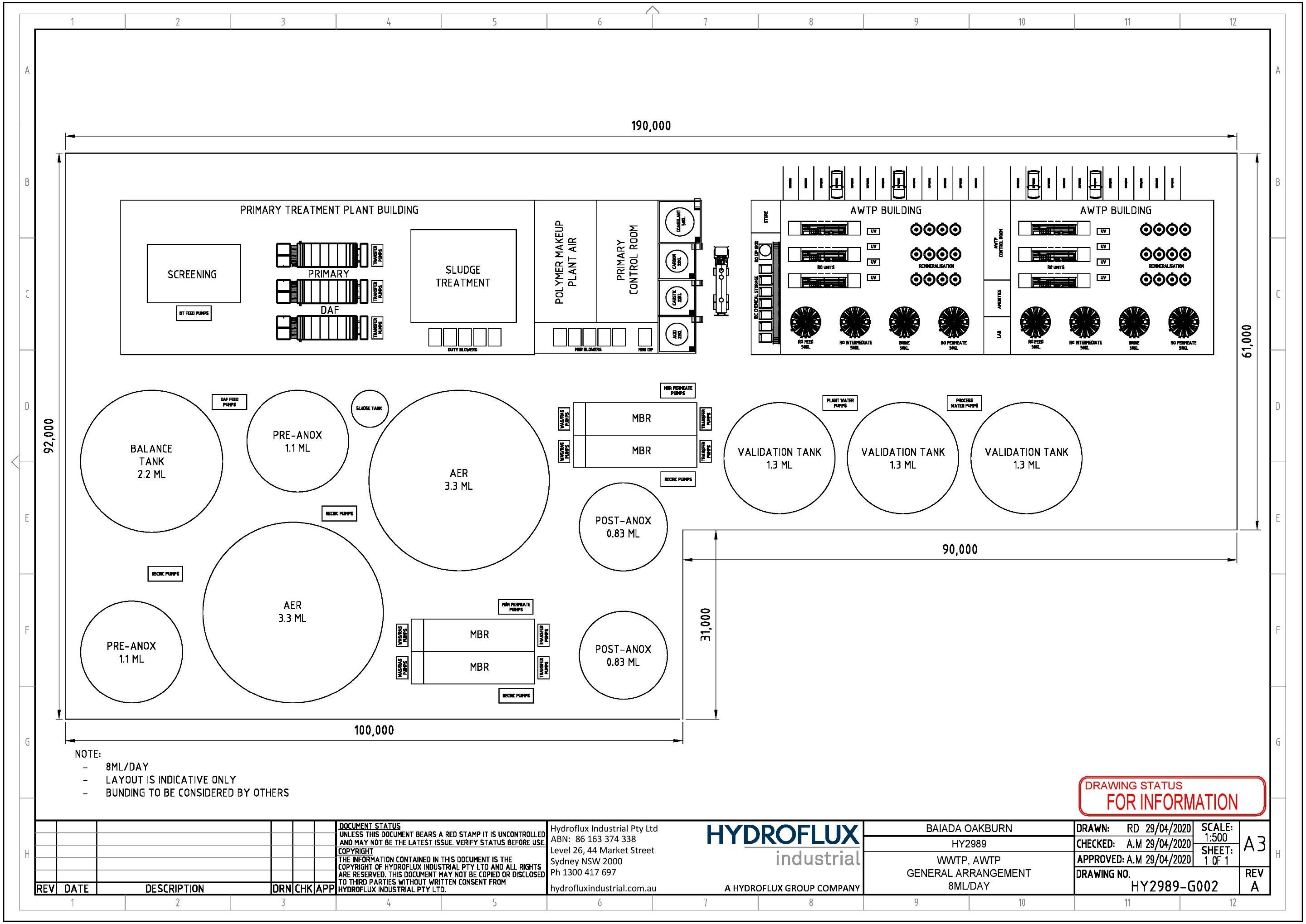
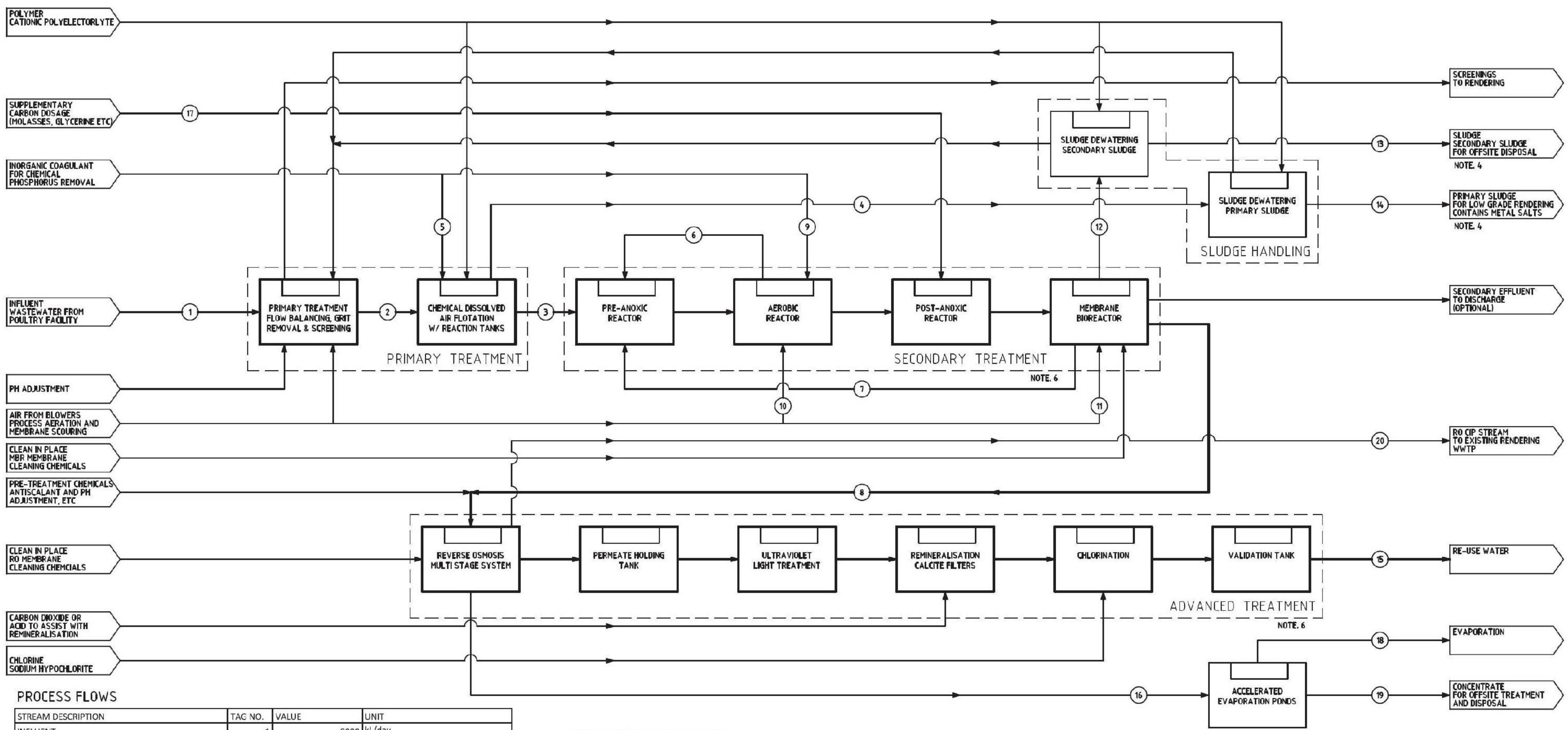


Figure 2.3 – Proposed PPF: General arrangement for the WWTP and AWTP



PROCESS FLOWS

STREAM DESCRIPTION	TAG NO.	VALUE	UNIT
INFLUENT	1	8000	kL/day
BALANCED FEED TO DAF	2	8000	kL/day
FEED TO SECONDARY TREATMENT	3	8000	kL/day
PRIMARY SLUDGE TO DEWATERING - NOTE 1	4	10502.4	kg TSS/day
COAGULANT TO DAF - NOTE. 2	5	4998.2	kg/day Ferric Chloride 42%
MIXED LIQUOR RETURN	6	32,000 - 64,000	kL/day
RETURN ACTIVATED SLUDGE	7	8000	kL/day
MEMBRANE BIOREACTOR EFFLUENT	8	7943.2	kL/day
COAGULANT TO SECONDARY TREATMENT - NOTE. 2	9	1249.6	kg/day Ferric Chloride 42%
AERATION FOR AEROBIC REACTOR	10	31960	Nm3/hr @ 620 mBar.g
AERATION FOR MEMBRANE SCOUR	11	13000	Nm3/hr @ 570 mBar.g
WASTE ACTIVATED SLUDGE - NOTE. 1	12	3077.6	kg TSS/day
DEWATERED SECONDARY SLUDGE	13	2923.7	kg TSS/day
DEWATED PRIMARY SLUDGE	14	9977.3	kg TSS/day
TREATED WATER FOR RECYCLING	15	7200	kL/day
RESERVE OSMOSIS CONCENTRATE	16	800	kL/day
SUPPLEMENTARY CARBON - NOTE 3.	17	AS REQUIRED FOR DENITRIFICATION PERFORMANCE.	
EVAPORATION OF CONCENTRATE	18	720	kL/day
CONCENTRATE POST EVAPORATION	19	80	kL/day
REVERSE OSMOSIS CIP STREAM TO EXISTING WWTP	20	40	kL/month

WATER QUALITY ESTIMATES

STREAM DESCRIPTION	TAG NO.	VOLUMETRIC FLOW	COD	BOD	TN	TKN	TP	PO4-P	TS	TSS	TDS
-	#	kL/day	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
INFLUENT	1	8000	3970	2380	210	210	40	36	2700	1300	1400
FEED TO SECONDARY TREATMENT	3	8000	1500	899	210	210	10	10	1600	200	1400
MEMBRANE BIOREACTOR EFFLUENT	8	8000	50	20	21	15	1	1	1405	5	1400
TREATED WATER FOR RECYCLING	15	7200	-	-	-	-	-	-	50 - 200	-	50 - 200
RESERVE OSMOSIS CONCENTRATE	16	800	250	200	210	150	312	272	13600	50	13550
CONCENTRATE POST EVAPORATION	19	80	2500	2000	2100	1500	3120	2720	136000	500	135500

NOTE. 5

NOTES:

1. PRELIMINARY CALCULATIONS SUGGEST 1,041 KG TSS IS PRECIPITATED DUE TO CHEMICAL P REMOVAL. FOR DESIGN PURPOSES IT HAS BEEN ASSUMED THAT 80% OF THIS SLUDGE IS PRODUCED DURING PRIMARY TREATMENT, WITH THE RESIDUAL PRODUCED IN THE SECONDARY TREATMENT PROCESS.
2. ESTIMATED FERRIC CHLORIDE DOSAGE IS 3,123.9 KG/DAY AS 42% SOLUTION. ASSUMPTION HAS BEEN MADE THAT THIS IS DOSED 4:1 INTO PRIMARY AND SECONDARY TREATMENT STAGES. MOLAR RATIO OF 2:1 [METAL]:[PHOSPHATE] USED FOR CALCULATIONS.
3. SUPPLEMENTARY CARBON DOSAGE MAY BE REQUIRED TO ACHIEVE TARGET TOTAL NITROGEN VALUES IN THE EFFLUENT.
4. WATER CONTENT OF DEWATERED SLUDGE HAS NOT BEEN CONSIDERED IN THE MASS BALANCE.
5. IMPACT OF CHEMICAL DOSING FOR PH CORRECTION, DISINFECTION AND CLEANING HAS NOT BEEN CONSIDERED IN THIS MASS BALANCE.
6. SECONDARY AND ADVANCED TREATMENT SPLIT INTO TWO PARALLEL TREATMENT TRAINS

Figure 2.4 - Process flow diagram of PPF WWTP and AWTP (**Source:** Hydroflux)

3 ODOUR RISK CHARACTERISATION & CONTROLS

3.1 PREAMBLE

In operating the PPF, there are several mitigation measures and management practices, both preventative and remedial, that will be incorporated into the SOPs upon commissioning and handover by the principal contractor to Baiada. These SOP will be managed through Baiada's operational management system for the PPF and referenced is to be made to these as required. As such, the following section is designed to educate the operators on the odour emission risks posed by process operations conducted at the PPF, with the view that the PPF personnel gain an adequate understanding and appreciation of the rationale behind the SOPs and its interaction with odour generation and management.

3.2 PROCESSING LINES 1 AND 2

The odour management protocol adopted for the various processing area of the PPF is the use of a dilution and dispersion system that offers multiple levels of control that facilitate an integrated solution for emission control, namely:

- Containment of odour within the PPF building spaces using a network of doors and extensive building ventilation air extraction system. The fan rate will be set to achieve the proposed extraction rate of 15 air changes per hour, although this may be varied to fit operational circumstances;

- A high air exchange rate within each of the processing area, which is a measure of the fresh air volume added to and removed from a building space over a specific time interval (dimensionally analysed on a per hour basis). This promotes good mixing properties within the building airspace, stabilises heat loads within the processing area, and provides the capability of achieving a comfortable environment for both operators and live birds. In turn, this air exchange phenomena leads to the minimises odour concentration levels within the building air space via a well-ventilated flux through the area;

- When air transports an odour from the source, dispersion and dilution of the odour is a feature of this phenomena. This results in a declining odour concentration with increasing distance downwind of the source. This reduction in odour concentration depends on the atmospheric stability. For this reason, an enhanced plume dispersion of the exhaust air from the processing areas via roof exhaust fans is selected for the PPF. As documented in the July 2020 Report, the design exit velocity selected for all roof exhaust fans at the PPF is 15 metres per second (**m/s**). At this exit velocity, initial plume dispersion properties will be favourable and provide maximum plume dispersion capability; and

- Attainment of negative pressure conditions and minimisation of ground-level fugitive emission release via building leakage.

The suitability of the dilution and dispersion system is appropriate for the PPF given the rate of fresh material flow during normal operations, the site context and nature of operations that will be undertaken for the areas elected using this odour management protocol. This is a conventional technique in which livestock processing is conducted in Australia.

3.3 WWTP AND AWTP

3.3.1 Wastewater Sources

The wastewater generated at the PPF originates from two key sources, as follows:

1. **Wastewater from livestock processing:** These flows are generated from the commencement of the kill until its completion. During the kill, the majority of wastewater is produced in the kill floor, offal, and chiller areas. These represent a continuous flow of wastewater. The wash down of production areas frequently occurs throughout the day to maintain adequate hygiene levels; and

2. **Wastewater from washdown and kill completion:** These flows are generated when clean in place (**CIP**) activities are undertaken;

3. **Wastewater from PRP processing**: these flows are generated from by-product protein recovery, both at the LT and HT plan; and

4. **Wastewater from the OCS:** these flows are generated from the normal operation of the biofilter-based odour control system.

3.3.2 Odour Emission Risk Characterisation

The PPF will have a risk management strategy (**RMS**) implemented to identify improved control and minimisation measures as to reduce residual risks to the operation of the WWTP and AWTP, so that impacts of discharge of sewer and odour emissions are minimised. Moreover, it is important to note that the PPF will have a strong dependence on the effluent from the AWTP for its processing demand. Therefore, it will always be in the interest of the PPF to have the WWTP and AWTP operating in optimised and steady-state capacity to minimise process disruption. This dependency will result in a heightened awareness of the WWTP and AWTP operations and, in turn, minimise the odour risks associated with the PPF wastewater treatment processes. As previously mentioned in **Section 2.2.4.1**, the effluent characteristics will meet a high-quality standard that is consistent with the guidelines provided in regularly water guidelines in food processing. As such, the OMP considers that the adequate management of wastewater will, in turn, lead to three mutually dependent outcomes:

1. Minimisation of odour emissions; and

2. Discharge quality of trade waste to sewer within approved limits; and

3. Mechanical evaporation of brine with minimal risk of odour impacts (see **Section 3.4.2**).

Moreover, the RMS has been developed by providing the environmental aspects and risk register for the PPF. The environmental aspects and risk register for the PPF identified areas of the WWTP and AWTP that warrant management procedures and controls to reduce the uncontrolled risk to a low level. The interpretation of the risk ratings, likelihood, and the consequence are shown in **Table 3.1**, **Table 3.2**, and **Table 3.3**, respectively.

Table 3.1 – Risk matrices						
Risk Assessment Rating Matrix		**Likelihood (how often?)**				
Environmental Consequence (how bad?)		**A**	**B**	**C**	**D**	**E**
		Very likely	Likely	Possible	Unlikely	Very unlikely
1. Severe		**H**	**H**	**H**	**M**	**M**
2. Significant		**H**	**H**	**M**	**M**	**M**
3. Moderate		**H**	**M**	**M**	**L**	**L**
4. Minor		**M**	**M**	**L**	**L**	**L**
5. Negligible		**L**	**L**	**L**	**L**	**L**
Risk Rating:	High Risk	**High**	Medium Risk	**Medium**	Low Risk	**Low**

Table 3.2 – Risk likelihood	
Likelihood: The probability that the identified consequence will occur, considering proximity and exposure to the environmental hazard	
A. Very likely	Over 90% probability, or 'Happens Often'
B. Likely	60% to 90% probability, or 'Could easily happen has occurred before'
C. Possible	20% to 60% probability, or 'Could happen has occurred before'
D. Unlikely	5% to 20% probability, or 'Hasn't happened yet but could'
E. Very unlikely	1% to 5% probability, or Conceivable, but only in extreme circumstances'

Table 3.3 – Risk consequence	
Consequence (impact): The most likely result of contact with the hazard	
Consequence (impact)	**Odour/Environmental impact**
1. Negligible	Negligible or no environmental harm or environmental nuisance.
2. Minor	Material environmental harm or an environmental nuisance, but prosecution unlikely, local publicity only, local nuisance impacts on the community.
3. Moderate	Serious environmental harm, possible prosecution, local state publicity.
4. Major	Serious environmental harm, prosecution probable, national publicity, reputation impacts, political and licence implications.
5. Extreme	Serious environmental harm, prosecution certain, severely affected reputation, international attention possible, probable licence restrictions.

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Table 3.4 – Odour risk management analysis of the key area of the PPF

Element	Aspect details	Description of Impacts	Inherent impact	Inherent Likelihood	Risk score	Management of Impacts	Residual risk
Processing Lines 1 & 2							
Roof fan failure	Motor failure	Cause a reduction in the efficacy of the dilution and dispersion system at the affected process area.	Moderate	Unlikely	Medium	▪ Implementation of a preventative maintenance schedule.	Low
WWTP & AWTP							
Screening failure	Screen inoperative	High solids load to buffer tanks.	Negligible	Likely	Low	▪ Duty/standby arrangement. ▪ Buffer tanks have the capacity to handle solids. ▪ WWTP operator procedures & training. ▪ Parallel process trains.	Low
Failure/ inadequacy of pumps, pipes, dosing systems	WWTP and AWTP underperforms or inoperative	Non-compliant wastewater discharge to sewer/evaporation pond.	Moderate	Possible	Medium	▪ Duty/standby arrangement for key equipment with the automated switchover. ▪ Install additional capacity (pumps/dosing). ▪ WWTP operator procedures & training. ▪ Spare parts/pumps held on-site. ▪ Buffer tank buffer storage available for stoppages of half-day.	Low
Inadequacy/ failure of DAF	WWTP and AWTP underperforms or inoperative	Non-compliant effluent for production. Large solids may cause mechanical issues with downstream processes, and FOG can upset the biological process when introduced in high concentrations.	Moderate	Moderate	Medium	▪ Increase air saturator capacity in DAF. ▪ WWTP and AWTP operator procedures & training. ▪ Spare parts/pumps held on-site. ▪ The primary treatment is designed to protect downstream processes from solids and FOG. ▪ Three units to be operated, with a third the rated capacity to be designed in parallel for maintenance and operational reliability.	Low
Aeration failure in tank vessels	Aerators inoperative	Increased settled solids build up. Odour risks.	Moderate	Unlikely	Medium	▪ WWTP operator procedures & training. ▪ On-site maintenance staff available & spare parts held on-site.	Low
Influent piping blockage or failure	Piping inoperative	Causes contamination of ground or stormwater system.	Moderate	Unlikely	Medium	▪ Install contingency diversion. . ▪ WWTP and AWTP operator procedures & training.	Low
Power failure	WWTP and AWTP inoperative. Process plant may continue.	If prolonged, process plant shutdown required to reduce the risk of adverse odour emission release and impact.	Moderate	Moderate	Medium	▪ Refer to **Section 4.6**.	Low

Table 3.4 – Odour risk management analysis of the key area of the PPF

Element	Aspect details	Description of Impacts	Inherent impact	Inherent Likelihood	Risk score	Management of Impacts	Residual risk
Wastewater tank rupture or overflow	Escape/loss of wastes	Causes contamination of ground or stormwater system sludge on the building floor.	Moderate	Very Unlikely	Medium	▪ Tanks equipped with high/low-level sensors linked to the supervisory control and data acquisition (**SCADA**) system ▪ Buffer tanks bunded. Captured spillage returned to WWTP ▪ Tanks are concrete & unlikely to fail	Low
Membrane bioreactor and reverse osmosis systems.	Failure or fouling of membrane train	Reduce treatment and performance efficiency of the WWTP and AWTP	High	Unlikely	Low	▪ Cleaning will be undertaken to maintain efficient operation. ▪ The CIP waste streams generated by the reverse osmosis system is proposed to be sent to the existing rendering wastewater treatment system, and ultimately be discharged to trade waste. ▪ For the reverse osmosis system, a typical CIP schedule would include inorganic acid and organic acid wash, non-oxidising biocide wash, and an alkaline and surfactant wash. Each reverse osmosis train is required to be cleaned quarterly. ▪ The cleaning of the individual trains would be on a rotating schedule, where roughly two trains would be cleaned each month generating. As the existing plant is designed to treat up to 4 ML/week or 16 ML/month, the addition of 40 kilolitres/month of CIP waste will not make any significant impact to existing wastewater treatment systems performance. ▪ The CIP streams from the membrane bioreactor will be self-contained in the proposed WWTP and AWTP for the PPF. These streams will not need to be sent to the existing WWTP. A typical CIP schedule would be monthly cleaning with chlorine, caustic and organic acids. ▪ Provision for the system to be split into two parallel trains for operational redundancy.	Low

3.4 WEATHER STATION

In addition to the odour management protocol described in **Section 2.2**, a weather station will be installed and maintained at the PPF to record local meteorology conditions. At a minimum, the parameters recorded by the weather station include:

- Rainfall;
- Wind speed (2 m and 10 m);
- Wind direction (2 m and 10 m);
- Temperature;
- Relative humidity; and
- Solar radiation.

The adoption of an on-site weather station will assist in the identification of adverse weather conditions and provide a feedback loop to facilitate a proactive response plan of odour events. Moreover, the observational data will be logged and stored in a database for use in complaints investigations (see **Section 6.1** for details) and any supplementary air dispersion modelling studies that are required to be performed for the PPF in the future.

3.4.1 Siting of Meteorological Station

The siting of all existing meteorological station must be reviewed in the context of its consistency with the applicable Australia Standards (**AS**) including *AS2922-1987 – Ambient Air Guide for the Siting of Sampling Units* and *AS2923-1987 – Ambient Air – Guideline for measurement of horizontal wind for air quantity applications*. If an ideal site that is a flat open area substantially free of obstructions is not available, a potential siting solution that is consistent with the standard would be mounting a 10-metre mast at a central location on the PPF building roof with a horizontal clearance of at least ten times any roof ventilation fan unit height from the roofline.

3.4.2 AWTP Mechanical Evaporation

The RO concentrate stream from the AWTP will be managed via an accelerated evaporation protocol with final disposal off-site as a concentrated brine. The accelerated evaporation protocol will be facilitated by a feedback loop from an in-built or on-site weather station. This protocol will be developed as part of the detailed design for the AWTP. A control system can adjust the operation to reduce or eliminate overspray by controlling droplet size and or stopping/reducing spray flow. In addition, the installation of overspray curtains or earth berm around the periphery of the pond is recommended by Hydroflux, especially with reference to the prevailing wind direction. In this instance, Hydroflux suggest that an overspray curtain should be considered, and combined with a weather-based control system.

The treated wastewater from the evaporation pond will not represent a significant source of odour emissions, given the effluent performance that will be achieved from the process. As such, no specific control to manage odour is required for this activity other than the current mechanical evaporation protocol that will be implemented by Hydroflux to manage fugitive aerosol plumes from the AWTP mechanical evaporation activities during normal operation.

The concentrated salt waste will be disposed of via a licenced disposal facility.

3.5 ANCILLARY CHILDCARE CENTRE

It is proposed to operate a childcare centre on-site at the location indicated in **Figure 1.1.** Given the odour management protocol that will be adopted at the PPF as described in **Section 2.2** and **Section 3.4**, any ground-level odour impact risks are considered to be unlikely. However, given the sensitivity of a childcare environment, Baiada will be implementing the following precautionary measures as part of the PPF:

- Adaption of a hybrid high-efficiency particulate air and carbon filter system to protect the indoor airspace environment of the childcare activities during atypical or upset conditions. During normal operating conditions, odour impact risks are very unlikely under the odour management protocol adopted for the PPF operations; and

- Vegetative landscaping for the outdoor areas to provide a level of screening, attenuation and visual disconnection from the PPF operations.

3.6 STAFF TRAINING

All workers at the PPF will undergo active environmental awareness workshops and training, which will include, but not be limited to:

- The regulatory requirements associated with the environment protection licence (**EPL**);

- Potential environmental impacts which may be caused by the PPF during normal and atypical/upset conditions;

- Prevention of accidental emissions and actions to be taken under such circumstances;

- Procedures for complaint handling, investigation, resolution and reporting back to the complainant and NSW EPA (see **Section 6.1**); and

- All employees will be instructed to remain vigilant to and report any atypical odour or change in air quality around the PPF immediately to the site manager.

4 EMERGENCY/CONTINGENCY PLAN

Even at a well-managed food processing facility, operating under steady-state conditions, incidents can occur that result in the release of nuisance levels of odour. As such, to minimise the likely consequence of such events, it is essential to have a crisis strategy and continuity plan, that follows the workflow shown in **Figure 4.1**.

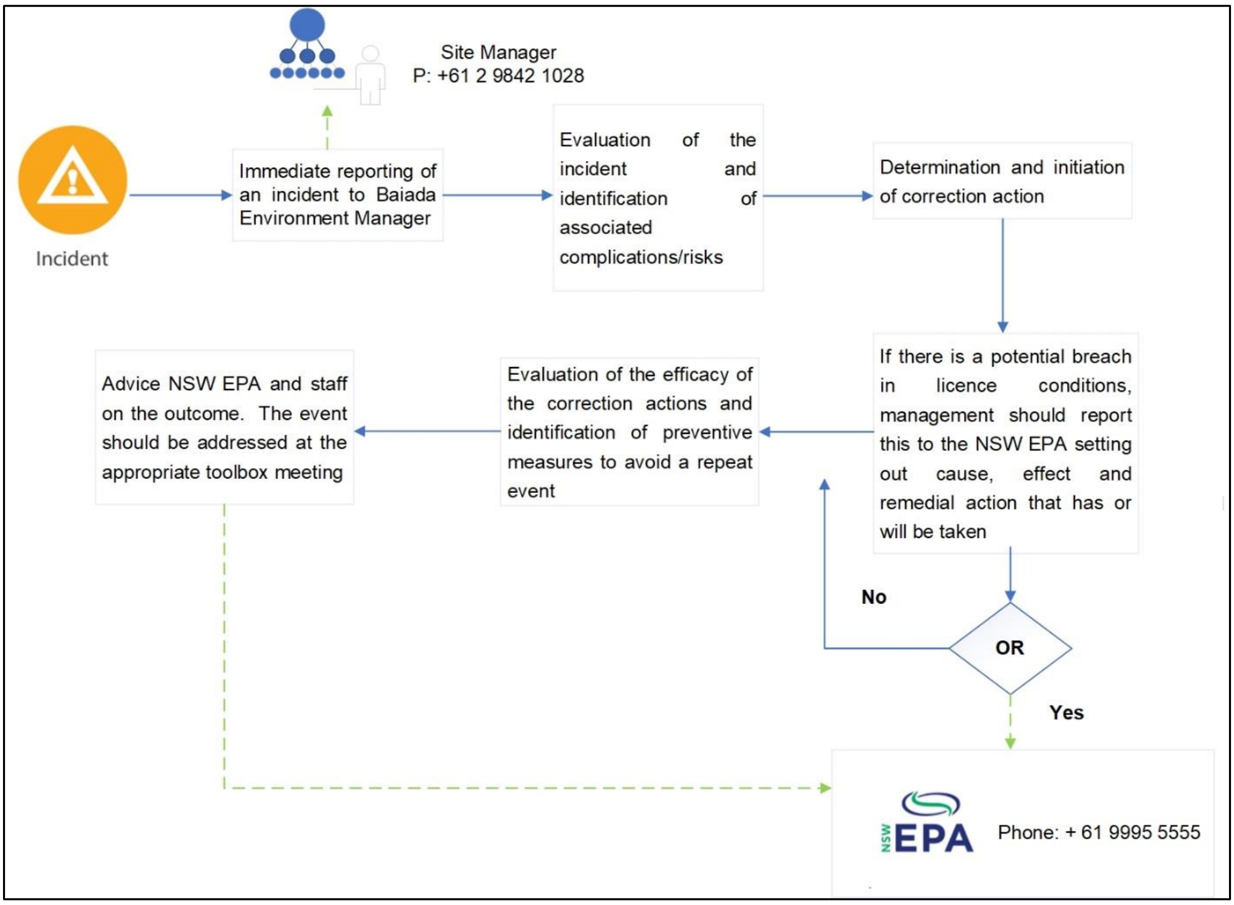

Figure 4.1 – Emergency/contingency plan workflow

4.1 UTILITY OF SOPS

The SOPs that will be developed in due course (see **Section 3.1**) will identify the components, define the layout of the system and describe the methodology of the PPF, WWTP and AWTP to adequately plan for contingency actions in the event of malfunction or other emergency scenarios at the PPF. It will apply to all potential odour generation and release points at the proposed PPF.

Given the importance and dependence of potable food-grade water for the PPF operations from the WWTP and AWTP, the emergency/contingency procedure will be developed to identify, eliminate or manage the risks associated with the movement, treatment and fate of effluent and trade waste. It will also include the emergency/contingency plan, which reflects a set of documented procedures to follow or reference in the instance of a plant or system failure at the PPF to manage the potential risk associated with odour impacts.

4.2 ROLES AND RESPONSIBILITIES

The following are the roles and responsibilities under an emergency event or a triggering of the contingency plan relating to the WWTP at the PPF to the potential risk associated with odour impacts:

a) The Plant Manager (or a delegated representative) has responsibility for the implementation of this relevant procedure;

b) The Maintenance Manager (or a delegated representative) has overall authority for the verification of the implementation and appropriateness of this procedure. They are responsible for the allocation of necessary resources to perform monitoring, preventative maintenance work and remediation of any faults associated with the system;

c) The Environment Manager is responsible for liaising with Senior Management and the General Manager to determine the appropriate course of action in the event of an incident which has or has the potential to impact either the environment or trade waste adversely;

d) The WWTP and AWTP operators have the responsibility to document and report any malfunctions in the WWTP which they observe immediately to both the Maintenance Manager and Environment Officer

e) All personnel at the PPF are responsible for reporting any faults or malfunctions immediately to the Maintenance Manager or Supervisor; and

f) External contractors will carry out preventative and maintenance work as directed by the Maintenance Manager or Environment Officer.

4.3 RECORDS

The following category of records will be developed and maintained as part of the operation of the PPF, WWTP and AWTP:

1. PPF, WWTP and AWTP checklists;
2. Pump checklist;
3. Operation checklist;
4. Preventative maintenance schedule; and
5. Maintenance log.

4.3.1 Corrective Actions

Any corrective actions performed by internal or external staff will be recorded using Baiada's Maintenance Management System.

4.4 WWTP AND AWTP CONTINGENCIES

Given the dependence of the WWTP and AWTP for the uninterrupted and operational reliability of the PPF activities (as outlined in **Section 3.3.2**), a layer of contingency will be provided to address odour management under the following circumstances:

a. under repair;

b. undergoing maintenance;

c. being cleaned, desludged or serviced;

d. prevented from discharging to sewer/evaporation pond;

e. have restricted flows to sewer/evaporation pond; or

f. otherwise operating at less than ordinary capacity;

These circumstances will be addressed as part of the SOPs for the WWTP and AWTP.

4.5 PPF ROOF VENTILATION FANS CONTINGENCY PLAN

The performance of the roof ventilation fans for Processing Lines 1 and 2 will be monitored for operability. If there is a failure of any roof ventilation fans, a signal will be issued via the SCADA system notifying the appropriate Baiada representative. It is expected that spare parts will be readily available to ensure a quick turnaround time for remediating the failed roof fan. Moreover, it is also expected that preventative maintenance will result in a low probability of roof fan failure, as a key measure facilitating this process will be the recording of operating hours for each fan. This is achieved automatically via the SCADA system and will be readily accessible to the Baiada operator.

4.6 POWER FAILURE

If a regional power failure occurs, then all processing will cease, and processing would recommence with the re-establishment of power connection. During this time, the undertaking of an FAOA survey (see **Section 6.2.1**) should be undertaken in the morning, afternoon and evening, corresponding with the recommencement of operation. However, power interruptions are not expected to be a common occurrence, and battery backup will be provided so essential programming is not lost.

4.7 EXTREME AND UNLIKELY EVENTS

The OMP does not cover extreme events as this is best dealt with on a case-by-case basis. The risk of an extreme event with the layer of contingency for the PPF is very unlikely, and therefore, the probability of occurrence is practically low. As such, odour impact risks under such circumstances are extraordinary.

4.8 WWTP AND AWTP MONITORING

The WWTP and AWTP will have an extensive SCADA system, which will generate a voluminous quantity of data and provide a network of feedback input for process optimisation and control. The WWTP and AWTP will be continuously supervised, with external contractors undertaking the necessary calibrations and checks as part of the service agreement for the WWTP and AWTP. All monitoring documentation, both hard and soft versions, will be managed by Baiada Environment Management System. All preventative maintenance documentation is kept with the Maintenance Division.

5 KEY STAFF AND RESPONSIBILITIES

This section summarises the key staff and responsibilities for ensuring that the OMP is valid, up to date and seek its overall implementation. The key staff responsible for the OMP at the PPF operations include:

- Chief Operating Officer;
- Plant Manager; and
- Environment Manager.

5.1 CHIEF OPERATING OFFICER

The Chief Operating Officer responsibilities are as follows:

- The environmental sustainability, livestock processing and business operations of the PPF; and
- Overall responsibility for the management of all the PPF operations.

5.2 PLANT MANAGER

The Plant Manager responsibilities are as follows:

- Overall responsibility for the management of operational activities for the PPF, including the oversight of the odour management and control systems;
- Oversees management of the PPF, ensuring that all activities and operations are conducted in compliance with management plans and operating systems, including supervision of those relating to environmental management (including odour). They are advised of any relevant odour complaints;
- Reports to Chief Operating Officer on operations and address of performances that require infrastructure support; and
- The implementation of the OMP on a day-to-day basis for the PPF operations.

5.3 ENVIRONMENT MANAGER

The Environment Manager responsibilities are as follows:

- Overall responsibility for administrative controls and environmental management systems for the PPF;
- Ensuring that the process parameters are being correctly undertaken and maintained; and
- Responsible for the maintenance of the monitoring records.

6 INCIDENT & COMPLAINTS MANAGEMENT

6.1 ODOUR COMPLAINTS/INCIDENT HANDLING

The PPF has two key reporting forms for the management of incident and complaints, as follows, respectively:

1. An environmental incident report; and
2. An environmental complaint form.

This is an existing feature of the PPF site location, which is provided by Baida's Environmental Management System.

6.2 ODOUR INCIDENT, MANAGEMENT AND MONITORING

6.2.1 Field Ambient Odour Assessment Surveys

In response to an odour complaint, the undertaking of Field Ambient Odour Assessment Surveys (**FAOA**) by suitable personnel from the PPF will allow for real-time monitoring of ambient odour levels, especially during atypical/upset process conditions and can be undertaken in the form of daily patrols both on-site and off-site (if necessary, at sensitive receptors). The FAOA surveys could also be a response protocol to an odour complaint received from the Plant Manager or Environment Manager of the PPF (provided the odour complaint has been logged the same day and within a reasonable timeframe since the odour episode).

The FAOA surveys are intended to be used as a complaints response and management tool, designed to record the PPF personnel determinations of the presence or absence of ambient odours at both on-site and off-site locations (in the instance that a positive detection beyond the PPF boundary is recorded), the perceived strength/intensity of any odour found to be present, the duration of the odour event, any definable odour character, and information of prevailing wind conditions. The results are to be recorded in an FAOA log sheet template (see **Form 6.1**). If there is an odour present, then the entry should be completed. If there is a prevailing wind from the direction of the PPF, and there is no positive detection observed, then the entry should still be made. These NIL entries can provide as much valuable data to the responsible PPF personnel as 'FAOA positive' form log sheet entries.

The key FAOA parameters that are to be recorded in the form log sheet are as follows:

- Date and time;
- Location;
- Intensity, according to the 7-point odour intensity scale (see **Table 6.1**); and
- Meteorological conditions including weather conditions, wind direction, and wind speed (via the installed meteorological station – see **Section 3.4**).

Form 6.1 should be printed or electronically stored, and template kept in a separate and accessible file at the PPF. All filled forms should also be kept in a separate file or attached to the corresponding logged complaint in the Baiada's Environmental Management System. To facilitate in the execution of the FAOA surveys at the PPF, **Section 6.2.1.1** & **Section 6.2.1.2** outline and describe the odour intensity scale and odour descriptors, respectively, available to the responsible PPF personnel for the assessment of odour during an FAOA survey.

6.2.1.1 Odour intensity scale

The odour strength for use in the FAOA is quantified, according to the German VDI 3940 odour intensity scale. The category scale for judging odour intensity in the field is a quantitative seven-point reference scale where the responsible PPF personnel award one of the attributes in **Table 6.1** to the assessor's odour impression. As a reference point, an odour is clearly recognised (category of intensity 3) when an odour descriptor can be clearly distinct.

Table 6.1 –Odour Intensity Chart

Odour Strength	Intensity Rank	Comment
Not detectable	0	No odour detected
Very Weak	1	Odour is recognised and where possible assigned to the odour source
Weak	2	Odour is weak but not yet distinct
Distinct	3	Odour is clearly detectable and distinct
Strong	4	Strong odour detectable
Very Strong	5	Very strong odour detectable
Extremely Strong	6	Extremely strong odour detectable

6.2.1.2 Odour character

Any potential odour sources have their origins from the process operations occurring at the PPF. Based on the PPF process operations, the key odour descriptors have been developed, as shown in **Table 6.2**. The odour descriptors are specific to the PPF and its operations. This enables the responsible Baiada personnel to readily identify the likely source of a positive odour entry during the daily FAOA survey.

Table 6.2 - Odour descriptors associated with the PPF

Character ID	Odour description
A	meaty, putrid
B	ammoniacal, pungent
C	faecal, dirty, septic
D	rotten egg, sewage
E	earthy, bark, musty

Field Ambient Odour Assessment Form Logsheet							
Date of Observation							
Time of Observation							
Measurement Location ID or location of odour							
Weather conditions (sunny, dry, rain, fog, snow etc)							
Temperature (hot, very warm, warm, mild, cold or degrees if known) *							
Wind strength (calm, light, steady, strong, gusting) *							
Wind direction (e.g. from NE) *							
What does it smell like? (Please circle response)	meaty, putrid ammoniacal, pungent faecal, dirty, septic rotten egg, sewage earthy, bark, musty stale water Other____						
How unpleasant is it?							
Was the character or strength of this smell offensive?							
Intensity – How strong was it? (Please circle) **Refer to odour intensity scale for meaning (see below)**	0	1	2	3	4	5	6
How long did the smell last?							
Was it constant or intermittent?							
Any other comments							

Form 6.1 - FAOA Logsheet

6.2.2 Odour Communication and Response Strategy

6.2.2.1 Odour diaries

Odour diaries can assist complainants in providing details of their perception of the suspected nuisance odours and any effects that the odour has on their behaviour. Details are recorded using a standard diary record sheet on a daily or weekly basis and particularly whenever an odour episode occurs. Simple local wind or weather condition records can also help identify or confirm the source of alleged nuisance odours. The odour descriptors and intensity chart should be provided to concerned neighbouring receptors, as shown in **Table 6.1** & **Table 6.2**.

The odour diaries are a valuable communication tool between the community, NSW EPA and the PPF operations, as it provides feedback on what the complainant is experiencing in real-time during an odour episode, especially in the event where they do not have the opportunity to lodge a complaint in real-time. This can be a contingency response plan in the event of any odour concerns associated with the PPF, which is expected to be not realised.

6.2.3 Meteorological Station

A meteorological station that is electronically enabled and logged will ensure best practice at the PPF to assist with odour related complaints (see **Section 3.4**).

7 OMP CONTINUOUS IMPROVEMENT PLAN

Version 0 of the OMP was developed as part of the regulatory approval process for the PPF. As such, the degree of information available, particularly of a detailed design nature regarding the engineered controls and monitoring system, were not available at the time of writing. Therefore, the current version of the OMP should be used as a supplementary document to the findings made in the July 2020 Report and as a framework that outlines the hierarchy of controls, in the form of, but not limited to, engineered, administration and/or management practices to prevent or minimise the potential of odour generation and release.

The OMP will undergo an update within three months of commissioning and optimisation of the PPF. Moreover, the OMP should be reviewed in conjunction with the regular checks by the Environment Manager throughout a typical environmental reporting year at the PPF.

End of Document

ATTACHMENT 8: REVISED STORMWATER MANAGEMENT REPORT

AP08

STORMWATER MANAGEMENT PLAN

OAKBURN PROCESSING PLANT

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18 June 2020

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REVISION STATUS

MPN Reference No: 7679

Client: Baiada (Tamworth) Pty Limited

Site Address: Oxley Highway, Westdale, New South Wales

Report Title: Stormwater Management Plan

DOCUMENT CONTROL

Version	Date	Author	Reviewer	Approved
Draft	31/07/2018	Matthew Hendle	Lachlan Stephenson	Lachlan Stephenson
Issue A	22/01/2019	Matthew Hendle	Lachlan Stephenson	Lachlan Stephenson
Issue B	03/06/2020	Matthew Hendle	Lachlan Stephenson	Lachlan Stephenson
Issue C	18/06/2020	Matthew Hendle	Lachlan Stephenson	

EXECUTIVE SUMMARY

This report has been commissioned by Baiada (Tamworth) Pty Limited for the Development Application for the proposed Oakburn Processing Plant at Oxley Highway, Westdale.

This report addresses the following Engineering aspects of the proposed development:

- Topography
- Flooding
- Stormwater quality management
- Stormwater quantity management
- Erosion and sediment control

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1 PURPOSE

This Stormwater Management Plan has been prepared to support the Development Application for the proposed Oakburn Processing Plant.

2 INTRODUCTION

2.1 Project Description

Stage 1 of the development, which was recently completed, included the construction of a new protein recovery plant to replace the old plant, which was destroyed by fire.

The current proposal includes the construction of a new processing plant to the South of the Stage 1 building along with new car parking, loading docks, access roads and a wastewater treatment plant.

The proposed development is depicted on the architectural plans prepared by SBA Architects attached in Appendix 1, with excerpt below.

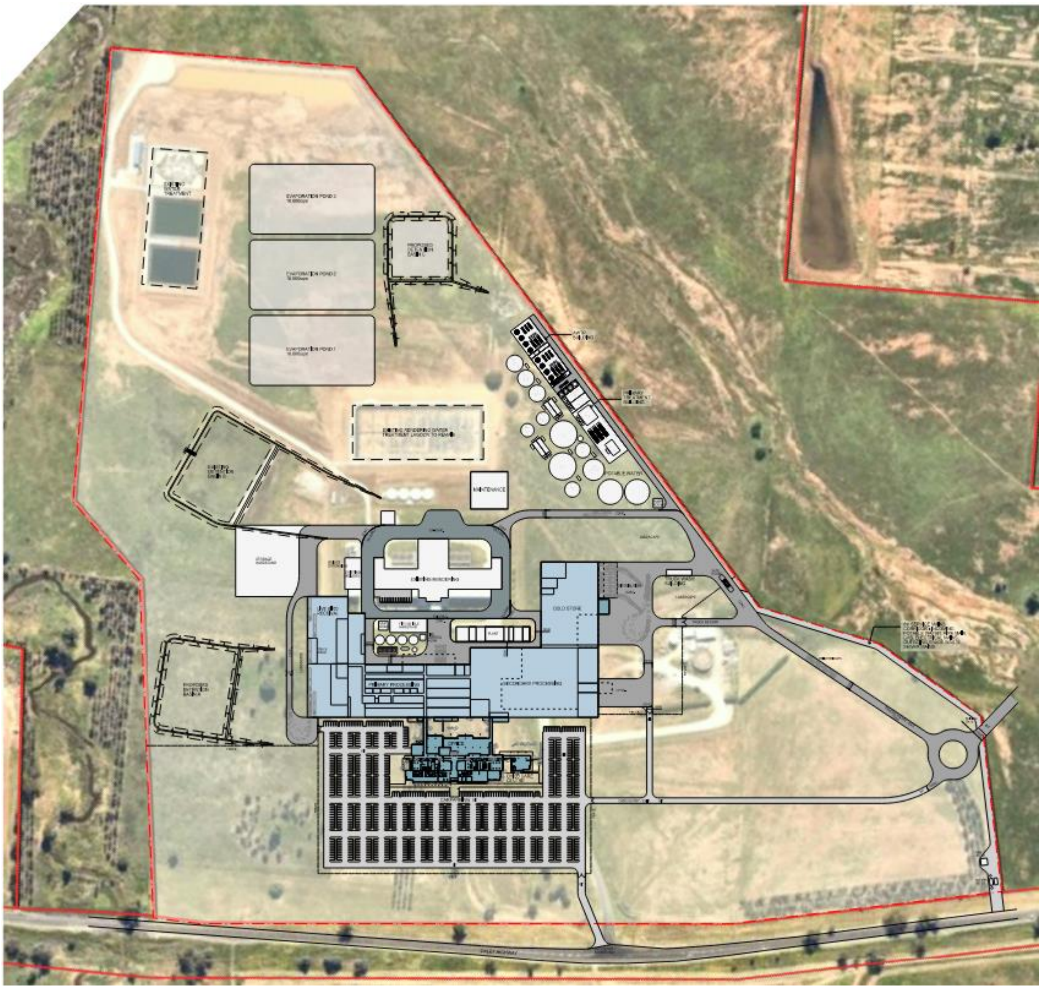


Figure 1 – Proposed Development

3 SITE CHARACTERISTICS

3.1 Site Location

The site is located at Oxley Highway, Westdale on land described as Lot 100 on DP 1097471.

The site is bounded by Oxley Highway to the South-West, Boltons Creek to the North-West and undeveloped rural land to the North and East.

Figure 2 – Site Location

3.2 Topography and Existing Site Drainage

The site currently contains a protein recovery plant and a series of smaller buildings and a wastewater treatment plant which was constructed as part of Stage 1 of the development.

The site generally falls away from the centre of the site's South Western boundary to the West towards Boltons Creek and to the North and East towards an existing overland flow path.

Stormwater runoff from the site discharges as overland sheet flow across the West, North and East boundaries of the site.

There is an existing detention basin which was constructed as part of Stage 1 to treat and detain the stormwater runoff from the development.

No external catchments appear to flow through the site.

4 SITE DATA

Site data has been obtained from the following sources of information:

- As constructed plans
- New South Wales Environmental Protection Authority (EPA)
- Tamworth Regional Council
- Satellite imagery
- Relevant reports
- Discussions with relevant authorities
- DBYD
- Survey plans

5 STORMWATER

5.1 Flooding

Current flood mapping in the area indicates the site is not subject to flooding from any sources.

5.2 Site Based Stormwater Management Plan

The aim of the Stormwater Management Plan outlined below is to:

- Prevent or minimise adverse social or environmental impacts from stormwater runoff originating from the proposed development.
- Achieve acceptable levels of stormwater runoff quality and quantity.

The Stormwater Management Plan aims to identify Stormwater Quantity and Quality Best Management Practice for the site and demonstrate that water quantity and quality impacts will be minimised in receiving waters.

The Stormwater Management Plan outlines the site in two sections, the operational phase and the construction phase. The operational phase addresses treatment of contaminated runoff from the developed site by natural methods before discharging into receiving waters whilst the construction phase of the Stormwater Management Plan addresses erosion and sediment control to prevent contamination of water sources by stormwater runoff during construction of the site.

5.3 Operational Phase

5.3.1 Proposed Site Drainage

The site has been split into three main sub-catchments – a South West, a North and an East catchment, identified as Catchments A, B and C, respectively. There are also three other sub-catchments including the undeveloped land and access roads in the Eastern half of the site and the undeveloped land on the Southern side of the site, identified as Catchments D and E, respectively. The catchment locations and extents are shown on MPN Plans 7679-SKC.01-SKC.03 attached in Appendix 2, with excerpt below.

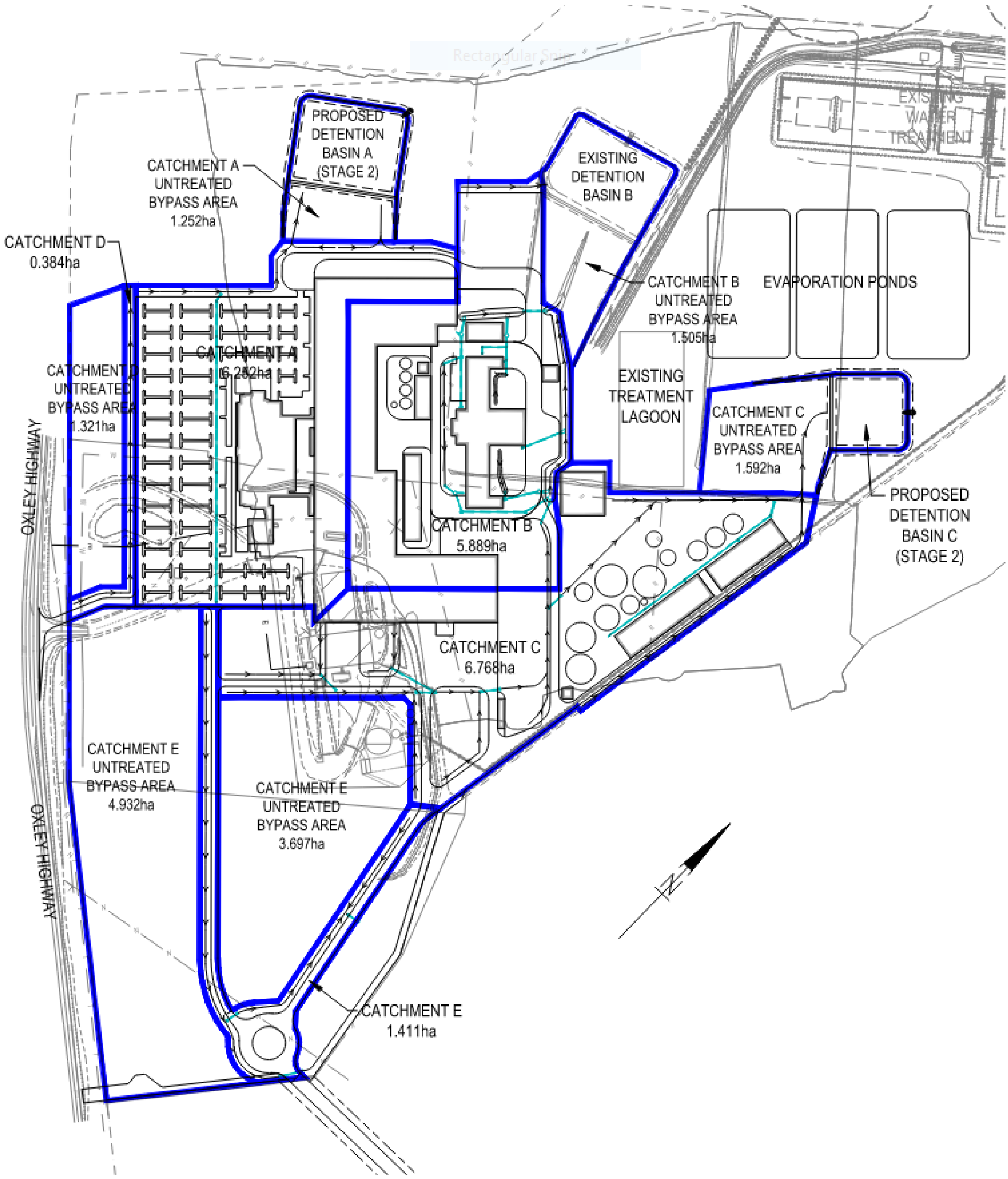


Figure 3 – Proposed Site Catchments

Stormwater runoff from each of the main sub-catchments will be collected and conveyed in a new internal stormwater pit, pipe and open channel network, prior to discharge to three separate treatment/detention basins. Stormwater will discharge from the basins via overland flow across the site boundaries as per existing condition. Litter baskets will also be fitted to the new field inlet pits to capture gross pollutants.

The existing detention basin constructed as part of the previous stage of the development will be retained (Existing Basin B) to service Catchment B. New basins will be constructed to the South West (Catchment A) and North East of the site (Basin C) to service Catchments A and C, respectively.

Stormwater runoff from each of the other sub-catchments will be collected in grassed swales prior to discharge across the site boundaries via overland flow as per existing condition.

The proposed site stormwater infrastructure is shown on MPN Plans 7679-SKC.01-SKC.03 attached in Appendix 3.

5.3.2 Stormwater Quantity Management Strategy

For the management of stormwater quantity for the proposed development, a DRAINs computer model was used to calculate the stormwater runoff quantity for the existing and post-development conditions.

In order to limit the site stormwater discharge, stormwater runoff from Catchments A, B and C will be detained in three separate above ground basins. The basins will be over-sized to cater for the areas which will bypass detention (Catchments D and E). The location and configuration of the three basins are shown on MPN Plans 7679-SKC.01-SKC.03 attached in Appendix 3. The properties of the basins are listed in Table 1 below.

Parameter	Detention Basin A	Detention Basin B	Detention Basin C
Storage (incl. Freeboard)	4,450m3	4,500m3	3,500m3
Outlet (V-Notch Weir)	2.26m Width @ RL 381.33 1.13m High	2.30m Width @ RL 380.65 1.15m High	2.52m Width @ RL 380.26 1.26m High
Invert Level	RL 380.20	RL 379.50	RL 379.00
Q100 Water Level	RL 381.03	RL 380.31	RL 379.96
Top of Bund (min)	RL 381.33	RL 380.65	RL 380.26
Freeboard	0.30m	0.34m	0.30m

Table 1 – Detention Basin Properties

Runoff flows for the Annual Recurrence Intervals from 5 to 100 years and durations of 5 minutes to 2 hours were calculated to ensure that peak runoff flows from the proposed development would not exceed peak runoff flows from the existing site. The most critical stormwater events for the site's catchment are compared in Table 2 below.

ARI	Existing Discharge From Site (m3/sec)	Proposed Discharge From Site (m3/sec)
5	2.31	2.02
10	3.11	2.53
20	4.16	3.19
50	5.47	3.97
100	6.60	4.71

Table 2 – Existing and Proposed Peak Flows with Detention

5.3.3 Stormwater Quality Management Strategy

In order to reduce overall post-development pollutant loads and concentrations being discharged from the site, treatment solutions have been provided to remove hydrocarbons, suspended solids and nutrients prior to being discharged from site.

5.3.3.1 Potential Pollutants Generated

The pollutants that could be potentially generated as a result of the development use are as follows:

- Litter
- Sediment
- Nutrients (Nitrogen and Phosphorous)
- Hydrocarbons (oils and grease)
- Surfactants
- Pathogens/Faecal Coliforms (bacteria and viruses)

The MUSIC computer modelling program developed by the Co-operative Research Centre for Catchment Hydrology was used to predict the performance of the proposed stormwater treatment train.

At this stage the pollutants modelled in MUSIC are Total Suspended Solids (TSS), Total Phosphorous (TP) and Total Nitrogen (TN).

5.3.3.2 Rainfall

The rainfall data used in the model was based on the Bureau of Meteorology data from rainfall station 55054 Tamworth Airport. The model was run from 16 August 1958 to 31 December 1992. The modelling time step was 6 minutes.

5.3.3.3 Rainfall Runoff Properties

The rainfall runoff properties listed in Table 3 below were adopted for the MUSIC modelling undertaken for the development.

PARAMETER	VALUE		
	Roof	Road	Ground Level
Rainfall Threshold (mm)	0.3	1.5	1.5
Soil Storage Capacity (mm)	100	100	100
Initial Storage (% of capacity)	25	25	25
Field Capacity (mm)	87	87	87
Infiltration Capacity Co-efficient a	250	250	250
Infiltration Capacity Co-efficient b	1.3	1.3	1.3
Initial Depth (mm)	10	10	10
Daily Recharge Rate (%)	60	60	60
Daily Base Flow Rate (%)	45	45	45
Deep Seepage (%)	0	0	0

Table 3 – MUSIC Rainfall Runoff Parameters

5.3.3.4 Pollutant Export Parameters

The adopted Pollutant Export Parameters for each source node type are presented in Table 4 below.

Runoff pollutant concentrations are generated stochastically from the defined mean and standard deviation.

		Log10 TSS (mg/L)		Log10 TP (mg/L)		Log10 TN (mg/L)	
		Base Flow	Storm Flow	Base Flow	Storm Flow	Base Flow	Storm Flow
Roof	Mean	0	1.30	0	-0.89	0	0.30
	Std. Dev.	0	0.32	0	0.25	0	0.19
Roads	Mean	0	2.43	0	-0.30	0	0.34
	Std. Dev.	0	0.32	0	0.25	0	0.19
Ground Level	Mean	1.20	3.00	-0.85	-0.30	0.11	0.34
	Std. Dev.	0.17	0.32	0.19	0.25	0.12	0.19

Table 4 – Pollutant Export Parameters

5.3.3.5 Water Quality Objectives

In the absence of specific Water Quality Objectives from Tamworth Regional Council, the industry standard pollutant reduction targets listed in Table 5 below have been adopted.

WATER QUALITY OBJECTIVES				
Total Suspended Solids (TSS) % Reduction	**Total Nitrogen (TN) % Reduction**	**Total Phosphorous (TP) % Reduction**	**Litter/ Gross Pollutants % Reduction**	**Oils/ Grease**
85	45	65	90	No visible films or odours

Table 5 – Water Quality Objectives

5.3.3.6 Treatment Plan

In order to achieve the pollutant load reduction targets for the development, it is proposed to use mechanical and natural treatment methods to treat the runoff prior to discharge from the site.

Stormwater runoff from Catchments A, B and C will be treated by GPTs and/or buffer strips prior to discharging via swales to the detention basins.

Stormwater runoff from catchments D and E will be treated by buffer strips and swales.

The treatment plan for the site is depicted on MPN Plans 7679-SKC.01-SKC.03, attached in Appendix 3, with MUSIC excerpt shown below.

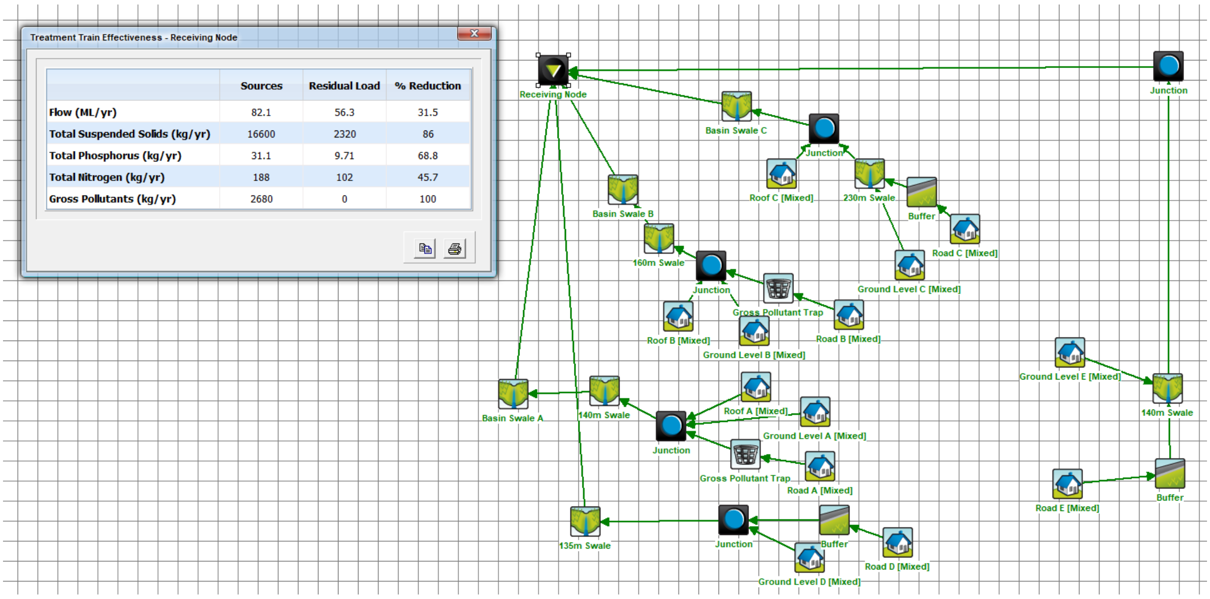


Figure 4 – Treatment Plan

5.3.3.7 MUSIC Results

The resulting percentage-based load reductions at the site outlet is shown in Table 6 below, together with the Water Quality Objectives for the receiving waters.

	Sources	Residual Load	% Reduction	Target %
Total Suspended Solids (kg/yr)	16,600	2,320	86.0	85
Total Phosphorous (kg/yr)	31.1	9.71	68.8	65
Total Nitrogen (kg/yr)	188	102	45.7	45
Gross Pollutants (kg/yr)	2,680	0	100	90

Table 6 – Percentage Based Load Reduction Results

5.3.3.8 POD Pollutant Reduction

5.3.3.8.1 Litter

Rubbish bins will be located within the development buildings and car parks for use by staff and visitors. As a result of this and with the installation of the GPTs and swales, levels of litter exiting the site via stormwater are expected to be negligible.

5.3.3.8.2 Sediment

The TSS outflow is identified in Table 6 above. As can be seen the pollutant load reduction achieves the Water Quality Objectives. The TSS level is therefore considered acceptable.

5.3.3.8.3 Nitrogen and Phosphorous

The TN and TP loads are identified in the above Table 6. As can be seen the TN and TP loads leaving the site achieve the Water Quality Objectives. Significant reductions in Nitrogen and Phosphorous have been achieved. The Nitrogen and Phosphorous residual loads are therefore considered acceptable.

5.3.3.8.4 Hydrocarbons

Hydrocarbons will be digested and processed by soil microorganisms within the swales and attachment to vegetation where biological breakdown of the hydrocarbons can occur. Hydrocarbons will also be captured within the GPTs.

5.3.3.8.5 Surfactants

If car or truck washing occurs on site it will be within a bunded area where surfactants will be captured and treated prior to discharging into the stormwater network.

5.3.3.8.6 Heavy Metals

Heavy metals in stormwater runoff generally become attached to fine sediment. The swales will remove the majority of this fine sediment. The removal of the fine sediment should effectively remove most of the heavy metals in the runoff.

5.3.3.8.7 Pathogen/ Faecal Coliforms

Domestic animals within the development will be under the control of their owners at all times and the owners will be expected to clean up after them.

5.3.3.9 Proposed Stormwater Quality Treatment Devices

5.3.3.9.1 Locations
The location of the proposed stormwater quality treatment devices is shown on MPN Plans 7679-SKC.01-SKC.03, attached in Appendix 3.

5.3.3.9.2 Device and Size
The device type and sizes are shown on MPN Plan 7679- SKC.01-SKC.03, attached in Appendix 3.

5.3.4 Construction Phase (Sediment and Erosion Control)

5.3.4.1 Intent of Erosion and Sediment Control Management Plan
To prevent stormwater contamination (of watercourses) and the release of contaminated stormwater and wastewater by ensuring compliance with the Protection of the Environment Operations Act 1997.

5.3.4.2 Implementation Strategy
Establish control measures and best practice approaches to prevent stormwater contamination and minimise the risk and adverse effects of erosion and sedimentation. All Erosion and Sediment Control measures must be designed, constructed and maintained in a manner that is commensurate with the site's erosion risk.

5.3.4.3 Erosion and Sediment Control Measures
- Obtain a license or approval to operate activities that are classed as environmental relevant activities (i.e. they have the potential to cause environmental harm).
- Implement and maintain appropriate control measures to prevent sediment laden wastewater and other potential pollutants such as oil, paint and wet concrete from entering the stormwater system via stormwater drains and gullies. The control measures which must be considered to be adopted are:
  - Limitation of site access during construction to minimise disruption to traffic. Install a temporary construction entry/ exit sediment trap at all site accesses to minimise mud and sediment from the site being tracked onto public road, particularly during wet weather or when the site is muddy.
  - Install and maintain appropriate sediment fences around construction areas.
  - Divert clean stormwater runoff, using catch drains, around construction areas to existing or new stormwater drainage system.
  - Install sandbags and other pollution containment devices around stormwater drains and any other locations where required to prevent sediment entering the trunk stormwater system.
  - Cover open earth/ soil areas progressively (with concrete slabs and pavements or mulch) to minimise areas of bare earth/ soil.
  - Any stockpiles of excavated soil and demolition/ construction waste must be located where risk of erosion and sedimentation is minimal, and must be protected from wind and water erosion.
  - Implement and maintain appropriate control measures such as catch drains and sediment fences to prevent ponding of stormwater or discharge of stormwater from the site to adjacent properties.
  - Provision of spill/ pollution control equipment that is readily accessible to clean up spills and leaks.
  - Ensure spill/ pollution control measures are available and maintained in working condition.

- Sediment contained by the sediment control devices such as sandbags, sediment fences and containment bunds must be frequently removed and placed in a controlled area.
- Implement an inspection schedule for any spill or leaks of any potential polluting areas or activities.

5.3.4.4 Erosion and Sediment Control Management Goals

- Licenses, approvals, permits and inspection reports are in order.
- Sediment or pollution control devices such as sandbags, sediment fences and containment bunds are in place, maintained and effective.
- Spill/ pollution control equipment is readily accessible at designated locations.
- No accumulated sediment is contained by the sediment control devices such as hay bales, sediment fences and containment bunds.
- No sediment exceeding a depth of 300mm in the pollution control devices (e.g. silt trap).

5.3.4.5 Erosion and Sediment Control Implementation Program

- Licenses, permits or approvals for each environmentally relevant activity must be obtained prior to the commencement of the particular activity.
- Appropriate control measures such as sediment fences, temporary construction entry/ exit sediment traps, pollution containment devices (e.g. sandbags), stormwater diversion and administrative controls must be installed and established prior to commencement of the earthworks and construction activities.
- Pollution control devices such as spill control equipment must be inspected on a regular basis (at least weekly).
- Other sediment and pollution control equipment such as containment bunds, hay bales and sediment fences must be inspected on a regular basis (at least daily).
- Inspection for any leaks, spills or potential contaminating activity must be performed on a regular basis (at least daily).
- Remove accumulated sediment or other contaminants from sediment/ pollution control devices on a regular basis.
- All erosion and sediment control measures must be inspected within 24 hours of expected rain and within 18 hours of a rainfall event.

5.3.4.6 Responsible Person or Organisation

The contractor shall be responsible for the implementation and maintenance of the Erosion and Sediment Control Measures.

5.3.4.7 Reporting/ Review

Records such as licenses, approvals, permits and inspection reports must be reviewed on a regular basis (e.g. at least monthly) to ensure that legal compliance is met, complaints are reviewed and systems are working to prevent contamination.

5.3.4.8 Corrective Actions

- Perform clean-up of any spills immediately.
- Any mud or sediment which is tracked onto public roads is to be immediately removed using dry clean-up methods (i.e. shovel and broom).
- Remove or relocate any stockpiles of waste where there is a reasonable risk of erosion and sedimentation.
- Replace or repair sediment or pollution control devices if they are not maintained in good working condition.

6 CONCLUSION

This Stormwater Management Plan demonstrates that under the proposed concept plan, stormwater quality and quantity treatment is achievable to the levels required by Tamworth Regional Council and Industry Best Management Practice.

Stormwater detention for the development will be provided in three detention basins located throughout the site to suit the site's sub-catchments. The detention basins will be over-sized to compensate for the areas of the site which bypass detention.

Stormwater treatment for the development will be provided by a series of GPT's and swales located throughout the site.

7 LIMITATIONS OF REPORT

MPN have prepared this report for the proposed extension to the Oakburn Processing Plant in accordance with MPN's proposal to Baiada (Tamworth) Pty Ltd. This report is provided for the exclusive use of Baiada (Tamworth) Pty Ltd for this specific project and its requirements. It should not be used or relied upon by a third party and MPN accept no responsibility for the use of this report by any party other than Baiada (Tamworth) Pty Ltd.

Appendix 1
Architectural Plans

PAVEMENT LEGEND

BIT.	HOT MIX BITUMEN
CONC.	CONCRETE FOR HEAVY VEHICLES
EX-CONC.	EXISTING CONCRETE

HEAVY DUTY CONCRETE (25,515sqm)

EXISTING CONCRETE (6,525sqm)

LIGHT DUTY PAVEMENT (36,000sqm)

SBA ARCHITECTS
Commercial Industrial Residential Retail Interior Design
Suite 702, 83 Mount Street, North Sydney NSW 2060
T 02 9929 9988 F 02 9929 8899
E info@sbaarch.com.au W www.sbaarch.com.au

ISSUE REV. DESCRIPTION DATE

CLIENT

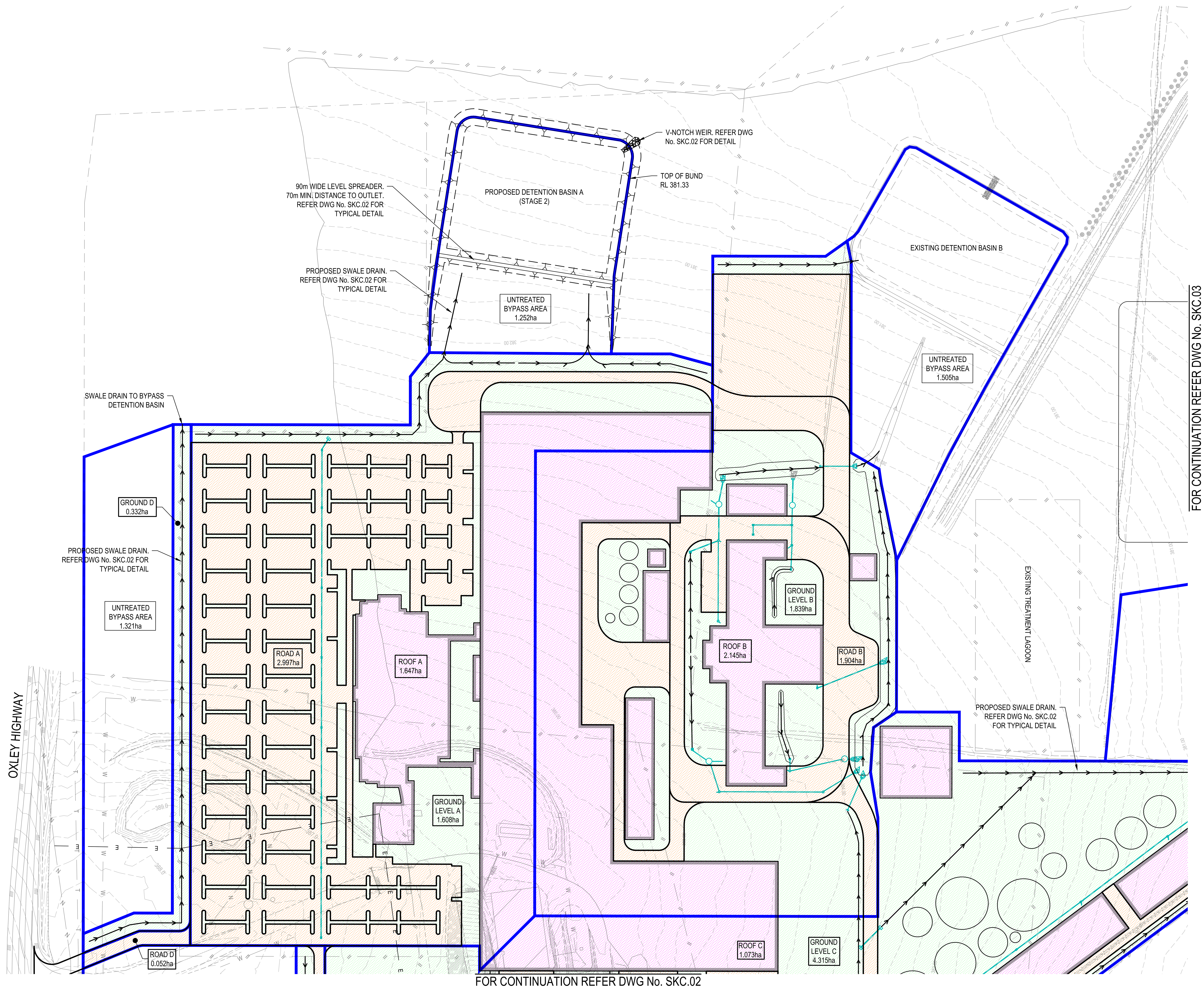
O A K B U R N P R O C E S S I N G P L A N T

O X L E Y H I G H W A Y , T A M W O R T H

DRAWING TITLE
SITE PLAN

DATE	SCALE	JOB NO.	DRAWING NO.	
16.06.20	1:2000@A1	19106	SK 10	E

Appendix 2
MPN Plans



FOR CONTINUATION REFER DWG No. SKC.02

FOR CONTINUATION REFER DWG No. SKC.03

LEGEND

- PROPOSED BUILDING
- PROPOSED CONCRETE
- PROPOSED BARRIER KERB
- PROPOSED KERB AND CHANNEL
- PROPOSED STORM WATER MAIN
- PROPOSED TOP OF BATTER
- PROPOSED TOE OF BATTER
- PROPOSED CATCHMENT BOUNDARY
- PROPOSED SWALE DRAIN
- PROPOSED ROOF AREA
- PROPOSED HARDSTAND AREA
- PROPOSED GROUND LEVEL AREA

NOTE:
LITTER BASKETS TO BE FITTED TO FIELD INLETS LOCATED IN THE CAR PARK AREAS.

0 10 20 30 40 50
SCALE 1:1000 (A1) 1:2000 (A3)

ISSUE	DATE	AMENDMENT	BY	APP
D	15.06.20	ISSUE FOR APPROVAL	KC	MH
C	29.04.19	ISSUE FOR APPROVAL	KC	MH
B	22.01.19	ISSUE FOR APPROVAL	KC	MH
A	31.07.18	ISSUE FOR APPROVAL	ND	MH

mpn consulting
MPN Consulting Pty Ltd
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P: 61 7 3335 4555
F: 61 7 3371 3196
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CLIENT: PSA CONSULTING AUSTRALIA

OAKBURN PROTEIN RECOVERY PLANT

OXLEY HIGHWAY
TAMWORTH, NSW, 2340

STORMWATER CATCHMENT PLAN
STAGE 2 - SHEET 1

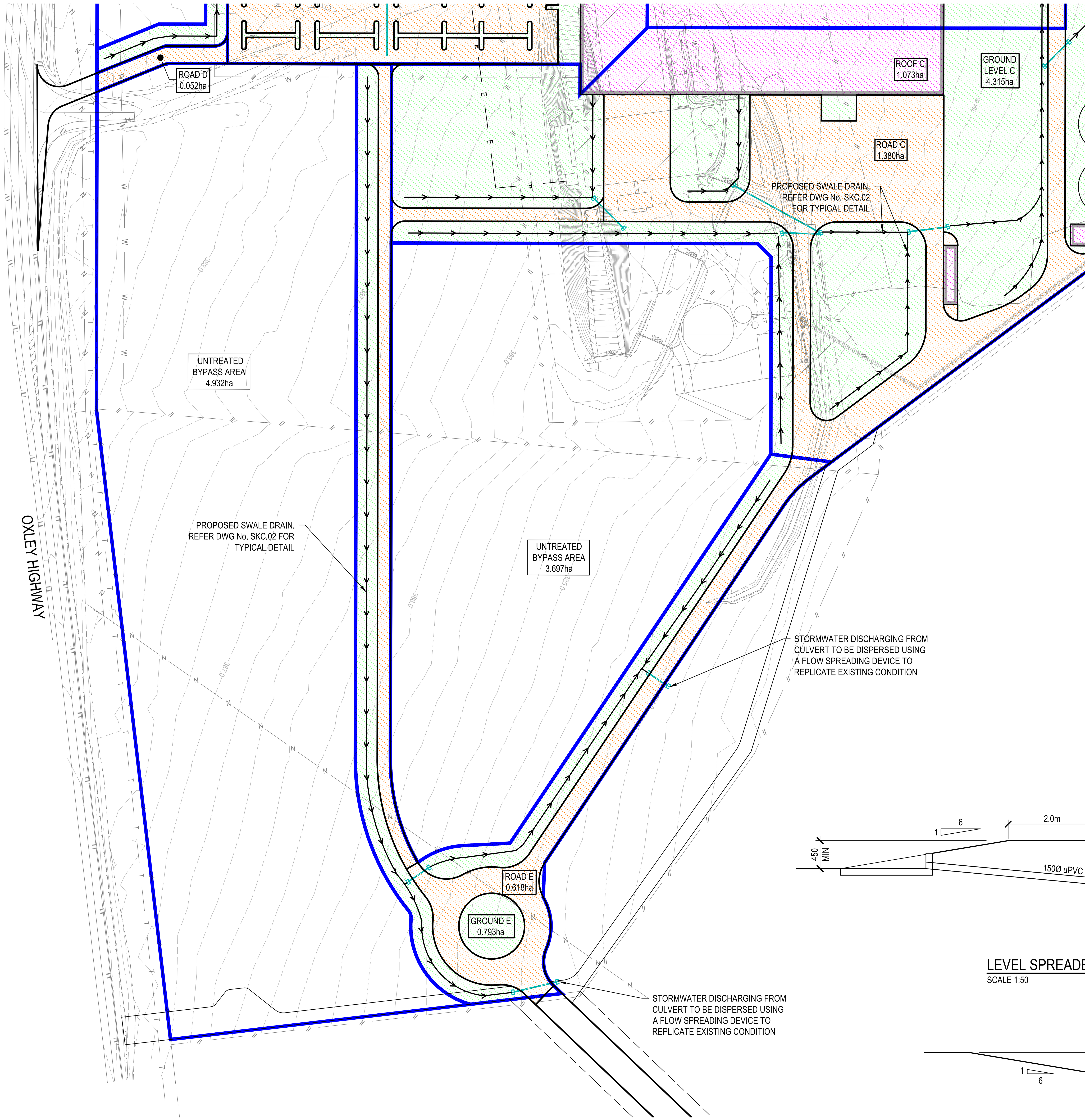
DESIGN: ND	DRAWN: ND	SCALES: AS SHOWN
CHKD:	APPRD:	DATE:

mpn JOB	DRAWING No.	REV
7679	SKC.01	D

FOR APPROVAL

NOT FOR CONSTRUCTION

FOR CONTINUATION REFER DWG No. SKC.01



LEGEND

- PROPOSED BUILDING
- PROPOSED CONCRETE
- PROPOSED BARRIER KERB
- PROPOSED KERB AND CHANNEL
- PROPOSED STORM WATER MAIN
- PROPOSED TOP OF BATTER
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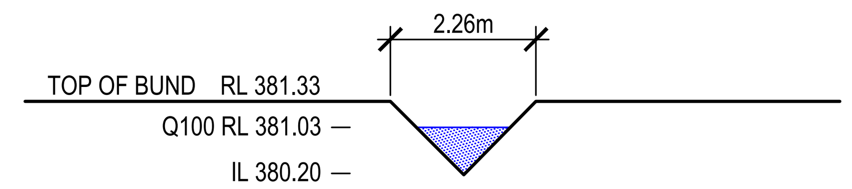
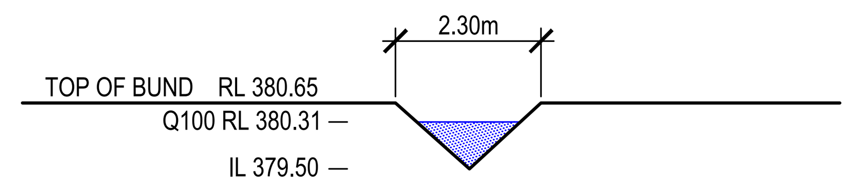
- PROPOSED ROOF AREA
- PROPOSED HARDSTAND AREA
- PROPOSED GROUND LEVEL AREA



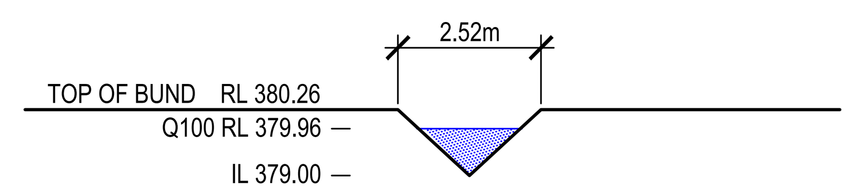
TYPICAL V-NOTCH WEIR DETAIL

(DETENTION BASIN A - STAGE 2)



TYPICAL V-NOTCH WEIR DETAIL

(EXISTING DETENTION BASIN B - STAGE 2)



TYPICAL V-NOTCH WEIR DETAIL

(DETENTION BASIN C - STAGE 2)

NOTE:
LITTER BASKETS TO BE FITTED TO FIELD INLETS LOCATED IN THE CAR PARK AREAS.

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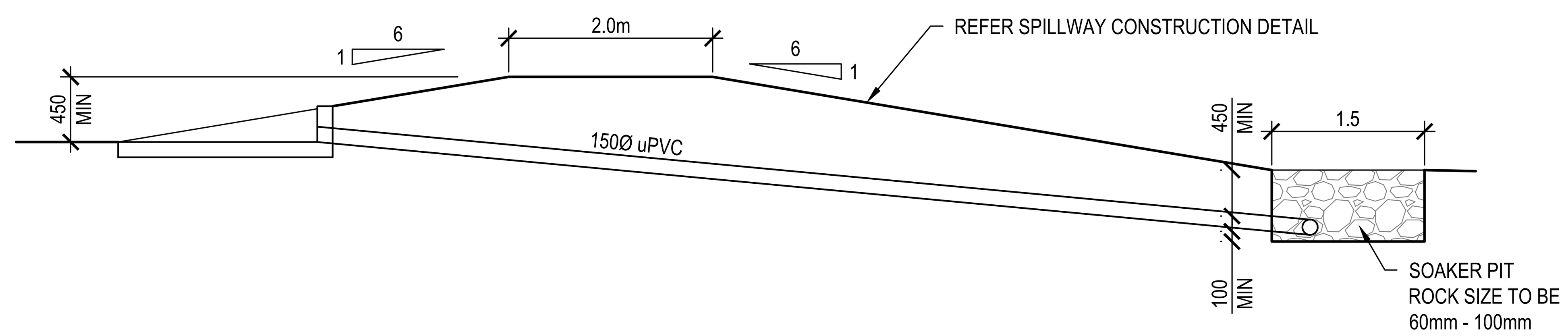
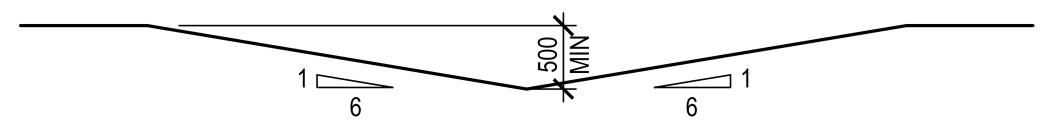
SCALE 1:1000 (A1) 1:2000 (A3)



LEVEL SPREADER TYPICAL SECTION

SCALE 1:50



SWALE DRAIN TYPICAL SECTION

SCALE 1:50

ISSUE	DATE	AMENDMENT	BY	APP
D	15.06.20	ISSUE FOR APPROVAL	KC	MH
C	29.04.19	ISSUE FOR APPROVAL	KC	MH
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CLIENT: PSA CONSULTING AUSTRALIA

OAKBURN PROTEIN RECOVERY PLANT

OXLEY HIGHWAY
TAMWORTH, NSW, 2340

**STORMWATER CATCHMENT PLAN
STAGE 2 - SHEET 2**

DESIGN: ND	DRAWN: ND	SCALES: AS SHOWN
CHKD:	APPRD:	DATE:

mpn JOB	DRAWING No.	REV
7679	SKC.02	D

NOT FOR CONSTRUCTION

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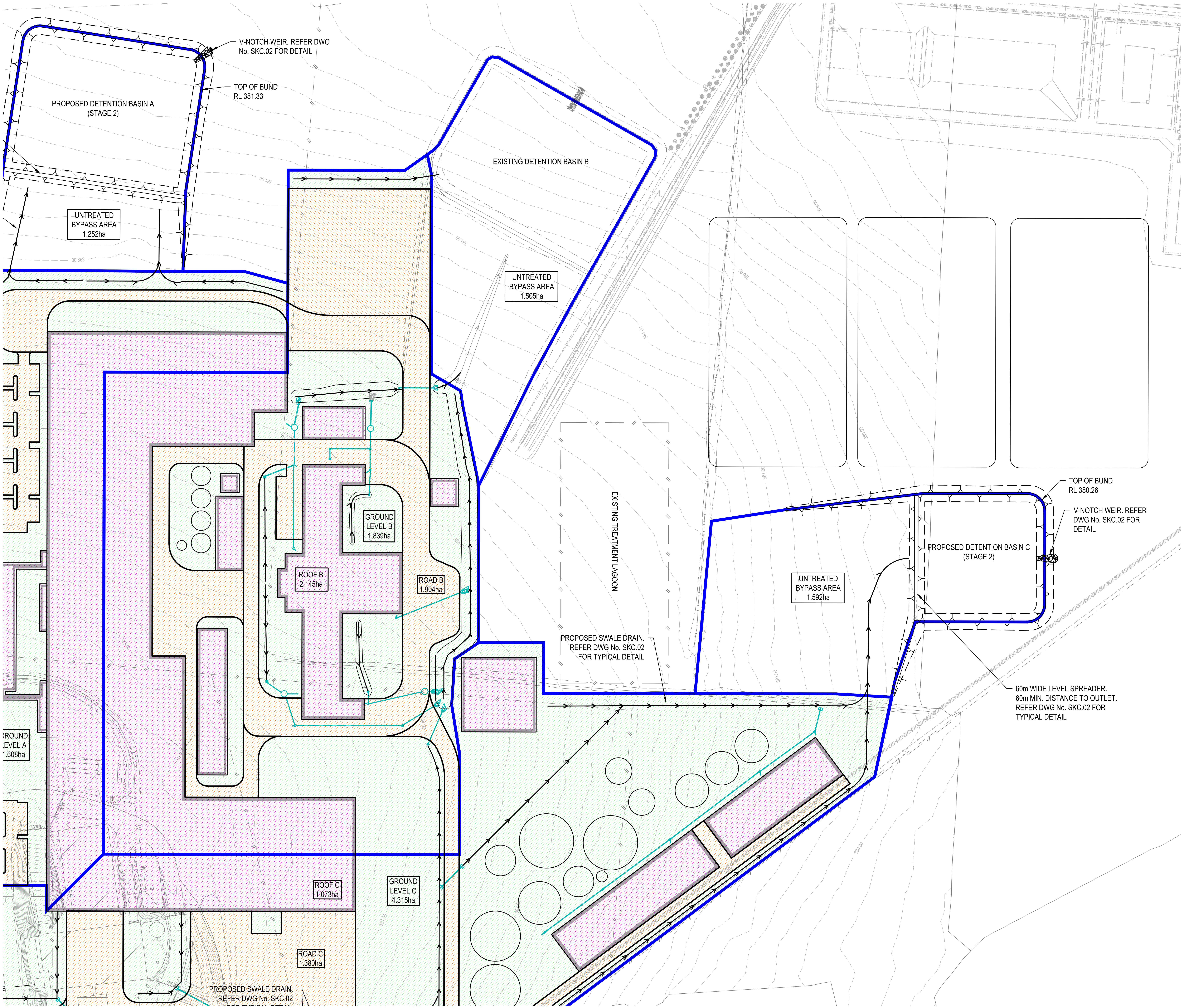

LEGEND

- PROPOSED BUILDING
- PROPOSED CONCRETE
- PROPOSED BARRIER KERB
- PROPOSED KERB AND CHANNEL
- PROPOSED STORM WATER MAIN
- PROPOSED TOP OF BATTER
- PROPOSED TOE OF BATTER
- PROPOSED CATCHMENT BOUNDARY
- PROPOSED SWALE DRAIN
- PROPOSED ROOF AREA
- PROPOSED HARDSTAND AREA
- PROPOSED GROUND LEVEL AREA

N

NOTE:
LITTER BASKETS TO BE FITTED TO FIELD INLETS LOCATED IN THE CAR PARK AREAS.

0 10 20 30 40 50
SCALE 1:1000 (A1) 1:2000 (A3)

ISSUE	DATE	AMENDMENT	BY	APP
D	15.06.20	ISSUE FOR APPROVAL	KC	MH
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CLIENT: PSA CONSULTING AUSTRALIA

OAKBURN PROTEIN RECOVERY PLANT

OXLEY HIGHWAY
TAMWORTH, NSW, 2340

STORMWATER CATCHMENT PLAN STAGE 2 - SHEET 3

DESIGN: ND	DRAWN: ND	SCALES: AS SHOWN
CHKD:	APPRD:	DATE:
mpn JOB 7679	DRAWING No. SKC.03	REV D

NOT FOR CONSTRUCTION

FOR APPROVAL

ATTACHMENT 9: REVISED BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

AP09

1154 Gunnedah Road, Westdale

Biodiversity Development Assessment Report

PSA Consulting Australia Pty Ltd

19 June 2020

Final

cumberland ecology

(02) 9868 1933 | PO Box 2474 Carlingford Court NSW 2118 | cumberlandecology.com.au

Report No. 18055RP3

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

Version	Date Issued	Amended by	Details
0	25/01/2019	HG/JL/KW	Draft
1	19/02/2019	HG	Final
2	03/06/2020	HG/KW	Amended Draft
3	19/06/2020	HG	Final

Approved by:	**Dr David Robertson**
Position:	Director
Signed:	David Robertson
Date:	19 June, 2020

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Glossary

Term / Abbreviation	Definition
AOBV	Area of Outstanding Biodiversity Value
Assessment area	Area of land within a 1500 m buffer around the outer boundary of the subject land
BAAS	Biodiversity Assessor Accreditation System
Baiada	Baiada Poultry Pty Limited
BAM	Biodiversity Assessment Method
BAMC	Biodiversity Assessment Method Calculator
BAR	Biodiversity Assessment Report
BC Act	NSW Biodiversity Conservation Act 2016
BCT	Biodiversity Conservation Trust
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offset Scheme
Box Gum Woodland	White Box – Yellow Box – Blakely's Red Gum Woodland
DA	Development Application
DAWE	Commonwealth Department of Agriculture, Water and the Environment
development site	The land directly impacted by the proposed development (see **Figure 2**)
DPIE	NSW Department of Planning, Industry and Environment
EEC	Endangered Ecological Community
EES	NSW Environment, Energy and Science Group (formerly OEH)
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
EP&A Act	NSW Environmental Planning and Assessment Act 1979
GDEs	Groundwater Dependent Ecosystems
GIS	Geographic Information System
GPS	Global Positioning System
ha	Hectares
IBRA	Interim Biogeographic Regionalisation for Australia
km	kilometres
LGA	Local Government Area
NSW	New South Wales
MNES	Matters of National Environmental Significance
OEH	former NSW Office of Environment and Heritage (now EES)
PCT	Plant Community Type
the Project	Baiada Poultry Processing Plant Development
SAII	Serious and Irreversible Impacts
SEARs	Secretary's Environmental Assessment Requirements

Term / Abbreviation	Definition
SEPP	State Environmental Planning Policy
SSD	State Significant Development
subject land	The area subject to the proposed action (**Figure 1)**
TEC	Threatened Ecological Community

Executive Summary

S1 Introduction

Cumberland Ecology was commissioned by PSA Consulting Australia Pty Ltd (PSA Consulting) on behalf of Baiada Poultry Pty Ltd (Baiada) to prepare a Biodiversity Development Assessment Report (BDAR) for the new Poultry Processing Plant Project located at 1154 Gunnedah Rd, Westdale NSW (the 'Project'). The Project involves construction of a new poultry processing plant plus ancillary developments, a new access road, and installation of an ancillary waste water treatment facility.

This BDAR will form part of the required documentation to support an application for State Significant Development Consent under Part 4 of the New South Wales (NSW) *Environmental Planning and Assessment Act 1979* (EP&A Act). Secretary's Environmental Assessment Requirements (SEARs) for the project were issued by the NSW Department of Planning, Industry and Environment (DPIE), which specified the requirement for a BDAR to be prepared in accordance with the Biodiversity Assessment Method (BAM).

The purpose of this BDAR is to document the findings of an assessment undertaken for the Project in accordance with Stage 1 (Biodiversity Assessment) and Stage 2 (Impact Assessment) of the BAM.

S2 Background

The Project is located on a property known as 'Oakburn' situated at 1154 Gunnedah Rd, Westdale NSW. It is approximately 7.5km north-west of the Tamworth Central Business District and lies within the Tamworth Regional Local Government Area. Oakburn is located on Lot 100 DP 1097471, covering an area of approximately 57.6 hectares (ha) and the proposed access track will cover a portion of the south-eastern adjacent properties comprising Lots 101 and 102 DP 1097471.

The Development Application for the subject site will seek development consent for the following key elements:

- A new poultry processing plant with the capacity to process up to 3 million birds per week;
- Complete flexibility to operate up to 24hrs / 7 days;
- Increase in production at the existing rendering plant from 120 tonnes to 240 tonnes of finished product material per day;
- A new site access road connection to Armstrong Street / Goddard lane which will be used for all staff and heavy vehicles as opposed to the existing access to Oxley Highway; and
- Waste Water Treatment.

S3 Landscape Features

As the project is being assessed as a site-based project, the assessment area comprises the area of land within a 1,500 m buffer around the outer boundary of the subject land. A summary of the landscape features identified within the assessment area are detailed below:

- Native vegetation covers 7.02% of the assessment area;

- Category 1, Category 2, and Category 3 streams and a small local wetland have been identified within the subject land and/or assessment area, which includes the Peel River Tributary that is considered to be a Category 1 stream that is within the development footprint;
- There is some very limited habitat connectivity between the subject land and surrounding areas, including planted vegetation associated with Boltons Creek;
- No karsts, caves, crevices cliffs or areas of geological significance were identified within the assessment area; and
- No Areas of Outstanding Biodiversity Value were identified within the assessment area.

S4 Native Vegetation

The subject land has been subject to detailed surveys by Cumberland Ecology for the purpose of this BDAR. Vegetation surveys included vegetation mapping, identification of Plant Community Types (PCTs), completion of 13 BAM plots, targeted threatened flora searches, targeted threatened fauna surveys, as well as assessment of vegetation patches against the Final Determinations for various Threatened Ecological Communities (TECs).

Native vegetation occupies approximately 4.41% of the subject land and includes a single plant community type in two broad condition states that align to PCT 599 - Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion. The remaining land within the subject land comprises exotic dominated pasture, garden beds and cleared land.

It is important to note that of the two broad condition states (vegetation zones) of PCT 599 occurring within the subject land, one consists of planted immature natives with the other occurring as scattered remnant and regrowth areas. This planted vegetation zone is not considered to comprise a naturally occurring vegetation community and technically does not conform to a PCT. Nonetheless, for the purpose of this BDAR, this vegetation community has been assigned to what is considered to be the best-fit PCT based on the dominant planted natives.

The remnant and regrowth portion of PCT 599 has been assessed as conforming to the Threatened Ecological Community White Box Yellow Box Blakely's Red Gum Woodland (Box Gum Woodland) listed under the BC Act. This vegetation does not conform to the EPBC listing of White Box Yellow Box Blakely's Red Gum grassy woodland and derived native grassland due to the either the lack of mature trees within the patch size, the patch size not having a predominantly native understorey, or where it does have one it lacks the requisite 12 native non-grass understorey species and is <2 ha in size (DEH 2006).

S5 Threatened Species

The BAM Calculator generates a list of species credit species requiring assessment utilising a number of variables. The predicted ecosystem credit species for the two vegetation zones within the subject land produced a list of 10 ecosystem credit species, 13 species credit species and seven joint ecosystem/species credit species. No ecosystem credit species were removed from further assessment. Of the 13 species credit species, three were removed from further assessment. Surveys were undertaken for all remaining species credit species. None of these species were recorded within the subject land, and none are considered likely to occur.

S6 Prescribed Impacts

The project is considered to potentially result in the following prescribed impacts:

- Impacts on the habitat of a threatened species which comprises human made structures;
- Impacts on the habitat of a threatened species which comprises non-native vegetation;
- Impacts on the connectivity of habitat that facilitates the movement of threatened species;
- Impacts on movement of threatened species that maintains their lifecycle; and
- Impacts of vehicle strike.

S7 Avoid and Minimise Impacts

A number of measures to avoid and minimise impacts of the development have been applied during the design process of the final development layout. These include avoidance of portions of the native vegetation where feasible, limiting impacts to the Peel River Tributary and ensuring the development site is outside the 30 m buffer applied to Boltons Creek. In order to conserve these areas and the biodiversity they support; the proposed development has been designed to avoid impacts to these areas as much as possible.

Although some areas of Box Gum Woodland TEC will be removed as part of the proposed development, the vegetation is in low condition and has little connectivity to the larger tract of the community across Gunnedah Road. Nevertheless, the majority of the two remnant and regrowth patches in the western portion of the subject land will be retained, along with some of the patch adjacent to the existing site entrance which has the highest number of mature trees and the most diverse native understorey.

Alignment of the proposed access road has been designed to minimise direct impacts to the Category 1 stream to the east of the subject land, by placement of the crossing closest to the stream end point.

S8 Impact Assessment

S8.1 Direct Impacts

Approximately 0.31 ha of the ~1.19 ha of Box Gum Woodland TEC and approximately 0.68 ha of the ~1.45 ha of planted natives will be removed under the proposed development. The remaining ~0.88 ha and ~0.77 ha, respectively, will be retained within the subject land. The remainder of the vegetation to be removed consists of exotic dominated pasture and gardens beds that do not constitute a recognised ecological community.

Two hollow-bearing trees and the habitat associated with the native vegetation will be directly impacted under the proposed development. Four hollow-bearing trees, one stick nest, and nearly two-thirds of the native vegetation within the subject land will be conserved. Overall, the removal of these habitat features are considered to have only minor implications for fauna species due to the highly modified and degraded ecological context they are within and the high mobility of the species likely to utilise these habitats.

S8.2 Indirect Impacts

Indirect impacts associated with the project are detailed within the report body and include:

- Inadvertent impacts on adjacent habitat or vegetation;

- Reduced viability of adjacent habitat due to noise, dust or light spill; and
- Inadvertent impacts to hydrological processes.

While no groundwater dependent ecosystems are mapped within the subject land, it is recognised that riparian along Boltons Creek and the Peel River Tributary could have some root access to alluvial groundwater.

S8.3 Mitigation Measures

The following measures will be undertaken to mitigate impacts to native vegetation and habitat during and prior to construction:

- Construction measures, to limit the impact of construction:
- Timing of construction works;
- Delineation of clearing areas;
- Pre-clearance surveys;
- Sedimentation control measures; and
- Weed management.

Vehicle Strike is the only uncertain impact likely to be relevant to the Project. Management of vehicle strike will be through implementation of signage, speed limits and lighting along the access road.

S8.4 Serious and Irreversible Impacts

One Serious and Irreversible Impact (SAII) entity, the Box Gum Woodland TEC, will be impacted under the proposed development. The proposed removal of approximately 0.31 ha of Box Gum Woodland TEC that occurs within the development site as a number of scattered and small isolated patches is unlikely to have any impact on the long-term survival of the TEC. The area surrounding the vegetation comprises vast areas of agricultural or industrial land use and the occurrence of these small, isolated, and degraded patches is unlikely to contribute to these in any measurable way.

The removal of ~0.31 ha of Box Gum Woodland TEC will not increase the isolation of any important areas of the TEC however it is expected to marginally increase the fragmentation. The TEC is currently lacking in substantial connectivity to other areas of the EEC and removal of the areas within the development site would contribute little, if any, to the persistence of the larger tract of the TEC along Boltons Creek and across Gunnedah Road to the south. The impacts to Box Gum Woodland TEC, which is a SAII entity, are not considered to be significant.

S8.5 Offset Liability

As the project includes the removal of some areas of native vegetation, offsets are required in the form of ecosystem credits. This assessment indicated that the removal of the native vegetation within the subject land requires a total of 15 ecosystem credits for PCT 599. A suite of other PCTs could be utilised to offset this PCT under the offset rules.

It is noted that DPIE published a revised version of the BAM that was on public exhibition until 16 October 2019, which included a module to assess planted native vegetation. Application of this module to the planted vegetation within the subject land would result in the vegetation being assessed for species credits only (i.e. no calculation of ecosystem credits). As the revised version of the BAM is not finalised, this BDAR has been based on the current advice for planted vegetation, which is to assign to a best-fit PCT. The consent authority may waive the requirement for offsetting the planted native vegetation based on this future adjustment, which would be deemed appropriate in this case and should be considered. This would result in an amended credit requirement of five credits to satisfy the offset obligation for the remnant vegetation within the subject land only.

S9 Conclusion

With the implementation of the proposed mitigation measures and the offsetting measures, it is considered that the impacts of this project on biodiversity, in particular on Box Gum Woodland will be minimal and can be appropriately managed.

1. Introduction

Cumberland Ecology was commissioned by PSA Consulting Australia Pty Ltd (PSA Consulting) on behalf of Baiada Poultry Pty Ltd (Baiada) to prepare a Biodiversity Development Assessment Report (BDAR) for the new Poultry Processing Plant Project located at 1154 Gunnedah Rd, Westdale NSW (the 'Project'). The Project involves construction of a new poultry processing plant plus ancillary developments, a new access road, and installation of waste water treatment facility. This BDAR will form part of the required documentation to support an application for State Significant Development (SSD) Consent under Part 4 of the New South Wales (NSW) *Environmental Planning and Assessment Act 1979* (EP&A Act).

1.1. Requirement for BDAR

Section 7.9 of the NSW *Biodiversity Conservation Act 2016* (BC Act), requires all SSD applications be accompanied by a BDAR unless the Planning Agency Head and the Environment Agency Head determine that the proposed development is not likely to have any significant impact on biodiversity values. The BDAR must be undertaken in accordance with the Biodiversity Assessment Method (BAM).

Secretary's Environmental Assessment Requirements (SEARs) were issued for the Project on 2 July 2018 which specified the requirement for a BDAR. The provisions of the SEARs that are relevant to this BDAR are reproduced below.

- Biodiversity – including:
  - accurate predictions of any vegetation clearing on site or for any road upgrades;
  - an assessment of the proposal in accordance with the Biodiversity Assessment Method (BAM) including the potential impacts on any threatened species;
  - populations, endangered ecological communities or their habitats and groundwater dependent ecosystems;
  - details of weed management during construction and operation in accordance with existing State, regional or local weed management plans or strategies; and
  - a detailed description of the measures to avoid, minimise, mitigate and offset biodiversity impacts.

1.2. Purpose

The purpose of this BDAR is to document the findings of an assessment undertaken for the Project in accordance with Stage 1 (Biodiversity Assessment) and Stage 2 (Impact Assessment) of the BAM. Specifically, the objectives of this BDAR are to:

- Identify the landscape features and site context (native vegetation cover) within the subject land and assessment area;
- Assess native vegetation extent, plant community types (PCTs), threatened ecological communities (TECs) and vegetation integrity (site condition) within the subject land;

- Assess habitat suitability for threatened species that can be predicted by habitat surrogates (ecosystem credits) and for threatened species that cannot be predicted by habitat surrogates (species credit species);
- Identify potential prescribed biodiversity impacts on threatened species;
- Describe measures to avoid and minimise impacts on biodiversity values and prescribed biodiversity impacts during project planning;
- Describe impacts to biodiversity values and prescribed biodiversity impacts and the measures to mitigate and manage such impacts;
- Identify the thresholds for the assessment and offsetting of impacts, including:
  - Impact assessment of potential entities of serious and irreversible impacts (SAII);
  - Impacts for which an offset is required;
  - Impacts for which no further assessment is required;
- Describe the application of the no net loss standard, including the calculation of the offset requirement.

1.3. Project Description

1.3.1. Location

The Project is located on a property known as 'Oakburn' situated at 1154 Gunnedah Rd, Westdale, NSW. It is approximately 7.5km north-west of the Tamworth Central Business District and lies within the Tamworth Regional Local Government Area (LGA).

Oakburn is located on Lot 100 DP 1097471, covering an area of approximately 57.6 hectares (ha) and the proposed access road will cover a portion of the south-eastern adjacent properties comprising Lots 101 and 102 DP 1097471. It is generally bounded by Gunnedah Road to the south west, Bolton Creek to the north west, rural pasture land to the north east and industrial developments and a Peel River tributary to the south east. The development will be a secondary production facility, and include a building envelope for the construction of the new poultry processing plant, installation of waste water treatment ponds and construction of a new access road to meet the existing Armstrong Street in the industrial development area.

A site map and location map have been prepared in accordance with the BAM and are presented in **Figure 1** and **Figure 2**, respectively.

1.3.2. Project Overview

The proposed development is identified under Item 22 Livestock Processing Industries within Schedule 3 of the *Environmental Planning and Assessment Regulation 2000* and accordingly is identified as Designated Development, requiring preparation of an Environmental Impact Statement. Due to the capital investment associated with the project the development is considered to be State Significant and will be assessed by the NSW Minister of Planning as the Consent Authority.

The Project involves the construction and operation of a new processing plant that will provide the capacity to process up to 3 million birds per week at the Oakburn property. The existing rendering plant located on the site is also proposed to increase current production levels from 120 tonnes of finished product per day to 240 tonnes per day.

The development of an integrated processing poultry processing plant was originally approved in February 1998 by the NSW Department of Urban Affairs and Planning (now the NSW Department of Planning, Industry and Environment (DPIE)). This approval (and subsequent modifications) allow for the development of an integrated poultry processing plant with a maximum capacity of 1 million birds per week. To date, only Stage 1 (Rendering Plant) has been constructed with the balance of the development still to be completed. In response to the projected growth in demand for poultry products, Baiada is now proceeding with a new application for a poultry processing plant with a production capacity of 3 million birds per week.

The SSD application for the subject land will seek development consent for the following key elements:

- A new poultry processing plant with the capacity to process up to 3 million birds per week;
- Complete flexibility to operate up to 24hrs / 7 days;
- Increase in production at the existing rendering plant from 120 to 240 tonnes of finished product material per day;
- A new site access road connection to Armstrong Street / Goddard lane which will be used for all staff and heavy vehicles as opposed to the existing access to the Oxley Highway; and
- Waste Water Treatment.

1.3.3. Identification of the Development Site Footprint

The layout of the Project is shown in **Figure 3**. The development site footprint comprises the area of land directly impacted by the Project including the Oakburn Processing Plant, car park, Oakburn Processing Plant Waste Water Treatment Plant, evaporation ponds, and access road; as well as a 10 m buffer surrounding the proposed developments that will account for any encroachment of construction activities into the adjacent land. Therefore, with the 10m buffer in place, the operational and construction footprint for the Project will be the same and will be referred to hereafter as the development site. The area of the Oakburn property occupying the whole of Lot 100 DP 1097471 and the portions of Lots 101 and 102 DP 1097471 to be utilised for the construction of the access road (including 10m buffers either side) will hereafter collectively be referred to as the subject land. A rendering waste water treatment plant to be located in the northern portion of the subject land has been approved separately under DA 2018-0443 and, although this area will be included within the subject land, it will be categorised as cleared land within this BDAR.

1.3.4. General Description of the Development Site

1.3.4.1. Historical and Present Land Use

Historically, the Oakburn property has been cleared of native vegetation and was used for agricultural purposes including grazing of cattle until it was purchased by Baiada in 1999. Baiada demolished the existing residential dwelling, excluded grazing cattle from most areas, and built a first Oakburn Rendering Plant within the property. The rendering plant burnt down in 2013 and was replaced by the larger Oakburn Rendering Plant that is presently operational and represents Stage 1 of the existing 1998 development approval. Two areas consisting of rows of native trees were planted in April 2011 by Baiada, utilising local species in landscaping of the property.

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

Lots 101 and 102 DP 1097471, that the access road will traverse, have also been cleared and are currently utilised for grazing purposes, though portions of these lots to the south are used as a cemetery and crematorium.

1.3.4.2. Topography and Soils

The topography and soils of Westdale are characterised by undulating to rolling slopes of sedimentary and metamorphic rocks interspersed with minor interbedded volcanics. The soils tend towards shallow and stony on ridges, red-brown texture contrast soils on most slopes, with harsh yellow gully-forming soils in the lower slopes (Mitchell 2002).

1.3.4.3. Hydrology

The subject land lies within the Namoi Catchment which is based around the Namoi River, one of the Murray-Darling Basin's major NSW sub-catchments (NSW Office of Water 2011). The hydrology of the subject land and surrounds has been heavily modified as a result of historical land use.

Boltons Creek is 3rd order mapped waterway that lies outside the north western boundary of the subject land and is crossed by Gunnedah Road via a bridge adjacent to the southern-most corner. A small swamp/wetlands area occurs as part of Boltons Creek towards the northern corner of the subject land that contains vegetation and reeds representative of swamp/wetlands area (*Typha orientalis*); however no visible standing water was present throughout most of the wetlands area at the time of survey. While this represents only a small swamp/wetland area that has limited potential to sustain some wetland species, it is recognised as having significant wildlife habitat value based on its inclusion on the NSW Environment, Energy and Science Group (EES) Biodiversity Values Map.

Within Lots 101 and 102 DP 1097471 an unnamed tributary of the Peel River that is a first order mapped waterway occurs, which will be traversed by the access road under the proposed development. No running water was present in this waterway during the time of survey, and it terminates within the boundary of Lot 101 DP 1097471 just south of the subject land. This is likely to be an ephemeral stream that accumulates water in its depressions and has marginal flows throughout periods of heavy rainfall. This waterway has been heavily modified through the clearing of vegetation and the agricultural use of the land, with mostly exotic grasses occupying the stream bed and edges. This waterway is not recognised as having a significant wildlife habitat function based on its exclusion from the Biodiversity Values Map.

1.3.4.4. Vegetation

The vegetation of Tamworth and the surrounding rural landscapes have been heavily modified since the first European settlement in NSW. Most of the pre-existing vegetation was historically cleared. The majority of cleared areas have been planted with pasture grasses to support agricultural grazing, and few areas have been allowed to regenerate due to ongoing land use activities. Native grasses do still occur throughout the region and may intergrade with the exotic pasture grasses where unrestricted.

To the south western corner across Gunnedah Road, and in conjunction with Boltons Creek, a patch of White Box – Yellow Box – Blakely's Red Gum Woodland (Box Gum Woodland) extends along the western boundary of the airport and continues southwards for approximately 6 km. There are also planted natives comprising canopy species characteristic of Box Gum Woodland outside the boundary of the subject land adjacent to Boltons Creek. These immature planted natives have been placed in rows either side of the creek and wetland area and have connectivity with the remnant patch across Gunnedah Road to the south. There is no connectivity to existing patches beyond the additional plantings to the north.

1.4. Information Sources

1.4.1. Databases

A number of databases were utilised during the preparation of this BDAR, including:

- EES BioNet Atlas;
- EES Threatened Biodiversity Data Collection;
- EES BioNet Vegetation Classification database;
- Commonwealth Department of Agriculture, Water and the Environment (DAWE) Species Profile and Threat Database;
- DAWE Protected Matters Search Tool (PMST); and
- DAWE Directory of Important Wetlands in Australia.

1.4.2. Literature

This BDAR has utilised the results and/or spatial data from the following documents:

- EES Hunter Native Vegetation Mapping - Hunter Greater Version 4 3855 (2012); and
- Namoi CMA GDE Mapping (SKM 2010).

1.4.3. Aerial Photography

The aerial imagery utilised in this BDAR is sourced from Nearmap and is dated 21 March 2020.

1.5. Authorship and Personnel

This document has been authorised by Dr David Robertson (BAM Accredited Assessor No: BAAS17027). This document. associated field surveys, and Geographic Information Systems (GIS) mapping, was prepared with the assistance of additional personnel as outlined in **Table 1**. Notwithstanding the assistance of the additional personnel, the assessment presented within this document is Dr Robertson's.

Table 1 Personnel

Name	Tasks	Relevant Qualifications / Training	BAM Accredited Assessor No.
Dr David Robertson	Document review	Doctor of Philosophy. Ecology, University of Melbourne, 1986 Bachelor of Science (Honours) in Ecology, University of Melbourne, 1980 BAM Accredited Assessor Training. Muddy Boots, 2017	BAAS17027
Katrina Wolf	Document review	Bachelor of Science (Environmental). The University of Sydney, 2007 BAM Accredited Assessor Training. Muddy Boots, 2017	BAAS18010
Dr Gitanjali Katrak	Document review	Doctor of Philosophy, Intertidal Wetland Ecology. Flinders University, 2011 Bachelor of Science (Honours) in Biological Sciences. La Trobe University, 2002 BAM Accredited Assessor Training. Muddy Boots, 2017	BAAS17064
Dr Rohan Mellick	Field surveys	Doctor of Philosophy, Evolutionary Ecology. The University of Adelaide, 2012 Bachelor of Applied Science (Honours) in Natural Resource Management, Southern Cross University, 2000. BAM Accredited Assessor Training. Muddy Boots, 2017	BAAS18075
Heather Gosper	Field surveys, document preparation, credit calculations	Bachelor of Environmental Science and Management. The University of Newcastle, 2013 BAM Accredited Assessor Training. Muddy Boots, 2017	BAAS19028
Michael Davis	GIS mapping, credit calculations	Bachelor of Biodiversity and Conservation. Macquarie University, 2016 BAM Accredited Assessor Training. Muddy Boots, 2017	-

Name	Tasks	Relevant Qualifications / Training	BAM Accredited Assessor No.
Jesse Luscombe	GIS mapping, credit calculations	Bachelor of Marine Science. Macquarie University, 2013 Certificate III in Conservation and Land Management. TAFE NSW, 2016	-

2. Landscape Features

2.1. Site Context

2.1.1. Assessment Area

As the Project is being assessed as a non-linear project, the assessment area comprises the area of land within a 1500 m buffer around the outer boundary of the subject land. The location of the assessment area is shown in **Figure 2**.

2.1.2. Native Vegetation Cover

The native vegetation cover was determined through the use of GIS. To map native vegetation cover within the subject land and assessment area, this assessment utilised the detailed vegetation mapping prepared by Cumberland Ecology in conjunction with broad scale mapping by the OEH Hunter Native Vegetation Mapping (2012). The native vegetation cover within the assessment area is shown in **Figure 2**. It occupies approximately 95.88 ha, which represents 7.02% of the assessment area. Therefore, the native vegetation cover value is assigned to the cover class of 0–10%.

2.2. Landscape Features

Landscape features identified within the subject land and assessment area are outlined below. The extent of these features within the subject land is shown in **Figure 1** and the extent within the assessment area is shown in **Figure 2**.

2.2.1. IBRA Bioregions and IBRA Subregions

The subject land and assessment area occurs within the Nandewar Interim Biogeographic Regionalisation for Australia (IBRA) Bioregion and within the Peel IBRA Subregion.

2.2.2. Rivers, Streams and Estuaries

The subject land and assessment area occurs within the Namoi catchment. Notable surface drainage systems include the Peel River and Lake Keepit. A Category 1 stream has been identified within the subject land, with a Category 2 and a Category 3 stream (Boltons Creek) within the assessment area.

A buffer of 10m and 30m either side of the waterways applies to Category 1 and Category 3 streams, respectively, in accordance with Appendix 3 of the BAM.

2.2.3. Important and Local Wetlands

No important wetlands listed in the Directory of Important Wetlands in Australia are present in the subject land or assessment area.

The closest important wetland based on the Directory of Important Wetlands in Australia is Lake Goran, located approximately 61km to the south west of the subject land.

There is a small area (<5 ha) identified as swamp/wetland outside the north-western boundary of the subject land associated with Boltons Creek based on vegetation mapping of the Nandewar IBRA region by the NSW Department of Environment and Conservation (DEC) (2004). The wetland is unnamed though it is classified as a Category 3 stream and contains vegetation indicative of riparian areas such as *Typha orientalis*. While the small swamp/wetland was predominantly dry and lacking in visible standing water when surveyed, it is identified as having some conservation significance due to being mapped on the Biodiversity Values Map.

2.2.4. Habitat Connectivity

The subject land is located in a highly agricultural and industrial environment, and is surrounded by grazing properties, Tamworth Airport, an industrial estate, and Gunnedah Road. There is some connectivity between the planted and remnant Box Gum Woodland that occurs within the riparian area of Boltons Creek outside the western boundary of the subject land, however continuation of this patch does not occur beyond the planted natives to the north, and this linear patch does not have significant habitat connectivity to the vegetation on site. The patch has some limited connectivity in the form of native grass species to grasses within the subject land.

2.2.5. Karsts, Caves, Crevices, Cliffs and Areas of Geological Significance

No karsts, caves, crevices, cliffs or areas of geological significance have been identified within the assessment area.

2.2.6. Areas of Outstanding Biodiversity Value

No Areas of Outstanding Biodiversity Value (AOBV) have been mapped within the assessment area. An area of riparian habitat associated with Boltons Creek is mapped on the Biodiversity Values map. This area is not within the subject land or Oakburn property boundary.

2.2.7. Additional Features Required by SEARs

The SEARs for the Project issued on 2 July 2018 provides the following additional requirements that are not within the general scope of the BAM to be addressed in this BDAR:

- Potential impacts on Groundwater Dependent Ecosystems (GDEs); and
- Details of weed management during construction and operation in accordance with existing state, regional or local weed management plans or strategies.

2.2.8. Mitchell Landscapes

The Mitchell Landscape that occurs in the subject land and surrounds is “Tamworth – Keepit Slopes and Plains”.

2.2.9. Soil Hazard Features

Not required to be identified or mapped for SSDs.

3. Methodology

3.1. Review of Existing Data

Existing information on biodiversity values within the assessment area were reviewed, which includes:

- Survey data that is held in the Flora Survey (BioNet) including:
  - EES Threatened Biodiversity Data Collection.
- Existing vegetation mapping, being:
  - EES Hunter Native Vegetation Mapping - Hunter Greater Version 4 (2012); and
  - Nandewar VIS mapping by the DEC (2004),

This existing information was considered and included, where appropriate, into survey design, vegetation mapping and reporting.

3.2. Flora Survey

3.2.1. Vegetation Mapping

Vegetation mapping of the subject land was undertaken by random meander searches throughout each patch of vegetation, noting key characteristics of areas in similar broad condition states such as similar tree cover, shrub cover, ground cover, weediness or combinations of these.

3.2.2. Vegetation Integrity Assessment

Vegetation integrity assessments following the BAM. Surveys included establishment of a 20 x 50 m plot within which the following data was collected:

- Composition for each growth form group by counting the number of native plant species recorded for each growth form group within a 20 m x 20 m plot;
- Structure of each growth form group as the sum of all the individual projected foliage cover estimates of all native plant species recorded within each growth form group within a 20 m x 20m plot;
- Cover of 'High Threat Exotic' weed species;
- Assessment of function attributes within a 20 m x 50 m plot, including:
  - Count of number of large trees;
  - Tree stem size classes, measured as 'diameter at breast height over bark' (DBH);
  - Regeneration based on the presence of living trees with steams <5 cm DBH;
  - The total length in metres of fallen logs over 10 cm in diameter;
- Assessment of litter cover within five 1 m x 1 m plots evenly spread within the 20 m x 50 m plot; and
- Number of trees with hollows that are visible from the ground within the 20 m x 50 m plot.

A total of 13 plots were undertaken within the subject land, and their location is shown in **Figure 4**. Of these 13 plots, a total of five were undertaken within the native vegetation within the subject land and utilised further within this assessment. **Table 2** summarises the plot requirements based on vegetation zones. The minimum number of plots has been completed for both vegetation zones.

Table 2 Plot survey requirements

Vegetation Zone	PCT	Condition	Area (ha)	Minimum Number of Plots Required	Number of Plots Completed
1	599	Low Condition	1.41	1	4
2	599	Planted	1.45	1	1

3.2.3. Threatened Flora Species Survey

Targeted threatened flora surveys were undertaken for species credit species that have the potential to occur within the subject land as determined by the BAM Calculator. All targeted surveys were conducted using parallel field traverses in accordance with the NSW Guide to Surveying Threatened Plants (OEH 2016). Targeted threatened flora surveys were undertaken by Rohan Mellick and Heather Gosper between the 17 December 2018 and 19 December 2018, for the following species:

- *Acacia atrox* (Myall Creek Wattle);
- Dichanthium setosum (Bluegrass);
- *Digitaria porrecta* (Finger Panic Grass);
- Euphrasia arguta;
- Homopholis belsonii (Belson's Panic);
- *Picris evae* (Hawkweed);
- *Thesium australe* (Austral Toadflax); and
- Tylophora linearis.
- At the time of targeted threatened flora surveys in December 2018, the survey period for *Digitaria porrecta* as provided in the Threatened Biodiversity Data Collection and BAM Calculator was listed as December to May. During updates undertaken by EES in September 2019 the survey period was amended to January to February for this species, meaning the targeted survey initially conducted is now considered to be outside the specified survey period. However, the surveys were conducted within two weeks of the newly defined survey period commencing, and conditions leading up to the December survey period included conditions ideal for plant growth. Therefore, the targeted threatened flora surveys undertaken for the species is considered adequate to assess potential occurrence within the subject land.

3.2.4. Flora Survey Effort

Table 3 below shows the flora survey effort, including dates, staff members and weather conditions.

Table 3 Flora survey effort

Survey Detail	Date	Effort	Personnel	Weather Conditions
Vegetation Mapping	18 and 19 July 2018	12 person hours	Rohan Mellick, Heather Gosper	Clear skies, light to moderate breeze, temperature range: 15-22°C
BAM Plots	19 and 20 July 2018	13 x BAM Plots	Rohan Mellick, Heather Gosper	Clear skies, light to moderate breeze, temperature range: 3-22°C
Threatened Flora Searches	18 – 20 July 2018	Throughout 18 – 20 July 2018 surveys	Rohan Mellick, Heather Gosper	Cloudy, light to moderate breeze, temperature range: 6-17°C
Targeted Threatened Flora Surveys	17 - 19 December 2018	9 person hours	Rohan Mellick, Heather Gosper	Clear skies, light breeze, temperature range: 18.4 – 36.3°C

3.3. Fauna Survey

3.3.1. Threatened Fauna Species Survey

The following threatened fauna species were included in targeted surveys during the field work:

- *Adelotus brevis* - endangered population (Tusked Frog population in the Nandewar and New England Tableland Bioregions);
- *Anthochaera phrygia* (Regent Honeyeater);
- *Calyptorhynchus lathami* (Glossy Black-cockatoo);
- *Haliaeetus leucogaster* (White-bellied Sea-eagle);
- Lathamus discolor (Swift Parrot);
- Litoria booroolongensis (Booroolong Frog);
- Miniopterus orianae oceanensis (Large Bent-winged Bat);
- Petaurus norfolcensis (Squirrel Glider);
- *Phascogale tapoatafa* (Brush-tailed Phascogale);

- Phascolarctos cinereus (Koala);
- *Pteropus poliocephalus* (Grey-headed Flying-fox); and
- *Uvidicolus sphyrurus* (Border Thick-tailed Gecko).

Under Section 6.4.1.13 of the BAM, species credit species can be excluded from further assessment, and thereby targeted surveys, if it is determined that none of the species-specific habitat constraints are present within the subject land (see **Section 5.3**). Of these species the Regent Honeyeater, Swift Parrot and Glossy Black-cockatoo were excluded from requiring further assessment based on either the lack of/degradation of habitat constraints within the subject land, or the subject land not occurring within the mapped area for the species as advised by EES.

Nevertheless, it was determined prudent the species be the subject of targeted surveys regardless as additional surveys were required for the species credit species requiring further assessment and the opportunity was available for undertaking these surveys despite them not being strictly required.

A number of other species credit fauna species had the potential to be excluded from further assessment based on the lack of/degradation of their habitat constraints, however due to the alignment of the survey period for these species within the timeframe for the additional surveys, they were not removed from consideration and were surveyed accordingly as a precautionary measure.

3.3.2. Fauna Survey Methods

Detailed survey methods are described below.

3.3.2.1. Habitat Assessment

Habitat assessments were carried out throughout the entirety of the subject site between 18 July 2018 and 20 July 2018. This survey identified any potential habitat features such as significant rocky outcrops, bush rock, fallen logs, culverts, water bodies, decorticating bark, nests and hollow-bearing trees. Additional habitat assessments were carried out between 17 December 2018 and 19 December 2018 to target nests for the White-bellied Sea-eagle and breeding camps for the Grey-headed Flying-fox.

3.3.2.2. Amphibian Surveys

Call playback was undertaken using a recording of the Booroolong Frog and Tusked Frog calls and involved playing the call for five minutes, listening for five minutes, and then searching the surrounding habitat for five minutes. This was conducted for each species at two locations; along Boltons Creek and along the Peel River Tributary within the subject land. These surveys took place over two consecutive nights on the 17 December 2018 and 18 December 2018. The region had recently experienced heavy rainfall in the previous weeks and conditions were ideal for amphibian survey.

This survey targeted: Booroolong Frog and Tusked Frog.

3.3.2.3. Nocturnal Survey

Nocturnal spotlighting was undertaken via area searches along pre-determined transects throughout the subject land using high power hand-held torches, focussing on treed areas and areas associated with habitat features. Call playback was undertaken using a recording of the Squirrel Glider and Koala calls and involved playing the call for five minutes, listening for five minutes, and then searching the surrounding habitat for five minutes. Five transects were surveyed for between 40 person minutes and 60 person minutes each. Surveys occurred over two consecutive nights on 17 December 2018 and 18 December 2018 and were carried out by Rohan Mellick and Heather Gosper. Observations of all nocturnal birds, mammals, amphibians and reptiles were recorded.

This survey targeted: Squirrel Glider, Koala, Grey-headed Flying-fox, Brush-tailed Phascogale, and Border Thick-tailed Gecko.

3.3.2.4. Stag/Hollow watches

Hollow/Stag-watching were undertaken by observing potential roost hollows for 30 minutes prior to sunset and 30 minutes following sunset. Watches were conducted at one of the two large *Eucalyptus melliodora* hollow-bearing trees within the development site each night between 17 December 2018 and 18 December 2018.

This survey targeted: Squirrel Glider, Brush-tailed Phascogale, and Glossy Black-Cockatoo.

3.3.2.5. Bird Surveys

Bird Surveys were undertaken using the area search method that involves walking within a 2 ha area and recording all avian species observed. These were conducted at six sites within the subject land for a minimum of 20 minutes per site. All surveys occurred between 17 December 2018 and 18 December 2018. A visual observation of all trees within the site was completed throughout the survey period and any nests present recorded.

This survey targeted: Swift Parrot, Regent Honeyeater, Glossy Black-Cockatoo, and White-bellied Sea-Eagle.

3.3.2.6. Microchiropteran Bat Surveys

One ANABAT unit and one Songmeter unit were placed in proximity to areas of the most suitable microbat habitat and were left on-site for two consecutive nights between the 17 December 2018 and 18 December 2018 to record microbat activity. The units were relocated after the first night to a new site, resulting in four separate locations being surveyed for one night each and were collected on the morning of the 19 December 2018. The calls were analysed, and species identified by Greg Ford of Balance Environmental.

This survey targeted the Large Bent-winged Bat.

3.3.2.7. Diurnal Active Searches

Diurnal Active Searches were conducted on 18 December 2018 and 19 December 2018 at a total of four locations within the subject the land. The surveys were situated to capture areas of suitable habitat that included treed vegetation, decorticating bark and fallen timber. Each site was surveyed by gently looking under loose bark on trees, under rock, through timber pile or fallen logs, and checking other areas where fauna are likely to be located. This method was employed carefully to ensure no detrimental impacts occurred to any fauna or their habitat.

This survey targeted: Border Thick-tailed Gecko, Booroolong Frog, and Tusked Frog.

3.3.2.8. Koala SAT Search

Surveys for Koala populations known as the Spot Assessment Technique (SAT) were conducted throughout the site where possible. Survey locations were chosen based on patches of vegetation within the site that contained Koala food trees. Once a central food tree is established, a maximum of two-person minutes was spent searching for faecal pellets (scats) within a one metre radius of the base of the central tree and 29 surrounding trees. Tree trunks were searched for scratch marks, and the canopy was observed for any koalas present. In cases where 30 trees were not present only those available within a 25m radius of the central tree were surveyed. These surveys were completed at four sites throughout the subject land between 18 December 2018 and 19 December 2018.

3.3.2.9. Motion Sensor Cameras

Four motion sensor cameras were deployed on 17 December 2018 throughout the subject land. The cameras were angled towards hollows in trees or towards the bases of treed vegetation as these areas were determined the most likely suitable habitats on site for fauna species. The cameras were operational for the duration of the surveys and were collected on the morning of the 19 December 2018.

3.3.3. Fauna Survey Effort

All surveys are undertaken during periods specified in the Threatened Biodiversity Data Collection (OEH 2018a) for each species and according to survey guidelines. **Table 4** below shows the fauna survey effort, including dates, staff members and weather conditions and **Figure 5** shows the fauna survey locations.

Table 4 Fauna survey effort

Survey Method	Date	Effort	Personnel	Weather	Notes
Habitat assessment	18-20 July 2018	Throughout survey period (approx. 30 person hours)	Rohan Mellick, Heather Gosper	Clear skies, light to moderate winds, temperature range:3-22°C	
Incidental observations	18-20 July 2018	Throughout survey period (approx. 30 person hours)	Rohan Mellick, Heather Gosper	Clear skies, light to moderate winds, temperature range: 3-22°C	
Habitat assessment	17 – 19 December 2018	Throughout survey period (approx. 37 person hours)	Rohan Mellick, Heather Gosper	Clear skies, light breeze, temperature range: 18.4 – 36.3°C	
Incidental observations	17 – 19 December 2018	Throughout survey period (approx. 37 person hours)	Rohan Mellick, Heather Gosper	Clear skies, light breeze, temperature range: 18.4 – 36.3°C	
Amphibian survey	17 & 18 December 2018	4 person hours	Rohan Mellick, Heather Gosper	Clear skies, light breeze,	Heavy rain in preceding

Survey Method	Date	Effort	Personnel	Weather	Notes
				temperature range: 18.4 – 36.3°C	weeks, ideal conditions
Nocturnal survey	17 & 18 December 2018	4 person hours	Rohan Mellick, Heather Gosper	Clear skies, light breeze, temperature range: 18.4 – 36.3°C	
Stag/hollow watch	17 & 18 December 2018	4 person hours	Rohan Mellick, Heather Gosper	Clear skies, light breeze, temperature range: 18.4 – 36.3°C	
Bird survey	18 & 19 December 2018	6 person hours	Rohan Mellick, Heather Gosper	Clear skies, light breeze, temperature range: 18.4 – 36.3°C	
Microchiropteran-ran bat survey	17 -19 December 2018	2 x units recording 12hrs per night each over 2 nights (48 hours recorded)	Rohan Mellick, Heather Gosper	Clear skies, light breeze, temperature range: 18.4 – 36.3°C	
Diurnal active searches	18 & 19 December 2018	4 x sites for 0.5hrs each (4 person hours)	Rohan Mellick, Heather Gosper	Clear skies, light breeze, temperature range: 18.4 – 36.3°C	
SAT survey	18 & 19 December 2018	4 x sites for 0.5hrs each (4 person hours)	Rohan Mellick, Heather Gosper	Clear skies, light breeze, temperature range: 18.4 – 36.3°C	
Motion sensor cameras	17 -19 December 2018	4 x units recording throughout surveys (156 hours recorded)	Rohan Mellick, Heather Gosper	Clear skies, light breeze, temperature range: 18.4 – 36.3°C	

4. Native Vegetation

4.1. Native Vegetation Extent

The subject land has been subject to detailed surveys by Cumberland Ecology for the purpose of this BDAR. The native vegetation extent within the subject land was determined through aerial photograph interpretation and field surveys. The native vegetation extent within the subject land is shown in **Figure 6**. It occupies approximately 2.64 ha, which represents ~4.41% of the subject land. The native vegetation extent within the subject land includes a single native vegetation community in two broad condition states.

The remaining land within the subject land comprises cleared land that includes roads, the rendering plant, infrastructure; and the area to the north of the subject land that is subject to the separate DA and was cleared after the initial surveys in July 2018. The remainder of the subject land consists of garden beds, cleared areas and exotic dominated pasture grasses. In accordance with Section 5.1.1.5 of the BAM, the areas of cleared land, garden beds and pasture grasses do not require further assessment, unless they provide habitat for species credit species.

4.2. Plant Community Types

4.2.1. Introduction

Identification of the PCTs occurring within the subject land was guided by the results of the Cumberland Ecology surveys. The data collected during surveys of the subject land was analysed in conjunction with a review of the PCTs held within the BioNet Vegetation Classification Database. Consideration was given to the following:

- Occurrence within the Peel IBRA subregion;
- Vegetation formation;
- Alignment with TECs;
- Landscape position; and
- Upper, mid and ground strata species.

The analysis determined that the native vegetation within the subject land aligned with the following PCT.

- PCT 599: Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion.

The distribution of this PCT within the subject land is shown in **Figure 7**. Detailed descriptions of this PCT and the justification for PCT selection is provided in the sections below.

4.2.2. Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion

Vegetation Formation: Grassy Woodlands

Vegetation Class: Western Slopes Grassy Woodland

Area: ~2.64 ha

Percent Cleared Value: 80%

TEC Status: Part Endangered Ecological Community (EEC) / Part non-EEC

4.2.2.1. General Description

This community occurs in two broad condition states within the subject land, as scattered degraded remnant patches (see **Photograph 1**) and as rows of planted natives (see **Photograph 2**). The remnant and planted patches occupy ~1.19 ha and ~1.45 ha of the subject land, respectively.

Five degraded remnant occurrences are present within the subject land. Two occurrences consist of scattered paddock trees, comprising a canopy of a single individual mature *Eucalyptus melliodora* (Yellow Box). One occurrence to the north of the existing rendering plant is based around three mature *Brachychiton populnea* (Kurrajong), another occurrence comprises a sole *Eucalyptus melliodora* and a final occurrence is adjacent to the Oxley Highway access and is made up of 17 mature *Eucalyptus blakelyi* (Blakely's Red Gum).

Across these occurrences, where present the midstorey consists of regrowth *Eucalyptus melliodora* and *Eucalyptus blakelyi* (Blakely's Red Gum). The ground cover generally contains a mix of native and exotic species; where the natives are represented by species such as *Aristida behriana* (Bunch Wiregrass), *Eragrostis brownii* (Brown's Lovegrass), *Dichelachne micrantha* (Shorthair Plumegrass), *Aristida ramosa* (Purple Wiregrass), *Rytidosperma caespitosum* (Ringed Wallaby Grass) and *Austrostipa scabra* (Speargrass). The exotic component of this community includes *Lycium ferocissimum* (African Boxthorn), *Avena sativa* (Oats), *Verbena bonariensis* (Purpletop), *Plantago lanceolata* (Lamb's Tongue), *Centaurea solstitialis* (St Barnaby's Thistle) and *Sida rhombifolia* (Paddy's Lucerne).

Three areas of rows of planted natives occur to the south and east of the existing rendering plant. These trees were planted by Baiada in April 2011 and consist of some species representative of PCT 599, and some additional natives, set out in four rows of evenly spaced individual plants. The species include the species representative of the community such as *Eucalyptus blakelyi* and *Eucalyptus melliodora, Eucalyptus amplifolia* (Cabbage Gum), *Allocasuarina verticillata* (Drooping Sheoak) and the additional native *Callistemon viminalis* (Weeping Bottlebrush). The ground cover is characterised by the natives *Aristida ramosa*, V*ittadinia cuneata* (A Fuzzweed), *Rytidosperma caespitosum* and *Aristida behriana*. The exotic groundcovers include *Sida rhombifolia*, *Marrubium vulgare* (White Horehound), *Carthamus lanatus* (Saffron Thistle) and *Lolium perenne* (Perennial Ryegrass).

Photograph 1 Remnant Blakely's Red Gum - Yellow Box grassy tall woodland within the subject land

Photograph 2 Planted Blakely's Red Gum - Yellow Box grassy tall woodland within the subject land

4.2.2.2. Justification of PCT Selection

PCTs were initially filtered using BioNet Vegetation Classification System for IBRA Region and for the key canopy species *Eucalyptus blakelyi* and *Eucalyptus melliodora*. The resulting list was narrowed down based on landform and geology. PCT 599 was determined to be the best fit based on the PCT Classification Confidence Level and the number of key indicator species present based on the BAM plot surveys undertaken.

4.3. Threatened Ecological Communities

The PCT identified within the subject land has been assessed as being partially associated with a TEC. Remnant PCT 599 is considered to conform to the White Box – Yellow Box – Blakely's Red Gum Woodland (Box Gum Woodland) TEC under the BC Act. A discussion of the alignment of PCT 599 with the TEC is provided below.

The Box Gum Woodland TEC occupies ~1.19 ha of the subject land. The distribution of this TEC within the subject land is shown in **Figure 8**.

4.3.1. Remnant PCT 599 – TEC

The five patches of remnant and regrowth Blakely's Red Gum - Yellow Box grassy tall woodland within the subject land are considered to conform to the TEC White Box – Yellow Box – Blakely's Red Gum Woodland listed under the BC Act due to their alignment with the listing for the TEC in the final determination (NSW Scientific Committee 2002). The PCT is considered to conform to the TEC based on it representing the vegetation community that would historically have occupied the subject land, and that degraded scattered paddock trees, or even areas lacking any trees, still conform to the BC Act listing of the community. A total of ~1.19 ha of this TEC occurs within the subject land.

This PCT does not conform to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listing of Box Gum Woodland due to the either the lack of mature trees within the patch, the patch size not having a predominantly native understorey, or where it does have one it lacks the requisite 12 native non-grass understorey species and is <2 ha in size (DEH 2006).

4.3.2. Planted PCT 599 – Non TEC

These planted natives are composed of a mix of representative and non-representative species that, while being native, are not an example of a naturally occurring PCT. The *Eucalyptus blakelyi* and *Eucalyptus melliodora* are dominant tree species for the PCT; with additional species *Eucalyptus amplifolia, Allocasuarina verticillata* present. *Callistemon viminalis* also occurs within the plantings. In the absence of formal guidance on how planted vegetation is assessed under BAM, this assessment has assigned the vegetation to the best-fit PCT. Therefore, although the patch of planted natives has been aligned to the PCT based on this being the most likely community to have historically occupied the site, it is not considered to align with the Box Gum Woodland TEC listed under the BC Act.

The planted natives do not conform to the EPBC Act listing of Box-Gum Woodland due to the understorey lacking the requisite 12 native non-grass understorey species and is <2 ha in patch size (DEH 2006).

4.4. Vegetation Integrity Assessment

The native vegetation identified within the subject land was assigned to a vegetation zone based on PCTs and broad condition state. Patch sizes were subsequently assigned for each vegetation zone. The extent of vegetation zones and patch size classes within the subject land are shown in **Figure 9**.

Each vegetation zone was assessed using survey plots/transects (see ***Section 3.2***) to determine the vegetation integrity score. Plot/transects utilised within the BAM Calculator to determine the vegetation integrity score is provided in **Appendix A**. A flora species list for the subject land is provided in **Appendix B**. Field data sheets and electronic copies of raw data are provided separately to this document.

Vegetation zones, patch sizes and vegetation integrity scores for the development site are summarised in **Table 5**.

Table 5 Vegetation zones

Zone	PCT #	PCT Name	Condition	Development Site Area (ha)	Subject Land Area (ha)	Patch Size Class	Vegetation Integrity Score
1	599	Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	Remnant	0.31	1.19	<5 ha, 25-100 ha	31.5
2	599	Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	Planted	0.68	1.45	<5 ha, 25-100 ha	28.0

4.5. Groundwater Dependent Ecosystems

SEARs for the Project require that an assessment of potential impacts to groundwater dependent ecosystems (GDEs) be provided within the biodiversity assessment of the Project. Upon review of the GDE Atlas (Bureau of Meteorology 2018) mapping, no GDEs are located within the subject land or within 2km.

While no obvious GDEs were observed to occur within the subject land, it is recognised that riparian vegetation along Boltons Creek and the Peel River Tributary could have some root access to alluvial groundwater. This riparian vegetation is not considered to be completely dependent on groundwater, with the water balance for this vegetation likely comprising rainfall, surface water and water stored in the soil.

5. Threatened Species

5.1. Threatened Species for Assessment

The BAM Calculator generates a list of threatened species requiring assessment utilising a number of variables. The following criteria have been utilised to predict the threatened species requiring further assessment:

- IBRA subregion: Peel;
- Geographic constraints:
  - Category 1 tributary of the Peel River within the subject land;
  - Category 3 Boltons Creek within the assessment area; and
  - Local wetland associated with Boltons Creek within the assessment area.
- Associated PCTs: 599;
- Percent native vegetation cover in the assessment area: 7.02%;
- Patch size: PCT 599: <5ha and 25-100ha; and
- Credit type: Ecosystem and/or species.

Based on the above variables, the BAM Calculator generated a list of 10 ecosystem credit species, 13 species credit species and seven joint ecosystem/species credit species.

5.2. Ecosystem Credit Species

Table 6 lists the predicted ecosystem credit species for the vegetation zones within the subject land. None of these species have been removed from consideration.

Table 6 Predicted ecosystem credit species

Scientific Name	Common Name	PCT #599 (TEC)	PCT # 599 (Non-TEC)
Artamus cyanopterus cyanopterus	Dusky Woodswallow	X	X
Chthonicola sagittata	Speckled Warbler	X	X
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	X	X
Dasyurus maculatus	Spotted-tailed Quoll	X	X
Glossopsitta pusilla	Little Lorikeet	X	X
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	X	X
Petroica boodang	Scarlet Robin	X	X
Petroica phoenicea	Flame Robin	X	X

Scientific Name	Common Name	PCT #599 (TEC)	PCT # 599 (Non-TEC)
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	X	X
Stagonopleura guttata	Diamond Firetail	X	X

5.3. Species Credit Species

5.3.1. Assessment of Habitat Constraints and Microhabitats

Table 7 lists the species credit species predicted by the BAM Calculator and details whether the species have been further assessed based on the presence or absence of habitat constraints within the subject land. Under Section 6.4.1.13 of the BAM, further species credit species can be excluded from further assessment if an assessment of habitat constraints and microhabitats determines that the habitat within the subject land is substantially degraded such that the species credit species is unlikely to occur.

Detailed habitat assessments of the site were undertaken as described in ***Section 3.3.3***. The habitat assessments focussed on habitat features relevant to species credit species predicted to occur. This included determining the presence/absence of the habitat constraints identified for the predicted threatened species and the condition of these habitat constraints and other microhabitats.

The Regent Honeyeater and Swift Parrot have been excluded from further assessment subsequent to confirmation from EES that no important habitat occurs within the subject land for either species. Breeding habitat for both species is limited to specific areas that are not associated with, or in the vicinity of, the subject land, therefore since the species credit species component for both species is associated with breeding habitat only, both the Regent Honeyeater and Swift Parrot were excluded from further assessment.

The initial habitat assessment survey completed in July 2018 focussed on determining if habitat for any potential species credit species (or relevant breeding component for dual credit species) was substantially degraded such that the species is unlikely to utilise the subject land or specific vegetation zone in accordance with the requirements of Step 3 (a) of Section 6.4 of the BAM. Based on the results of the survey the Glossy Black-cockatoo was excluded from requiring further assessment as the habitat for this species is considered substantially degraded. The subject land is predominantly cleared open grassland with small scattered occurrences of remnant or immature planted natives, while Glossy Black-cockatoos favour woodlands, forests, timbered watercourses, or rugged and rocky inland areas that have not been cleared (EES 2020c). Furthermore, the subject land does not contain any feed trees for the species such as casuarinas, and there are no records of this species held by the EES BioNet Atlas within 10km of the subject land. Accordingly, the Glossy Black-cockatoo has been excluded from further assessment based on the habitat within the subject land being degraded such that would be unsuitable to support the breeding of this species.

A number of other species credit fauna species had the potential to be excluded from further assessment based on the lack of/degradation of their habitat constraints, however due to the alignment of the survey period for these species within the timeframe for the additional surveys; they were not removed from consideration and were surveyed accordingly as a precautionary measure.

Table 7 Species credit species assessment

Species Credit Species	Common Name	Habitat Constraint	Removed from Consideration	Reason for Inclusion or Removal
Flora				
Acacia atrox	Myall Creek Wattle	None	No	Potential suitable habitat present within subject land
Dichanthium setosum	Bluegrass	None	No	Potential suitable habitat present within subject land
Digitaria porrecta	Finger Panic Grass	None	No	Potential suitable habitat present within subject land
Euphrasia arguta		None	No	Potential suitable habitat present within subject land
Homopholis belsonii	Belson's Panic	None	No	Potential suitable habitat present within subject land
Picris evae	Hawkweed	None	No	Potential suitable habitat present within subject land
Thesium australe	Austral Toadflax	None	No	Potential suitable habitat present within subject land
Tylophora linearis		None	No	Potential suitable habitat present within subject land
Fauna				
Adelotus brevis – endangered population	Tusked Frog population in the Nandewar and New England Tableland Bioregions	None	No	Potential suitable habitat present within subject land

Species Credit Species	Common Name	Habitat Constraint	Removed from Consideration	Reason for Inclusion or Removal
Anthochaera phrygia (Breeding)	Regent Honeyeater	Mapped area	Yes	Subject land not within mapped area for the species
Calyptorhynchus lathami (Breeding)	Glossy Black-Cockatoo	Living or dead tree with hollows greater than 15cm diameter and greater than 5m above ground.	Yes	Habitat degraded for this species and lacking required feed trees such as Allocasuarina and Belah. No records of this species within 10km of the subject land.
Haliaeetus leucogaster (Breeding)	White-bellied Sea-Eagle	Living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines	No	Habitat constraint is present within the subject land
Lathamus discolor (Breeding)	Swift Parrot	Mapped Area	Yes	Subject land not within mapped area for the species
Litoria booroolongensis	Booroolong Frog	None	No	Potential suitable habitat present within subject land
Miniopterus orianae oceanensis (Breeding)	Large Bent-winged Bat	Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave;" observation type code "E nest-roost;" with numbers of individuals >500	No	Potential suitable habitat present within subject land
Petaurus norfolcensis	Squirrel Glider	None	No	Potential suitable habitat present within subject land
Phascogale tapoatafa	Brush-tailed Phascogale	Hollow-bearing trees	No	Habitat constraint is present within the subject land

Species Credit Species	Common Name	Habitat Constraint	Removed from Consideration	Reason for Inclusion or Removal
Phascolarctos cinereus (Breeding)	Koala	Areas identified via survey as important habitat: Important' habitat is defined by the density of koalas and quality of habitat determined by on-site survey - contact OEH for more information.	No	Survey required as advised by OEH
Pteropus poliocephalus (Breeding)	Grey-headed Flying-fox	Breeding camps	No	Potential suitable habitat present within subject land
Uvidicolus sphyrurus	Border Thick-tailed Gecko	None	No	Potential suitable habitat present within subject land

5.3.2. Candidate Species for Further Assessment

The following species were identified as candidate species credit species for further assessment;

- Flora:
  - Acacia atrox;
  - Dichanthium setosum;
  - Digitaria porrecta;
  - Euphrasia arguta;
  - Homopholis belsonii;
  - Picris evae;
  - Thesium australe; and
  - Tylophora linearis.
- Fauna:
  - Tusked Frog population in the Nandewar and New England Tableland Bioregions;
  - White-bellied Sea-eagle (breeding);
  - Booroolong Frog;

- Large Bent-winged Bat;
- Squirrel Glider;
- Brush-tailed Phascogale;
- Koala (breeding);
- Grey-headed Flying-fox (breeding); and
- Border Thick-tailed Gecko.

5.3.3. Presence of Candidate Species

5.3.3.1. Surveys

Targeted surveys for the candidate species credit species for further assessment undertaken within the subject land are summarised in **Table 8**. These surveys are detailed further in ***Section 3.3.3***. Additional targeted surveys were undertaken for the species credit species that required no further assessment throughout the additional survey period due to the opportunity to do so within the additional December period as described in ***Section 3.3.3***.

Table 8 Surveys for candidate species credit species

Species Credit Species	Survey Period	Surveys Undertaken
Flora		
Acacia atrox	Year round	Parallel field traverse threatened flora surveys
Dichanthium setosum	Nov-May	Parallel field traverse threatened flora surveys
Digitaria porrecta	Jan-Feb	Parallel field traverse threatened flora surveys
Euphrasia arguta	Nov-Mar	Parallel field traverse threatened flora surveys
Homopholis belsonii	Dec-Apr	Parallel field traverse threatened flora surveys
Picris evae	Sep-Feb	Parallel field traverse threatened flora surveys
Thesium australe	Nov-Feb	Parallel field traverse threatened flora surveys
Tylophora linearis	Oct-May	Parallel field traverse threatened flora surveys
Fauna		
Tusked Frog population in the Nandewar and New England Tableland Bioregions -	Oct-Feb	Amphibian survey, nocturnal survey, diurnal active searches
White-bellied Sea-eagle	Jul-Dec	Habitat assessment, bird survey
Booroolong Frog	Nov-Dec	Amphibian survey, nocturnal survey, diurnal active searches

Species Credit Species	Survey Period	Surveys Undertaken
Large Bent-winged Bat	Dec-Feb	Microchiropteran bat survey, nocturnal survey, habitat assessment
Squirrel Glider	Year round	Nocturnal survey, stag/hollow watches, motion sensor cameras
Brush-tailed Phascogale	Dec-Jun	Nocturnal survey, stag/hollow watches, motion sensor cameras
Koala	Year round	Nocturnal survey, Koala SAT search, motion sensor cameras
GHFF	Oct-Dec	Nocturnal survey, habitat assessment
Border Thick-tailed Gecko	Nov-Mar	Nocturnal survey, diurnal active searches

5.3.3.2. Species Occurrence

None of the candidate species credit species were detected within the subject land, nor was any suitable breeding habitat such as nests observed for these species. As these species were not recorded within the subject land or considered likely to utilise the habitat within the subject land, no further assessment is required for species credit species.

5.4. Prescribed Impacts

Prescribed impacts are outlined within the NSW *Biodiversity Conservation Regulation 2017*. The project is considered to result in a number of prescribed impacts outlined in **Table 9**.

Table 9 Identification of prescribed impacts on the development site

Feature	Present (Yes/No)	Description of feature characteristics and location	Potential impact	Threatened species or community using or dependent on feature	Section of BDAR where impact is addressed
Karst, caves. Crevices, cliffs or other geologically significant feature	No	N/A	Feature not present within site	N/A	N/A
Rocks	No	N/A	Feature not present within site	N/A	N/A
Human-made structure	Yes	Existing waste water processing plants	Demolition of existing waste water treatment plant	Large Bent-winged Bat (roosting only, not breeding)	6.1.2, 7.2.1, 7.4.1

Feature	Present (Yes/No)	Description of feature characteristics and location	Potential impact	Threatened species or community using or dependent on feature	Section of BDAR where impact is addressed
Non-native vegetation	Yes	Exotic dominated pasture and garden bed vegetation throughout subject land	Reduce extent of potential foraging habitat for species	Grey-headed Flying-fox (foraging)	6.1.2, 7.2.2, 7.4.2
Connectivity of different areas of habitat that facilitates movement across a species' range	Yes	Peel River tributary traversed by proposed access road	Reduce connectivity between habitats and accessibility to habitat for species	Threatened woodland birds (ecosystem credit species)	6.1.2, 7.2.3, 7.4.3
Movement of threatened species that maintains their lifecycle	Yes	Peel River tributary traversed by proposed access road	Removal of foraging habitat	Threatened woodland birds (ecosystem credit species)	6.1.2, 7.2.4, 7.4.4
Water quality, water bodies and hydrological processes	No	N/A	No prescribed impacts on hydrological processes	N/A	N/A
Hydrological processes - Ground water dependent ecosystems	No	N/A	Feature not present within site	N/A	N/A
Wind turbine strikes	No	N/A	No wind farm proposed on site	N/A	N/A
Vehicle strikes	Yes	Construction of access road for additional vehicles	Additional roads increase vehicle strike	Threatened woodland birds (ecosystem credit species)	6.1.2, 7.2.6, 7.4.6, 7.5
Other	No	N/A	Feature not present within site	N/A	N/A

6. Avoid and Minimise Impacts

6.1. Avoid and Minimise Impacts

This section includes demonstration of efforts to avoid and minimise impacts on biodiversity values identified within the subject land, which includes assessment of direct and indirect impacts.

6.1.1. Avoid and Minimise Direct Impacts

6.1.1.1. Project Location

The Project has been situated within the Oakburn property to allow the development site to provide for the operational requirements of the site yet minimise impacts to areas of biodiversity values.

The current development site has been proposed to avoid removal of native vegetation where possible, including avoidance of the majority of the two patches of Box Gum Woodland TEC located on the western side of the subject land and of a portion of the patch to the west of the entrance currently accessing the property off Gunnedah Rd (Oxley Highway). The two large remnant *Eucalyptus melliodora* trees within each of the patches to the west of the subject land are both hollow-bearing and these will be retained; along with two hollow-bearing trees in the patch at the entrance to the property which will be partially retained.

Clearing of the other occurrences of the Box Gum Woodland TEC and the planted natives has been minimised where feasible while still allowing for the practical functioning of the proposed development. Areas of both the TEC and planted natives will be conserved throughout the subject land, including retention of approximately 0.88 ha of the ~1.41 ha of Box Gum Woodland TEC and approximately 0.77 ha of the ~1.45 ha of planted natives.

Alignment of the proposed access road has been designed to minimise direct impacts to the Category 1 stream to the east of the subject land, by placement of the crossing closest to the stream end point.

Furthermore, the proposed development site is outside the 30m buffer applicable to the Category 3 stream Bolton's Creek.

Therefore, the proposed development will avoid and minimise direct impacts on clearing of native vegetation and habitat by:

- Locating the project predominantly in areas where there are low to no biodiversity values (such as in the exotic dominated pasture);
- Situating the development site to minimise clearing of native vegetation that is a TEC; and
- Locating the project to reduce impacts to waterways.

6.1.1.2. Consideration of Alternative Locations

Alternative development layouts were considered throughout the planning stage; however, these were amended due to the following:

- Proposed development layout placed further south closer to Oxley Highway or situated further west was amended as this would require removal of larger areas of the TEC and more habitat features; and

- Alternative access road route: amended as this would result in crossing the Category 1 stream further upstream.

Therefore, it is determined the current proposed development envelope has sought to avoid and minimise direct impacts on native vegetation and watercourses within the property, whilst allowing for adequate functionality of the proposed development.

6.1.1.3. Consideration of Project Design

The project design has been developed to avoid and minimise clearing of native vegetation and habitats by minimising the clearing footprint to include only the operational footprint and the 10m buffer for the constructional footprint. There are no ancillary areas proposed to be cleared that are not directly related to areas to be utilised for buildings and infrastructure. By retaining all works within the one development site, and in areas of the least biodiversity values practical, the Project will avoid and minimise direct impacts to native vegetation and habitats through:

- Reducing the overall clearing footprint of the project; and
- Locating facilities in areas where the native vegetation or threatened species habitat will be least impacted.

The Project will include as a design component the retention of the remaining native vegetation and habitat within the development site.

6.1.2. Avoid and Minimise Prescribed Impacts

Measures to avoid and minimise prescribed impacts identified in ***Section 5.4*** are outlined below.

6.1.2.1. Human Made Structures

The existing waste water treatment plant will be demolished as part of the proposed development which could potentially provide roosting habitat for the threatened Large Bent-winged Bat (see **Photograph 3**). This species breeds in specialist maternity caves (EES 2020b), therefore, this prescribed impact does not relate to breeding habitat and applies only to the ecosystem credit component for the species.

Given the limited area of land on which the development site occurs, as well as the design requirements for creating a functioning processing plant, impacts to these structures are not able to be avoided as part of the proposed development.

Nevertheless, the human made structures planned to be demolished and removed are not considered to be depended on for survival of the Large Bent-winged Bat. Searches of the subject land failed to detect any bats roosting. Furthermore, targeted surveys for microbats failed to detect the species utilising the subject site in any capacity and it is therefore unlikely the species is reliant on these structures or that they are using the site as anything other than very occasional foraging and roosting habitat.

Photograph 3 Existing waste water treatment plant

6.1.2.2. Non-native Vegetation

The development design has been focused on avoiding areas of native vegetation and locating the development site predominantly within areas of exotic vegetation. As a result, the majority of areas to be cleared are non-native vegetation including the exotic dominated pasture and garden beds **(Photograph 4**)**,** which has the potential to reduce the foraging habitat for the Grey-headed Flying-fox.

However, this non-native vegetation is considered highly marginal foraging habitat for this species and is unlikely to be relied upon as a substantial foraging area. Nevertheless, approximately half of the non-native vegetation will be retained, and additional landscaping will occur around the new development which will minimise the impact (if any) of the potential loss of foraging habitat for the Grey-headed Flying-fox.

Photograph 4 Non-native grassland vegetation within the subject land

6.1.2.3. Connectivity

The development has been designed to avoid impacts to native vegetation; hence the development will only remove a relatively small area of native vegetation/habitat within the subject land. The vegetation to be removed consists of low condition isolated fragments surrounded by exotic dominated pasture. The proposed removal of these small isolated areas of vegetation and marginal habitat would very minimally add to fragmentation further than current conditions, as there is currently very limited connectivity due to numerous existing hostile gaps throughout the subject land. Threatened woodland birds may occasionally utilise this area for movement throughout the landscape and between areas of habitat, however none are likely to rely on the highly fragmented, small areas of habitat available within the development site.

6.1.2.4. Movement of Threatened Species

Small areas of native vegetation and two hollow-bearing trees will be removed that may act as part of threatened woodland bird movements; however it is considered unlikely that any birds would be solely reliant or regularly utilising the highly degraded and exposed habitat within the subject land.

6.1.2.5. Vehicle Strikes

The construction of the access road to service the additional trucks and vehicles that will be accessing the site will increase the risk of fauna vehicle strike. This has been minimised by restricting the additional vehicles and construction to an area primarily devoid of native vegetation that could act as habitat for threatened species. Accordingly, the chance of vehicle strike to species, particularly threatened woodland bird species, is substantially reduced by avoidance of areas most likely to facilitate the movements and foraging of these species.

7. Impact Assessment

7.1. Assessment of Impacts to Native Vegetation and Habitat

7.1.1. Direct Impacts

The primary and direct impact resulting from the proposed development is the loss of vegetation and associated habitat within the subject land.

7.1.1.1. Impacts on Vegetation Communities

One native vegetation community, PCT 599, will be impacted under the proposed development. Within this PCT five patches of remnant vegetation and two patches of planted vegetation will be removed, or partially removed. All other native vegetation within the subject land will be retained.

The remainder of the vegetation to be removed within the development site consists of exotic dominated pasture and garden beds that do not constitute a recognised ecological community.

Table 10 identifies the areas of vegetation to be removed and retained within the subject land.

Table 10 Areas of vegetation to be removed and retained within the subject land

PCT	TEC status	Approximate Area (ha)		
		Current Extent	Removed Extent	Retained
Native Vegetation				
599 - Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	TEC	1.19	0.31	0.88
599 - Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	Non-TEC	1.45	0.68	0.77
Other				
Exotic dominated pasture		37.41	20.82	16.59
Garden beds		2.52	2.30	0.22
Cleared		17.31	5.44	11.87
Total		59.88	29.54	30.34

7.1.1.2. Loss of Specific Habitat Features

The majority of the habitat, albeit degraded habitat, for native fauna in the subject land is in the areas of native vegetation. Overall, nearly two-thirds of the native vegetation on site and the majority of the habitat features will be retained under the proposed development.

Nevertheless, the proposed development will result in the loss of some existing habitat in the form of two hollow-bearing trees and other regrowth/immature native trees that provide marginal roosting and foraging habitat for a variety of predominantly avian species.

The two large hollow-bearing trees that each contain hollows include one close to the entrance on Gunnedah Road and one paddock tree in the north east of the subject land. These are both remnant trees that were not observed to have any active inhabitants at the time of survey.

The remainder of the trees in the subject land include two large remnant *Eucalyptus melliodora* in the western patches of the TEC, two remnant *Brachychiton populneus* to the north east, and regrowth natives that appear to have regenerated since grazing was excluded from Oakburn subsequent to Baiada purchasing the property. This regrowth, along with the planted native vegetation, provides some limited roosting and foraging habitat for birds and arboreal fauna, such as in the form of flowering trees. One stick nest was located in the western portion of the subject land and will be retained.

Overall, the removal of these habitat features are considered to have only minor implications for fauna species due to the highly modified and degraded ecological context they are within and the high mobility of the species likely to utilise these habitats.

7.1.2. Change in Vegetation Integrity Score

The changes in vegetation integrity scores as a result of clearing are documented for each vegetation zone in **Table 11** below.

Table 11 Change in vegetation integrity score

Zone	PCT	Approximate Area (ha)	Current Vegetation Integrity Score	Future Vegetation Integrity Score	Change in Vegetation Integrity Zone
1	599_Remnant	0.31	31.5	0	-31.5
2	599_Planted	0.68	28.0	0	-28.0

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7.1.3. Indirect Impacts

The following indirect impacts to native vegetation and habitat may occur as a result of the Project:

- Inadvertent impacts on adjacent habitat or vegetation;
- Reduced viability of adjacent habitat due to noise, dust or light spill; and
- Inadvertent impacts to hydrological processes.

7.1.3.1. Inadvertent Impacts on Adjacent Habitat or Vegetation

i. Nature and Extent

The vegetation within the subject land that will be removed occurs in very small isolated patches that are surrounded by disturbed land. Removal of the small areas of native vegetation and construction activities associated with the new development are unlikely to inadvertently impact on the adjacent habitat beyond potential minor loss of connectivity that could act as “stepping stone” habitat. The vegetation to the west which occurs along Boltons Creek is primarily immature native plantings similar to those within the subject land, and these would have little reliance, if any, on the isolated patches of native vegetation within the subject land. The connectivity between these plantings alongside Boltons Creek and the area of remnant Box Gum Woodland that occurs south of Gunnedah Road alongside the Tamworth Airport would be maintained and is in no way expected to be indirectly impacted by the removal of the small areas of low condition vegetation within the subject land. The remainder of the adjacent habitat surrounding the subject land is agricultural land that does not support any large tracts of native vegetation that may be impacted by the proposed development.

ii. Duration

Any impact on adjacent habitat or vegetation is likely to be long term.

iii. Likely Affected Threatened Entities

There is a potential for the following threatened entities to be affected:

- Box Gum Woodland TEC; and
- Threatened woodland birds (ecosystem credit species).

iv. Consequences

The construction of the Project will result in removal of approximately 0.99 ha of native vegetation that has some, albeit very minor, connectivity to adjacent vegetation and habitats that could be used by threatened species as they traverse throughout the landscape. However, this vegetation is in low condition and is scattered such that is unlikely to be solely relied upon by any threatened species, or contribute substantially to genetic flow between adjacent areas of Box Gum Woodland TEC. Therefore, the consequences of the Project on adjacent habitat or vegetation is expected to be nil or minimal.

7.1.3.2. Reduced Viability of Adjacent Habitat Due to Noise, Dust or Light Spill

i. Nature and Extent

The Project will involve construction and operation of the new poultry processing plant 24 hrs a day and will therefore increase the noise, dust and light due above current levels due to the additional traffic, infrastructure and operating hours. However, most of the adjacent habitat consists of agricultural land that is covered by exotic dominated pasture grasses that are unlikely to be impacted by these changes. Similarly, the planted native vegetation adjacent to Boltons Creek and the western side of the subject land is an artificial immature community that is unlikely to experience reduced viability due to the increase in noise, dust or light. Due to the vegetation forming a barrier to the wetlands area associated with Boltons Creek, and the Project design that situates the new poultry processing plant towards Gunnedah Rd and away from the wetlands, it is not considered that noise, dust, or light levels are likely to significantly increase in this area.

ii. Duration

Increases in noise, dust and light are expected to last in the long-term for the duration of the operational activities of the Project.

iii. Likely Affected Threatened Entities

There is a potential for the Box Gum Woodland TEC to be affected.

iv. Consequences

The potential increase in noise, dust and light from the proposed development is unlikely to significantly impact the Box Gum Woodland TEC adjacent habitat. The area of vegetation is already subject to the significant levels of noise, dust and light from the traffic of Gunnedah Rd, the operation of the Tamworth Airport, and the surrounding agricultural and industrial infrastructure. The minor increase in light, noise and dust from the Project is unlikely to be such that it would reduce the viability of the adjacent habitats surrounding the subject land.

7.1.3.3. Inadvertent impacts to hydrological processes

i. Nature and Extent

The location and design of the development site have been modified so that it avoids the most ecologically significant watercourse and wetlands in proximity to the subject land and the majority of the secondary watercourse present within the subject land.

Nevertheless, the road design for the access road will cross the watercourse within approximately 150m from the mapped end of this ephemeral stream, which may inadvertently alter the hydrological regime in the subject land close to the end of the existing Peel River Tributary. Any indirect impacts to hydrological processes are expected to result in only minimal disturbance which will not impact on any other watercourses or hydrological processes. There is also minor potential for sedimentation in Boltons Creek to occur as a result of the construction phase of the Project.

Sediment control and reduction measures in accordance with Managing Storm Water: Soils and Construction – Volume 1, 4th Edition "The Blue Book" (2004) will also be employed to minimise impacts on water quality in the Peel River Tributary and Boltons Creek. Additionally, the development site has been located outside the 30 m buffer applied to Boltons Creek and will thereby avoid impacts to the most ecologically significant watercourse in the vicinity of the subject land.

ii. Duration

Impacts to hydrological processes are expected to last in the long-term for the Peel Creek Tributary, while being restricted to the short-term for Boltons Creek.

iii. Likely Affected Threatened Entities

There is a potential for the Box Gum Woodland TEC to be affected.

iv. Consequences

The potential increase in noise, dust and light from the proposed development is unlikely to significantly impact the Box Gum Woodland TEC adjacent habitat. The area of vegetation is already subject to the significant levels of noise, dust and light from the traffic of Gunnedah Rd, the operation of the Tamworth Airport, and the surrounding agricultural and industrial infrastructure. The minor increase in light, noise and dust from the Project is unlikely to be such that it would reduce the viability of the adjacent habitats surrounding the subject land.

7.1.4. Groundwater Dependent Ecosystems

i. Nature and Extent

While no obvious GDEs were observed to occur within the subject land, there is potential for riparian vegetation adjacent to the subject land associated with Boltons Creek and the Peel River Tributary to have root access to alluvial groundwater. This riparian vegetation is not considered to be completely dependent on groundwater, with the water balance for this vegetation likely comprising rainfall, surface water and water stored in the soil. The Project does not include the extraction of groundwater. Areas comprising GDE vegetation are unlikely to be significantly impacted by the Project.

ii. Duration

Impacts to GDEs are expected to be long-term.

iii. Likely Affected Threatened Entities

There is a potential for the Box Gum Woodland TEC to be affected.

iv. Consequences

The potential indirect impacts to GDEs are unlikely to be significant. The vegetation within the subject land and adjacent areas may have some access to alluvial groundwater, however, are unlikely to rely on it as a sole water source. The proposed development is not expected to exacerbate any impacts on GDEs as it does not include the extraction of groundwater.

7.2. Assessment of Prescribed Impacts

The following prescribed impacts are potentially relevant to the proposal:

- The impacts of development on the habitat of threatened species or ecological communities associated with human made structures;
- Impacts of development on the threatened species that utilise the non-native vegetation within the subject land;
- Impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range;
- Impacts of the development on movement of threatened species that maintains their life cycle;

- Impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities; and
- Impacts of development on threatened species that may occur as a result of vehicle strike.

These are discussed in detail in subsequent sections.

7.2.1. Human Made Structures

As part of the development a small number of human-made structures, which could potentially provide roosting habitat for the threatened Large Bent-winged Bat, are planned to be demolished. These structures include buildings and infrastructure associated with the existing waste water treatment plant.

Given the limited area of land on which the development site occurs, as well as the design requirements for creating a functioning processing plant, impacts to these structures are not able to be avoided as part of the development.

Nevertheless, the human made structures to be removed for the proposed development are not considered to form significant roosting habitat for this species and therefore are not considered to be dependent on for survival for the Large Bent-winged Bat.

Searches of the subject land failed to detect any bats roosting and targeted surveys did not detect the species utilising the site in any form.

7.2.2. Non-native Vegetation

The development design has been focused on avoiding areas of native vegetation and locating the development site predominantly within areas of exotic vegetation. As a result, the majority of areas to be cleared are non-native vegetation including the exotic dominated pasture and gardens, which has the potential to reduce the foraging habitat for the Grey-headed Flying-fox.

However, this non-native vegetation is considered highly marginal foraging habitat for this species and is unlikely to be relied upon as a substantial foraging area. Nevertheless, approximately half of the non-native vegetation will be retained, and additional landscaping will occur around the new development which will minimise the impact (if any) of the potential loss of foraging habitat for the Grey-headed Flying-fox.

7.2.3. Connectivity of Different Areas of Habitat that Facilitates Movement Across a Species Range

The development has been designed to avoid impacts to native vegetation to the highest extent possible; hence the development will only remove a relatively small area of native vegetation/habitat within the subject land. The vegetation to be removed consists of low condition isolated fragments surrounded by existing agricultural and industrial development. The proposed removal of these small isolated areas of vegetation and marginal habitat would very minimally add to fragmentation further than current conditions, as there is currently very limited connectivity due to numerous existing hostile gaps throughout the subject land. While the minor connectivity may provide for the occasional "stepping stone" for threatened species movement throughout the landscape for threatened woodland birds; it is unlikely these degraded and highly fragmented areas would be relied upon by any threatened species to facilitate movements between habitats throughout their range.

7.2.4. Movement of Threatened Species that Maintains their Lifecycle

The project design has aimed to reduce the development footprint where feasible and the current layout will allow for the retention of the over half the area of both native and non-native vegetation, including the majority of the hollow-bearing trees within the subject land that may be utilised by threatened woodland birds. These retained areas will provide for any movement of threatened species required to maintain their lifecycle; however, it is considered unlikely that any species would be regularly utilising the exposed and degraded habitats within the subject land as part of their lifecycle movements.

7.2.5. Vehicle Strike

The construction of the access road to service the additional trucks and vehicles that will be accessing the site will increase the risk of fauna vehicle strike. This has been minimised by restricting the additional vehicles and construction of the access road to an area primarily devoid of native vegetation that could act as habitat for threatened species. Accordingly, the chance of vehicle strike to species, particularly threatened woodland bird species, is substantially reduced by avoidance of areas most likely to facilitate the movements and foraging of these species.

7.3. Mitigation Measures for Impacts to Native Vegetation and Habitat

A range of mitigation measures have been developed for this project to mitigate the impacts that are unable to be avoided using the measures outlined previously. These include a range of measures to be undertaken before and during construction to limit the impact of construction, enhance the retained vegetation and measures to manage weed control.

These measures are discussed in more detail below.

7.3.1. Construction Mitigation Measures

7.3.1.1. Timing of Construction Works

In order to minimise impacts to amphibians, bulk earthworks within the vicinity of the Peel River Tributary will either be:

- Undertaken during the winter months when movement of amphibian species is not occurring; or
- Undertaken during periods of no ephemeral pooling of water in the tributary; or
- Undertaken after a pre-clearance inspection by a qualified ecologist determines no amphibian presence at that time.

In order to minimise impacts to threatened fauna species that may utilise the hollow-bearing trees within the development site, removal of these will either be:

- Undertaken after a pre-clearance inspection by a qualified ecologist determines no hollow-dwelling species breeding presence at that time; or

- If breeding hollow-dwelling species are located, removal will be once the ecologist determines the breeding period for that species has ended and all juveniles have moved on.

7.3.1.2. Delineation of Clearing Areas

Areas that require clearance will be flagged and clearly delineated by temporary fencing to ensure that no areas intended for conservation will be inadvertently cleared during the construction process. No machinery will be parked on areas beyond the temporary fencing and no access will be allowed during construction. Ancillary facilities such as stockpile sites, site compounds and construction zones will not be located beyond the limits of clearing.

7.3.1.3. Pre-clearance Surveys

In order to avoid impacts to fauna species during construction, pre-clearance surveys will be conducted in all areas that are required to be cleared. Pre-clearing surveys will be undertaken ahead of clearing, to limit fauna injury and mortality and to identify habitat features to be relocated. Pre-clearance surveys will be conducted by suitably qualified ecologists and all fauna found during these surveys will be encouraged to move on or relocated by the ecologists in areas of similar habitat nearby that will not be impacted.

Pre-clearing protocols will include:

- Preparation of an inventory of trees and hollows to be removed and relocated, prior to clearing;
- Checking trees for the presence of bird nests and arboreal mammals, such as possums, gliders and bats, prior to felling;
- Animals found to be occupying trees and habitat will be safely removed before the clearing of trees and relocated into nearby woodlands; and
- Boulders and large logs will be placed in nearby areas of retained vegetation to allow their continued use as fauna habitat.

7.3.1.4. Sedimentation Control Measures

One of the potential impacts of the project is increased sedimentation of waterways and wetlands as a result of soil disturbance during construction. In order to prevent this impact, the Environmental Impact Statement (EIS) for the Project includes details of erosion, sediment and stormwater and leachate control during construction as required by the SEARs. These measures will be undertaken in accordance with "The Blue Book" (Landcom 2004).

7.3.1.5. Weed Management

In order to minimise the spread of weeds throughout the subject land and spread of weeds present in the subject land to areas outside of it, appropriate weed control activities will be undertaken in accordance with all state, regional and local weed management plans. The SEARs for the Project require 'details of weed management during construction and operation in accordance with existing State, regional or local weed management plans or strategies'. The following section has been prepared to address this requirement.

The subject land lies within the North West Local Land Services Area and is subject to the North West Regional Strategic Weed Management Plan 2017 - 2022 (LLS: North West 2017) and management of Weeds of National Significance (WoNS).

The *Biosecurity Act 2015* and regulations provide specific legal requirements for state level priority weeds and high risk activities, as provided in the Appendices of the North West Regional Strategic Weed Management Plan.

The objectives of the management plan (2017) are:

- Prevention: preventing the entry of new risks into NSW;
- Eradication: quickly finding, identifying and eradicating threats where possible;
- Containment: quickly finding, identifying and containing threats; and
- Minimisation: effectively minimising the impacts of those pests, diseases and weeds that cannot be eradicated.

In order to comply with the objectives of the North West Regional Strategic Weed Management Plan, it is recommended the following measures be implemented as part of a management plan for the subject land.

i. Prevention

Appropriate site hygiene measures will be implemented to prevent entry of new weeds to the area.

ii. Eradication

Initial weed management will be carried out over the development site according to best-practice methods under the direction of a suitably qualified bush regenerator. The targeted species will be those listed under Appendices 1 and 2 of the North West Regional Strategic Weed Management Plan. Initial weed treatment will include eliminating woody species and targeting large dominant infestations of exotic herbs. This may be achieved via a combination of manual weed removal and herbicide use.

Best-practice bush regeneration should undertake measures to avoid adverse impacts to retained vegetation within the development site, including not over clearing (remove only targeted species), employment of minimal disturbance techniques to avoid soil and surrounding vegetation disturbance, and replacement of disturbed mulch/leaf-litter.

It is noted that due to the agricultural history of the subject land and surrounds, removal of all exotic grasses will not be feasible and weed management will focus on non-grass species.

iii. Containment

Follow-up monitoring and maintenance should be undertaken in areas of the development site that have received past primary weeding treatments in the following months, to contain any re-emergence of weed species.

iv. Minimisation

Minimisation of weed species that cannot be effectively controlled on the site, such as exotic grasses, will be prevented from further spread through construction and operational phase site hygiene procedures.

7.4. Mitigation Measures for Prescribed Impacts

7.4.1. Human Made Structures

A small number of human-made structures are planned to be demolished within the subject land that form the existing waste water treatment plant. Although the human made structures proposed to be removed are not considered to form significant roosting habitat or be dependent on for survival for the Large Bent-winged Bat, or any other threatened species, they could still potentially be used occasionally for roosting habitat for the species as well as other non-threatened microchiropteran bat species.

In order to mitigate or avoid impacts to fauna species, and the Large Bent-winged Bat in particular, during demolition of the mentioned structures, pre-clearance checks will be conducted of all human made structures proposed to be demolished prior to construction. Pre-clearance surveys will be conducted by suitably qualified ecologists and all fauna found during these surveys will be encouraged to move on or relocated by the ecologists in areas of similar habitat nearby that will not be impacted.

7.4.2. Non-native Vegetation

Although non-native vegetation that may occasionally be utilised by the Grey-headed Flying-fox for foraging will be removed as part of the development, over half the non-native vegetation will be retained and additional areas that comprise a mix of native and non-native species will be planted in accordance with the landscaping plan. The plantings provided under the landscape plan are likely to result in maintenance or improvement of the biodiversity values of the non-native vegetation currently occupying the development site.

7.4.3. Connectivity of Different Areas of Habitat that Facilitates Movement Across a Species' Range

As previously stated in ***Section 7.2.3***, the vegetation to be removed already consists of isolated fragments surrounded by agricultural and industrial development. The proposed removal of this small area of vegetation and marginal habitat would very minimally add to fragmentation further than current conditions, as there is currently very limited connectivity due to numerous existing hostile gaps throughout the subject land.

The design of the Project provides for landscaped vegetation throughout the development site, which can be used as "stepping stones" for fauna species to move through the landscape. The final design layout of the development provides a range of trees, shrubs, and ground-cover vegetation where there are currently vast open spaces occupied by predominantly exotic pasture grasses. The size of the hostile gaps is reduced where possible by the introduction of landscaped vegetation. The "stepping stone" habitat will provide improved fauna habitat and movement corridors for the species that may utilise the subject land and adjacent habitats, including threatened woodland birds.

7.4.4. Movement of Threatened Species that Maintains their Lifecycle

As previously mentioned in ***Section 7.3.1***, a number of construction measures are proposed to mitigate any potential impacts to threatened species that may occasionally utilise the development site for foraging. These measures are focused around the timing of the construction works and pre-clearance surveys.

To minimise the impacts upon native threatened woodland birds utilising hollows for breeding or tree limbs for nesting, vegetation pre-clearance is required for all vegetation to be removed and clearing should not occur during the breeding period for any species found to be utilising the habitats within the development site.

7.4.5. Vehicle Strike

As discussed in ***Section 7.2.5***, the design of the access road has been situated so as to avoid areas of the treed vegetation that are most likely to be inhabited by fauna species susceptible to vehicle strike.

Accordingly, the chance of vehicle strike to species, particularly threatened woodland bird species, is substantially reduced by avoidance of areas most likely to facilitate the movements and foraging of these species.

A quantitative traffic impact assessment has been prepared for the project in accordance with relevant Council, Ausroads and Roads and Maritime Services guidelines and is included in the EIS material.

7.5. Adaptive Management of Uncertain Impacts

Vehicle strike is the only uncertain impact likely to be relevant to the Project. Management of vehicle strike will be through implementation of:

- Signage: appropriate signage notifying vehicles of potential fauna presence should be installed along the access road;
- Speed limits: Speed limits will be introduced to restrict the speed of vehicles travelling along the access road; and
- Lighting: Low wattage lighting, and minimal / well-spaced street lights should be considered. The use of lights with flat glass aeroscreen rather than reflector glass covers may be an option to reduce glare, thus reducing impact on nocturnal fauna. The location of street lights is subject to the final road design plans.

7.6. Assessment Thresholds

Unavoidable impacts of the project have been considered and a determination made of the assessment thresholds. The following sections outline the assessment thresholds and their relevance to the project.

7.6.1. Impacts to Potential Serious and Irreversible Impact Entities

7.6.1.1. Identification of the Serious and Irreversible Impact Entity

One SAII entity, Box Gum Woodland TEC, will be impacted by the Project (**Figure 10**). Approximately 0.31 ha of Box Gum Woodland will be directly impacted in the form of removal as a result of the Project, with approximately 0.88 ha retained within the subject land. The Box Gum Woodland TEC is part of a single vegetation zone that is categorised as being in low condition based on the vegetation integrity score of 31.5 for the vegetation zone and will require offsetting due to the vegetation integrity score being ≥17.

7.6.1.2. Actions and measures taken to avoid direct and indirect impacts on the potential SAII entity

The measures taken to avoid impacts to the SAII entity, as described in ***Section 6.1.1*** and ***Section 7.3*** include avoidance measures through consideration of the project location, possible alternative locations, project design, and mitigation measures such as construction activities mitigation and weed management.

7.6.1.3. Extent to which the impact exceeds the threshold

The proposed development will result in the removal of approximately 0.31 ha of low condition Box Gum Woodland TEC. There is currently no defined threshold for this SAII entity.

7.6.1.4. Extent and overall condition of the potential TEC within an area of 1000 ha, and 10,000 ha surrounding the proposed development

Within an area of 1,000 ha surrounding the subject land approximately 12.88 ha of Box Gum Woodland is mapped as occurring, which is equal to ~1.29%. This was derived using the EES Hunter Native Vegetation Mapping (2012) for the Nandewar IBRA bioregion clipped to include the 1,000 ha within a radius surrounding the subject land. This area is represented by the larger tract of Box Gum Woodland TEC across Gunnedah Road and continuing south alongside the Tamworth Airport. The condition of this TEC is expected to be in a higher condition than the vegetation within the subject land based on the larger tract size and connectivity of the area. Given the small patches of TEC within the subject land did not exist on available mapping, it can be assumed the areas of the TEC that have been mapped throughout the region are likely to be generally in better condition than that of the vegetation within the subject land.

Within an area of 10,000 ha surrounding the subject land approximately 193.53 ha of Box Gum Woodland has been mapped, equal to ~1.94% of the area. This was derived using the OEH Hunter Native Vegetation Mapping (2012) for the Nandewar IBRA bioregion clipped to include the 10,000 ha within a radius surrounding the subject land. The condition of this TEC within this area is expected to be variable, though it is likely to be generally in better condition than the vegetation within the subject land as described above.

7.6.1.5. An estimate of the extent and overall condition of the potential TEC remaining in the IBRA subregion before and after the impact of the proposed development.

Approximately 297,848 ha of Box Gum Woodland TEC is mapped as occurring within the Peel subregion according to OEH Hunter Native Vegetation Mapping.

None of this area will be diminished by the proposed development as the area identified within the subject land as conforming to the TEC was not included within this mapping. Regardless, ~0.31 ha of Box Gum Woodland will be removed.

The condition of the TEC remaining within the Nandewar region and Peel subregion is unknown. This community is known to have suffered a very severe decline in geographic distribution and reduction in its integrity across most of its geographic range (Threatened Species Scientific Committee 2006). It is likely that due to the community being situated largely on fertile, arable land in prime agricultural areas (DECCW (NSW) 2010), that the remaining extent within the region and subregion is in a variable condition and would include areas that have undergone historical clearing and fragmentation. Areas comprising higher quality habitat may exist within Mount Kaputar National Park, Wallabadah National Park and Gibraltar Nature Reserve, where this community is known to occur.

7.6.1.6. An estimate of the TEC that is in the reserve system within the IBRA region and the IBRA subregion

Approximately 11,506 ha of Box Gum Woodland is in the reserve system in the Nandewar bioregion and 8,125 ha is within the reserve system in the Peel subregion based on EES Hunter Native Vegetation Mapping (2012). This mapping was clipped to the Nandewar IBRA bioregion and Peel subregion, respectively, then further clipped to include only those areas within the NSW National Parks and Wildlife Service Estate Data Version 4 (2016).

7.6.1.7. The development, clearing or biodiversity certification proposal's impact on:

i. abiotic factors critical to the long-term survival of the CEEC or EEC. For example, how much the impact will lead to a reduction of groundwater levels or substantial alteration of surface water patterns

The proposed removal of approximately 0.31 ha of low condition Box Gum Woodland TEC that occurs within the development site as a number of scattered and small isolated patches is unlikely to have any impact on abiotic factors critical to the long-term survival of the TEC.

The subject land is largely dry and the main vegetation within it is dry-land woodland and grasslands, which are not dependent on streams or groundwater for their existence. For this reason, there is considered to be very limited potential for impacts from alteration to groundwater levels and hydrological regimes to impact this community. Extensive areas of this community occur at locations where groundwater and streams are unlikely to be accessed by species within this community. The Box Gum Woodland within the subject land is not considered to comprise a GDE.

ii. characteristic and functionally important species through impacts such as, but not limited to, inappropriate fire/flooding regimes, removal of understorey species or harvesting of plants

Within the development site, a substantial change will occur to the composition of the community, as it will be entirely removed. Indirect impacts, such as altered microclimates, weed invasion and soil erosion are not anticipated to have a significant impact on characteristic and functionally important species.

Box Gum Woodland has previously been substantially cleared and or modified within the subject land. Although invasive flora species are known to occur within this community, there is the potential for an increase of such species if left unmitigated due to changing land uses and management. The Project will not result in the regular mobilisation of fertilisers, herbicides or other chemicals or pollutants which may harm or inhibit growth of species that harm or inhibit the growth of plant species in Box Gum Woodland TEC.

iii. the quality and integrity of an occurrence of the CEEC or EEC through threats and indirect impacts including, but not limited to, assisting invasive flora and fauna species to become established or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants which may harm or inhibit growth of species in the CEEC or EEC.

The quality and integrity of the remaining areas TEC is unlikely to be significantly impacted due to a lack of substantial connectivity and the already degraded condition of the TEC within the development site.

7.6.1.8. direct or indirect fragmentation and isolation of an important area of the CEEC or EEC. .

The removal of ~0.31 ha of Box Gum Woodland TEC will not increase the isolation of any important areas of the TEC however it is expected to marginally increase the fragmentation. The TEC is currently lacking in substantial connectivity to other areas of the TEC and removal of the areas within the development site would contribute little, if any, to the persistence of the larger tract of the TEC along Boltons Creek and across Gunnedah Road to the south.

Although the Project will increase the amount of overall fragmentation, it will not result in the isolation of areas of habitat for this community

7.6.1.9. the measures proposed to contribute to the recovery of the CEEC or EEC in the IBRA subregion.

Biodiversity offsets as determined by the BAM Calculator are proposed to be purchased within the IBRA subregion or surrounding subregions that will contribute to the recovery of Box Gum Woodland in the surrounding landscape.

Therefore, it is considered the removal of ~0.31 of Box Gum Woodland would not represent a SAII to the persistence of the TEC within the region.

7.6.2. Impacts that Require an Offset

7.6.2.1. Native Vegetation

In accordance with the BAM, an offset is required for all impacts of development on PCTs that are associated with:

- A vegetation zone that has a vegetation integrity score ≥15 where the PCT is representative of an EEC or CEEC, or;
- A vegetation zone that has a vegetation integrity score of ≥17 where the PCT is associated with threatened species habitat (as represented by ecosystem credits), or is representative of a vulnerable ecological community; or
- A vegetation zone that has vegetation integrity score of ≥20 where the PCT is not representative of a TEC or associated with threatened species habitat.

The PCTs and vegetation zones requiring offsets, and the number of ecosystem credits required, are documented in **Table 12**, whilst these areas are mapped in **Figure 11**.

Although vegetation zone 2 is not associated with a TEC, it was selected as 'TEC' in the BAM Calculator as the same PCT within an assessment cannot have multiple TEC statuses selected. The biodiversity risk weighting for PCT 599 is the same irrespective of the TEC status due to the percent cleared value. Accordingly, when a separate calculation was run using the same data while selecting non-TEC within the BAM Calculator, the resulting credit requirements and costs were the same as when TEC was selected. Therefore, alignment of vegetation zone 2 to the TEC does not impact the number of credits generated. As such, both vegetation zones have been included in the one BAM Calculator assessment and assessed as TECs.

Table 12 Ecosystem credit liability

Zone	PCT	TEC	Area (ha)	Credits
1	599_Remnant	White Box Yellow Box Blakely's Red Gum Woodland	0.31	5
2	599_Planted	Not a TEC	0.68	10

7.6.2.2. Threatened Species

No species credit species have been assessed as impacted within the development site and therefore no offset is required.

7.6.3. Impacts that do not Require an Offset

All areas identified in **Figure 12** as 'Cleared' or 'Exotic dominated pasture' and 'Garden beds' occur within the development site however do not require an offset. Areas within the subject land that do not require assessment are shown in **Figure 13**.

7.7. Summary of Offset Credits Required

The credit requirement for the project is summarised in **Table 13**, whilst the 'like for like' offsetting options for the ecosystem credits are provided in **Table 14**. A credit report from the BAM calculator has been included in **Appendix D**.

Table 13 Project credit requirement

PCT	TEC	Credits
599 – Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	TEC	15

Table 14 Like for like options for PCTs

Original PCT to offset	Any PCT with the below TEC	Containing HBT	In the below IBRA subregions
599	White Box Yellow Box Blakely's Red Gum Woodland (including PCT's 2, 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 506, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1601, 1606, 1608, 1611, 1691, 1693, 1695, 1698)	Yes	Peel, Eastern Nandewars, Hunter, Inverell Basalts, Kaputar, Liverpool Plains, Liverpool Range, Northern Basalts, Tomalla and Walcha Plateau. or Any IBRA subregion that is within 100 kilometres of the outer edge of the impacted site.

7.7.1. Consideration of Credits for Planted Vegetation

It is noted that DPIE published a revised version of the BAM that was on public exhibition until 16 October 2019, which included a module to assess planted native vegetation. Application of this module to the planted vegetation within the subject land would result in the vegetation being assessed for species credits only (i.e. no calculation of ecosystem credits). As the revised version of the BAM is not finalised, this BDAR has been based on the current advice for planted vegetation, which is to assign to a best-fit PCT. The consent authority may waive the requirement for offsetting the planted native vegetation based on this future adjustment, which would be deemed appropriate in this case and should be considered. This would result in an amended credit requirement of five credits to satisfy the offset obligation for the remnant vegetation within the subject land only.

8. Conclusion

The Project involves the construction and operation of new poultry processing plant within the development site. An assessment was undertaken to examine the impacts of the Project on the biodiversity values of the subject land. This BDAR has been prepared to document the findings of an ecological investigation undertaken within the subject land in accordance with the BAM.

The biodiversity values of the subject land are limited, due the site history of heavy modification and agricultural activities. Only one native vegetation community, Box Gum Woodland, occurs as scattered isolated patches that align to the BC Act listing of the TEC and as patches of planted natives that are non-TEC. The remaining areas include garden beds, exotic dominated pasture and cleared areas. The subject land contains six hollow-bearing trees and a Category 1 watercourse. Additional habitat values are represented by the non-native vegetation and human-made structures. There is some, albeit minor, connectivity between the Box Gum Woodland vegetation within the subject land and a larger tract of Box Gum Woodland that is associated with Boltons Creek outside the subject land.

Measures to avoid and minimise impacts to the biodiversity values of the subject land have been implemented and included consideration of the project location, design and possible alternative locations.

Nevertheless, the Project will result in the removal of ~0.31 ha of Box Gum Woodland TEC and ~0.68 ha of planted native vegetation. Two hollow-bearing trees and areas of non-native vegetation will also be removed. Potential indirect impacts of the Project include inadvertent impacts on hydrological processes and adjacent habitat, and prescribed impacts such as demolition of human-made structures and impacts on habitat connectivity and species movements have been considered. The impacts to Box Gum Woodland TEC, which is a SAII entity, are not considered to be significant.

A suite of mitigation measures have been proposed to minimise the direct, indirect and prescribed impacts of the Project, such as construction mitigation measures, weed management and pre-clearance surveys.

As the Project includes the removal of areas of native vegetation, offsets are required in the form of ecosystem credits. This assessment indicated that the removal of the native vegetation within the subject land requires a total of 15 ecosystem credits, comprising PCT 599. It is noted that DPIE published a revised version of the BAM that was on public exhibition until 16 October 2019, which included a module to assess planted native vegetation. Application of this module to the planted vegetation within the subject land would result in the vegetation being assessed for species credits only (i.e. no calculation of ecosystem credits). As the revised version of the BAM is not finalised, this BDAR has been based on the current advice for planted vegetation, which is to assign to a best-fit PCT. The consent authority may waive the requirement for offsetting the planted native vegetation based on this future adjustment, which would be deemed appropriate in this case and should be considered. This would result in an amended credit requirement of five credits to satisfy the offset obligation for the remnant vegetation within the subject land only.

With the implementation of the proposed mitigation measures and the offsetting described previously, it is considered that the impacts of this project on biodiversity, in particular on Box Gum Woodland, will be minimal and can be appropriately managed.

9. References

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APPENDIX A :

Plot/Transect Data

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Table 15 Plot/transect data

Plot	Vegetation Zone	PCT	Composition						Structure						Large Trees	Hollow Trees	Litter Cover	Length of Fallen Logs	Tree Stem (5-10)	Tree Stem (10-20)	Tree Stem (20-30)	Tree Stem (30-50)	Tree Stem (50-80)	Tree Regeneration	High Threat Exotic
			Tree	Shrub	Grass	Forb	Fern	Other	Tree	Shrub	Grass	Forb	Fern	Other											
1	1	599	1	1	5	6	1	1	5.0	0.2	3.1	3.4	0.2	0.2	1	2	73.0	0.0	0	1	1	1	0	0	0.0
2	1	599	2	3	5	0	0	0	23.0	1.2	4.5	0.0	0.0	0.0	1	1	84.0	43.0	1	1	0	0	0	1	2.5
3	-	-	0	0	1	1	0	0	0.0	0.0	2.0	0.2	0.0	0.0	0	0	77.0	0.0	1	0	0	0	0	1	3.0
4	1	599	1	0	3	0	0	0	15.0	0.0	2.8	0.0	0.0	0.0	1	1	87.0	22.0	1	0	1	0	0	1	0.5
5	-	-	0	1	3	1	0	0	0.0	0.5	2.7	0.2	0.0	0.0	0	0	75.0	0.0	0	0	0	0	0	0	1.5
6	-	-	0	0	3	2	0	0	0.0	0.0	43.0	1.2	0.0	0.0	0	0	88.0	0.0	0	0	0	0	0	0	0.0
7	-	-	0	0	4	0	0	0	0.0	0.0	50.7	0.0	0.0	0.0	0	0	49.0	0.0	0	0	0	0	0	0	1.0
8	1	599	1	1	2	0	0	0	25.0	0.3	16.0	0.0	0.0	0.0	2	0	96.0	34.0	0	0	0	0	1	0	2.5
9	-	-	0	0	2	3	0	0	0.0	0.0	2.5	0.9	0.0	0.0	0	0	88.0	0.0	0	0	0	0	0	0	11.5
10	2	599	5	0	2	4	0	1	12.0	0.0	1.2	2.5	0.0	0.2	0	0	64.0	0.0	1	1	1	0	0	1	0.5
11	-	-	0	0	2	2	1	1	0.0	0.0	10.0	5.0	0.2	0.5	0	0	60.0	0.0	0	0	0	0	0	0	1.0
12	-	-	0	1	2	2	0	0	0.0	0.3	2.0	0.8	0.0	0.0	0	0	72.0	0.0	0	0	0	0	0	0	0.5
13	-	-	0	0	3	0	0	0	0.0	0.0	10.7	0.0	0.0	0.0	0	0	83.0	0.0	0	0	0	0	0	0	3.0

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APPENDIX B :

Flora Species List

Table 16 Flora species list

Family	Exotic	Scientific Name	Common Name
Amygdalaceae	*	Prunus spp.	
Apiaceae	*	Foeniculum vulgare	Fennel
Asteraceae	*	Bidens pilosa	Cobbler's Pegs
Asteraceae		Calotis cuneata	Mountain Burr-Daisy
Asteraceae		Calotis lappulacea	Yellow Burr-daisy
Asteraceae	*	Carthamus lanatus	Saffron Thistle
Asteraceae	*	Centaurea solstitialis	St Barnabys Thistle
Asteraceae	*	Chondrilla juncea	Skeleton Weed
Asteraceae	*	Cichorium intybus	Chicory
Asteraceae	*	Cirsium vulgare	Spear Thistle
Asteraceae		Cotula australis	Common Cotula
Asteraceae	*	Gamochaeta calviceps	Cudweed
Asteraceae	*	Gazania linearis	
Asteraceae	*	Hypochaeris radicata	Catsear
Asteraceae	*	Senecio madagascariensis	Fireweed
Asteraceae	*	Tragopogon porrifolius subsp. porrifolius	Salsify
Asteraceae		Vittadinia cuneata	A Fuzzweed
Asteraceae		Vittadinia cuneata	A Fuzzweed
Asteraceae		Vittadinia muelleri	A Fuzzweed
Brassicaceae	*	Capsella bursa-pastoris	Shepherd's Purse
Brassicaceae	*	Lepidium africanum	Common Peppercress
Brassicaceae	*	Lepidium bonariense	Argentine Peppercress
Campanulaceae		Wahlenbergia gracilenta	Annual Bluebell
Caryophyllaceae	*	Paronychia brasiliana	Chilean Whitlow Wort
Casuarinaceae		Allocasuarina verticillata	Drooping Sheoak
Chenopodiaceae		Einadia trigonos	Fishweed
Chenopodiaceae		Maireana microphylla	Small-leaf Bluebush
Convolvulaceae	*	Convolvulus arvensis	Field Bindweed
Convolvulaceae		Convolvulus erubescens	Pink Bindweed
Convolvulaceae		Dichondra repens	Kidney Weed
Cupressaceae	*	Juniperus spp.	Juniper
Cyperaceae		Cyperus gracilis	Slender Flat-sedge
Dilleniaceae		Hibbertia obtusifolia	Hoary Guinea Flower

Family	Exotic	Scientific Name	Common Name
Fabaceae (Faboideae)		Desmodium varians	Slender Tick-trefoil
Fabaceae (Faboideae)	*	Medicago polymorpha	Burr Medic
Fabaceae (Faboideae)	*	Medicago sativa	Lucerne
Fabaceae (Mimosoideae)		Acacia saliciformis	
Geraniaceae		Geranium solanderi	Native Geranium
Geraniaceae	*	Geranium spp.	
Juncaceae		Juncus usitatus	
Lamiaceae	*	Marrubium vulgare	White Horehound
Lamiaceae		Westringia fruticosa	Coastal Rosemary
Lomandraceae		Lomandra multiflora subsp. multiflora	Many-flowered Mat-rush
Lomandraceae		Lomandra spp.	Mat-rush
Malvaceae		Brachychiton populneus	Kurrajong
Malvaceae	*	Malva parviflora	Small-flowered Mallow
Malvaceae	*	Sida rhombifolia	Paddy's Lucerne
Myrtaceae		Angophora floribunda	Rough-barked Apple
Myrtaceae		Callistemon viminalis	Weeping Bottlebrush
Myrtaceae		Eucalyptus amplifolia	Cabbage Gum
Myrtaceae		Eucalyptus blakelyi	Blakely's Red Gum
Myrtaceae		Eucalyptus melliodora	Yellow Box
Nandinaceae	*	Nandina domestica	Japanese Sacred Bamboo
Pittosporaceae		Bursaria spinosa	Native Blackthorn
Plantaginaceae	*	Plantago lanceolata	Lamb's Tongues
Poaceae	*	Andropogon virginicus	Whisky Grass
Poaceae		Aristida behriana	Bunch Wiregrass
Poaceae		Aristida ramosa	Purple Wiregrass
Poaceae		Austrostipa scabra	Speargrass
Poaceae		Austrostipa verticillata	Slender Bamboo Grass
Poaceae	*	Avena sativa	Oats
Poaceae	*	Axonopus fissifolius	Narrow-leafed Carpet Grass
Poaceae	*	Briza maxima	Quaking Grass
Poaceae	*	Briza minor	Shivery Grass
Poaceae	*	Cenchrus clandestinus	Kikuyu Grass
Poaceae	*	Chloris virgata	Feathertop Rhodes Grass
Poaceae		Cynodon dactylon	Common Couch
Poaceae		Dichanthium sericeum	Queensland Bluegrass

Family	Exotic	Scientific Name	Common Name
Poaceae		Dichelachne micrantha	Shorthair Plumegrass
Poaceae		Eragrostis brownii	Brown's Lovegrass
Poaceae	*	Lolium perenne	Perennial Ryegrass
Poaceae	*	Paspalum dilatatum	Paspalum
Poaceae	*	Phalaris aquatica	Phalaris
Poaceae	*	Poa annua	Winter Grass
Poaceae		Rytidosperma caespitosum	Ringed Wallaby Grass
Poaceae		Rytidosperma sp.	
Poaceae		Sporobolus creber	Slender Rat's Tail Grass
Poaceae		Themeda triandra	
Poaceae	*	Vulpia spp.	Rat's-tail Fescue
Polygonaceae		Rumex brownii	Swamp Dock
Proteaceae		Grevillea speciosa	Red Spider Flower
Pteridaceae		Cheilanthes sieberi	Rock Fern
Rosaceae	*	Rosa spp.	
Rutaceae	*	Coleonema spp.	
Rutaceae		Geijera parviflora	Wilga
Scrophulariaceae	*	Verbascum virgatum	Twiggy Mullein
Solanaceae	*	Lycium ferocissimum	African Boxthorn
Verbenaceae	*	Verbena bonariensis	Purpletop
Violaceae	*	Viola spp.	
Xanthorrhoeaceae		Xanthorrhoea spp.	

APPENDIX C :

Fauna Species List

Table 17 Fauna species list

Scientific Name	Common Name	Exotic
Amphibia		
Limnodynastes fletcheri	Barking Frog	
Litoria caerulea	Green Tree Frog	
Litoria latopalmata	Broad-palmed Frog	
Litoria peronii	Peron's Tree Frog	
Litoria rubella	Red Tree Frog	
Aves		
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	
Acanthiza nana	Yellow Thornbill	
Anas gracilis	Grey Teal	
Cacatua sanguinea	Little Corella	
Chalcites osculans	Black-eared Cuckoo	
Cincloramphus mathewsi	Rufous Songlark	
Coracina novaehollandiae	Black-faced Cuckoo-shrike	
Corvus coronoides	Australian Raven	
Coturnix ypsilophora	Brown Quail	
Cracticus nigrogularis	Pied Butcherbird	
Cracticus tibicen	Australian Magpie	
Dacelo novaeguineae	Laughing Kookaburra	
Elanus axillaris	Black-shouldered Kite	
Eolophus roseicapillus	Galah	
Grallina cyanoleuca	Magpie-lark	
Haliastur sphenurus	Whistling Kite	
Lichenostomus penicillatus	White-plumed Honeyeater	
Malurus cyaneus	Superb Fairy-wren	
Manorina melanocephala	Noisy Miner	
Milvus migrans	Black Kite	
Mirafra javanica	Horsfield’s Bushlark	
Nycticorax caledonicus	Nankeen Night-Heron	
Nymphicus hollandicus	Cockatiel	
Ocyphaps lophotes	Crested Pigeon	
Pardalotus striatus	Striated Pardalote	
Petrochelidon ariel	Fairy Martin	
Platycercus eximius	Eastern Rosella	

Scientific Name	Common Name	Exotic
Psephotus haematonotus	Red-rumped Parrot	
Rhipidura leucophrys	Willie Wagtail	
Scythrops novaehollandiae	Channel-billed Cuckoo	
Smicrornis brevirostris	Weebill	
Streptopelia chinensis	Spotted Dove	*
Sturnus tristis	Common Myna	*
Sturnus vulgaris	Common Starling	*
Taeniopygia guttata	Zebra Finch	
Vanellus miles	Masked Lapwing	
Mammalia		
Austronomus australis	White-striped Freetail-bat	
Bos taurus	Cow	*
Chalinolobus gouldii	Gould's Wattled Bat	
Lepus capensis	Brown Hare	*
Macropus giganteus	Eastern Grey Kangaroo	
Macropus rufogriseus	Red-necked Wallaby	
Macropus rufus	Red Kangaroo	
Mormopterus planiceps	Southern Freetail-bat	
Mormopterus ridei	Eastern Free-tailed bat	
Oryctolagus cuniculus	European Rabbit	*
Scotorepens balstoni	Inland Broad-nosed Bat	
Sus scrofa	Pig	*
Vulpes vulpes	Red Fox	*
Reptilia		
Pseudonaja textilis	Eastern Brown Snake	

APPENDIX D :

Credit Report

BAM Credit Summary Report

Proposal Details

Assessment Id

00012526/BAAS17027/18/00012527

Proposal Name

Baiada

BAM data last updated *

18/06/2020

Assessor Name

David Robertson

Report Created

19/06/2020

BAM Data version *

29

Assessor Number

BAAS17027

BAM Case Status

Finalised

Date Finalised

19/06/2020

Assessment Revision

0

Assessment Type

Major Projects

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion								
1	599_Remnant	31.5	0.3	0.25	High Sensitivity to Potential Gain	2.00	TRUE	5

2	599_Planted	28.0	0.7	0.25	High Sensitivity to Potential Gain	2.00	TRUE	10
							Subtotal	**15**
							Total	**15**

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Biodiversity risk weighting	Potential SAII	Species credits

FIGURES

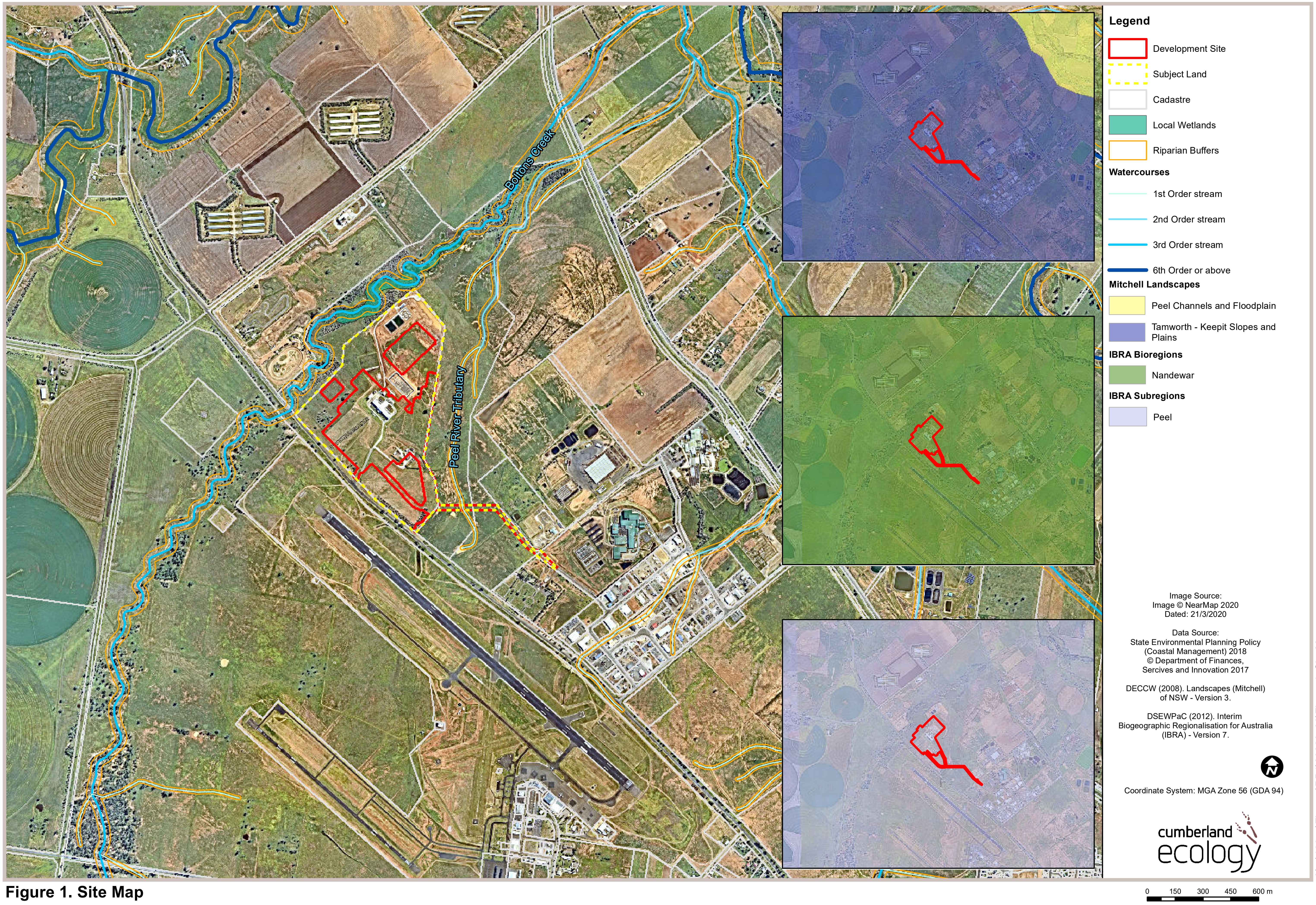


Figure 1. Site Map

I:\...\18055\Figures\RP1\20200529\Figure 1. Site Map

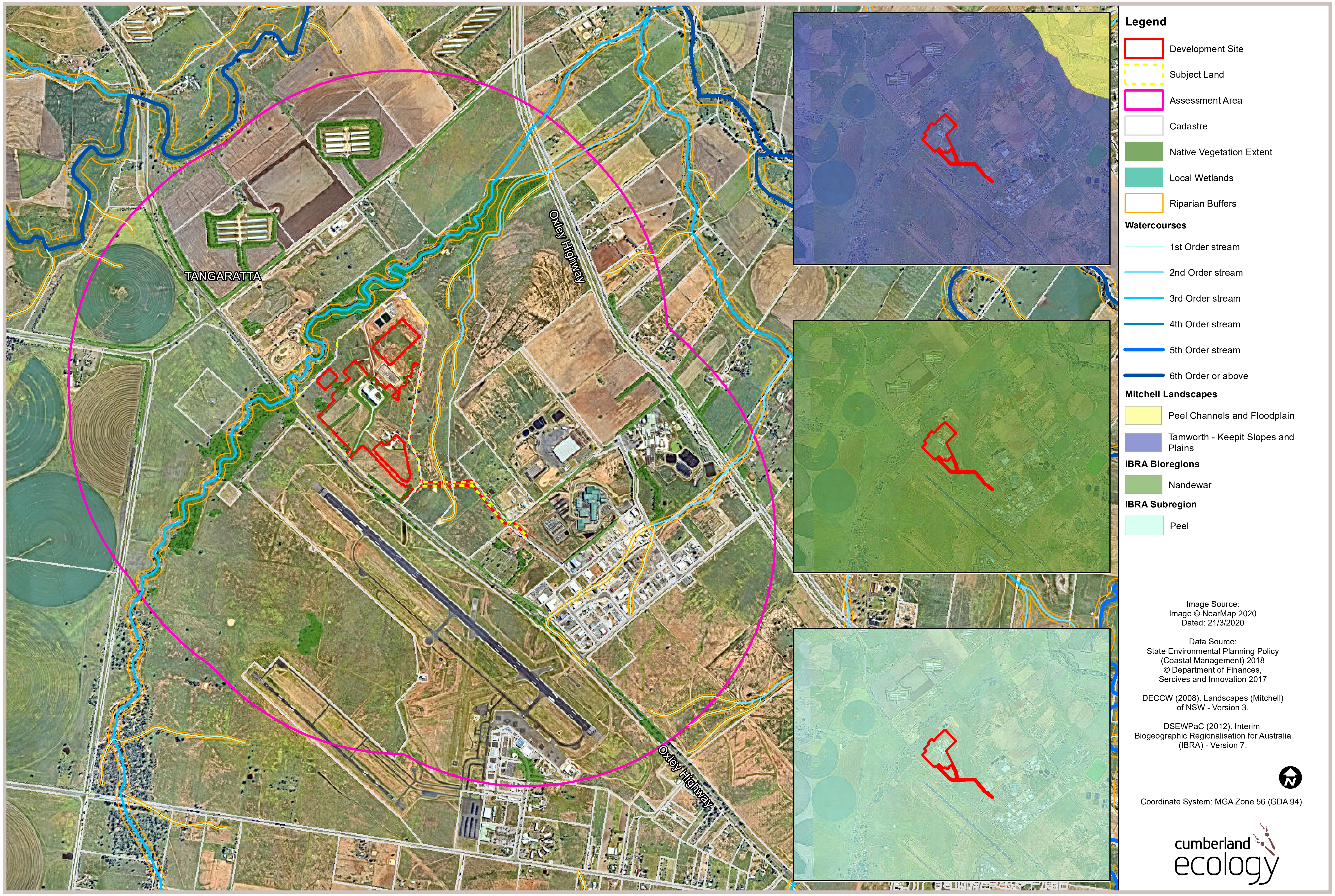


Figure 2. Location Map

I:\...\17145\Figures\RP1\20200529\Figure 3. Layout of the Project

Figure 3. Layout of the Project

Image Source: Baiada 2020

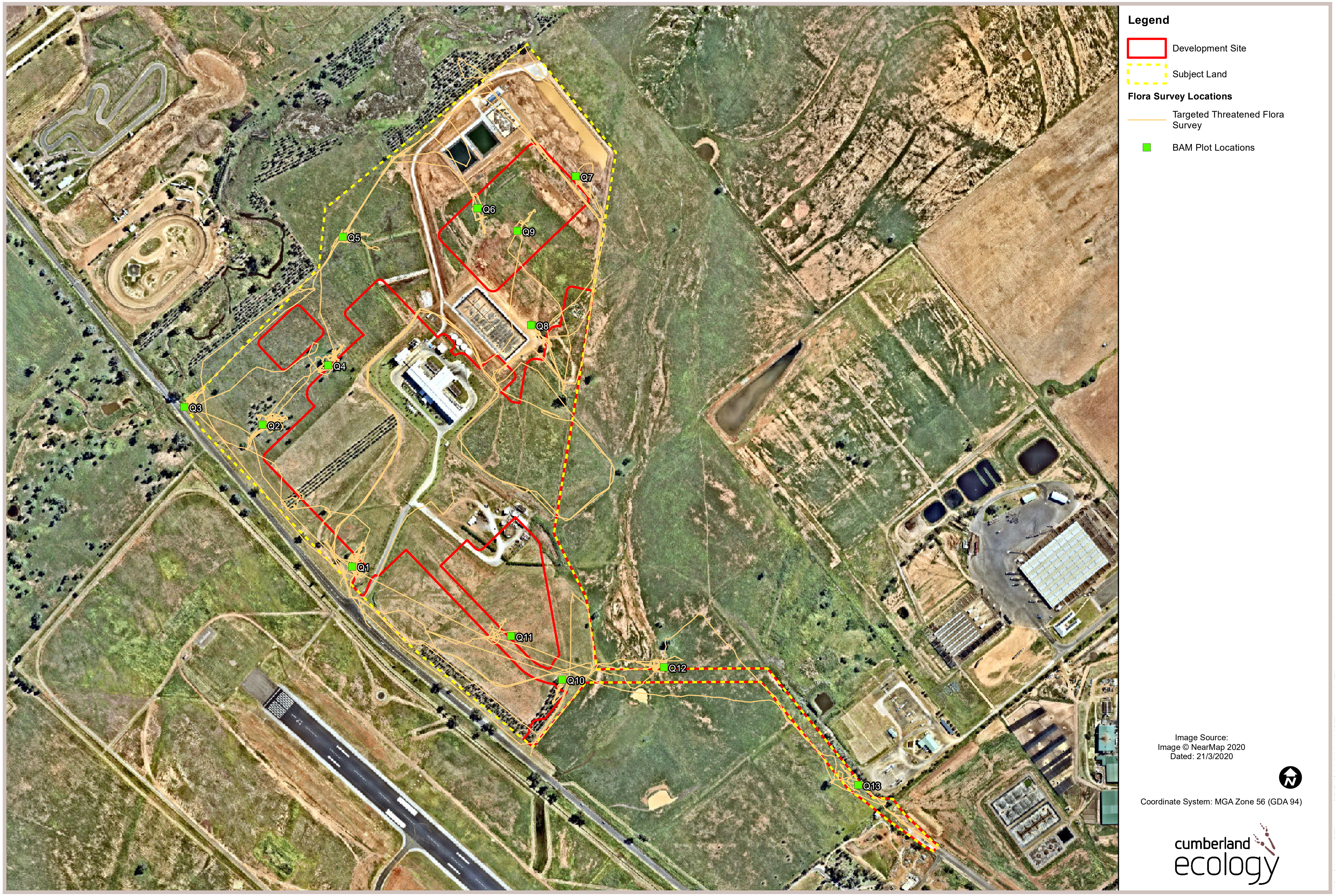


Figure 4. Flora survey locations

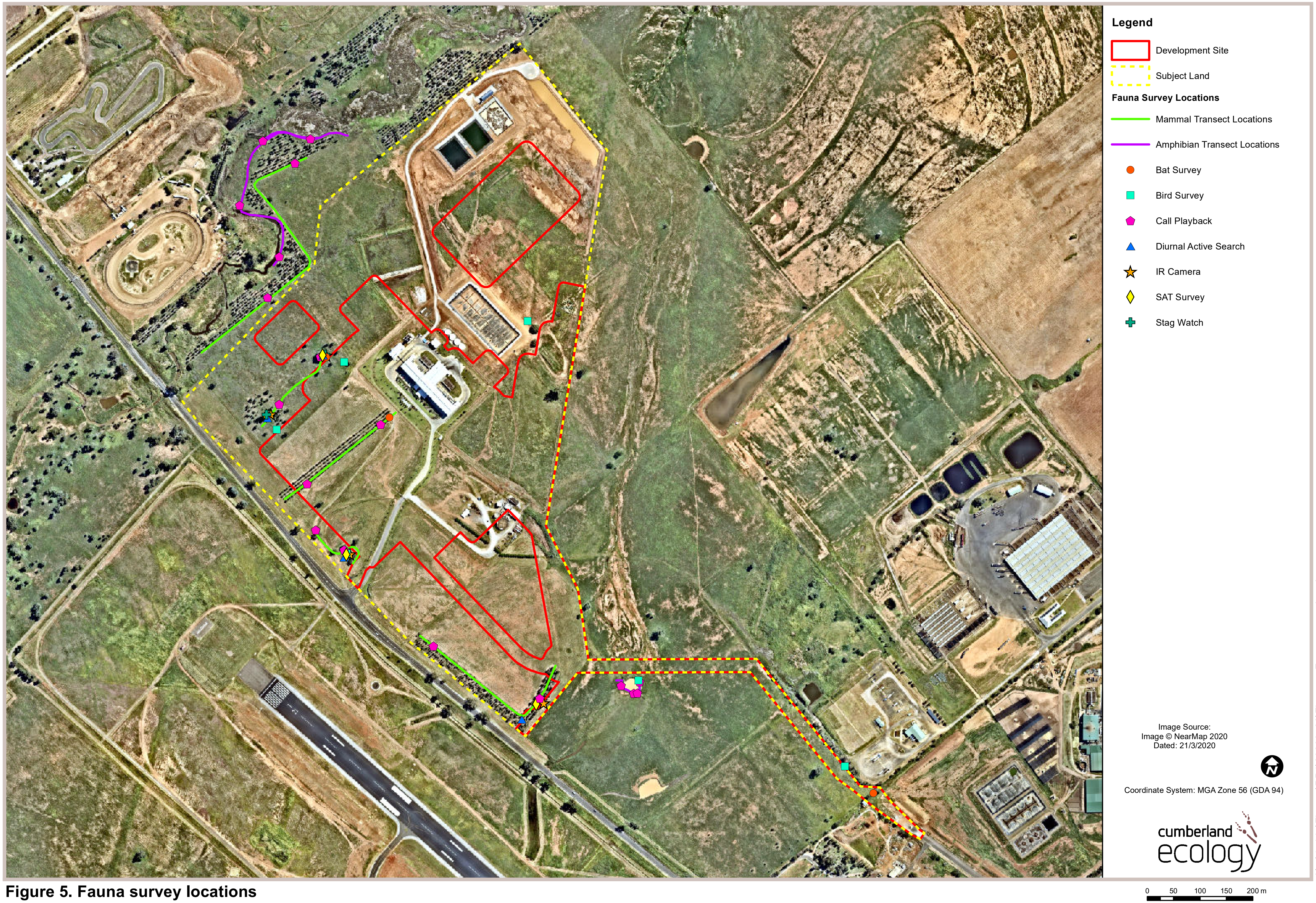


Figure 5. Fauna survey locations

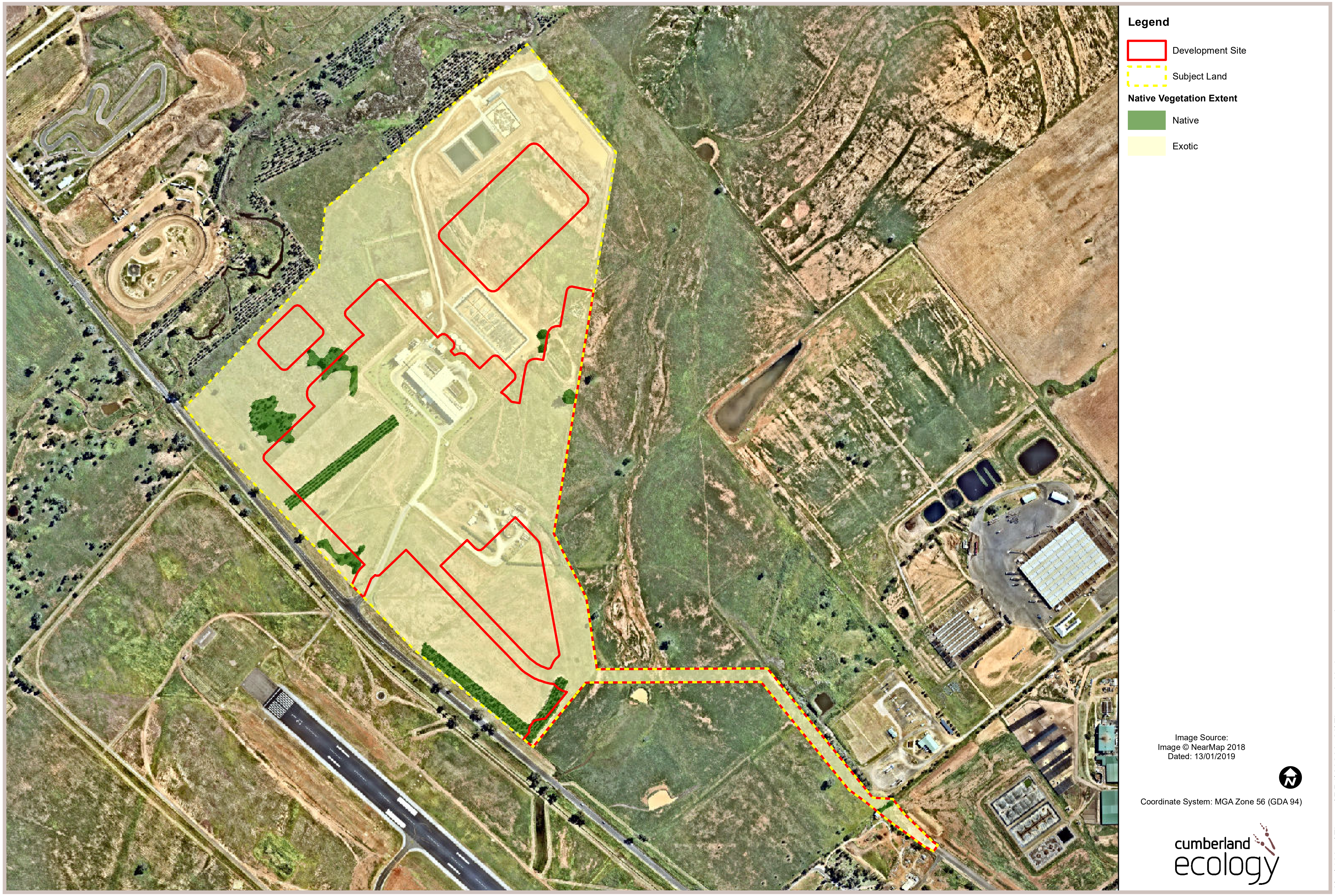


Figure 6. Native vegetation extent

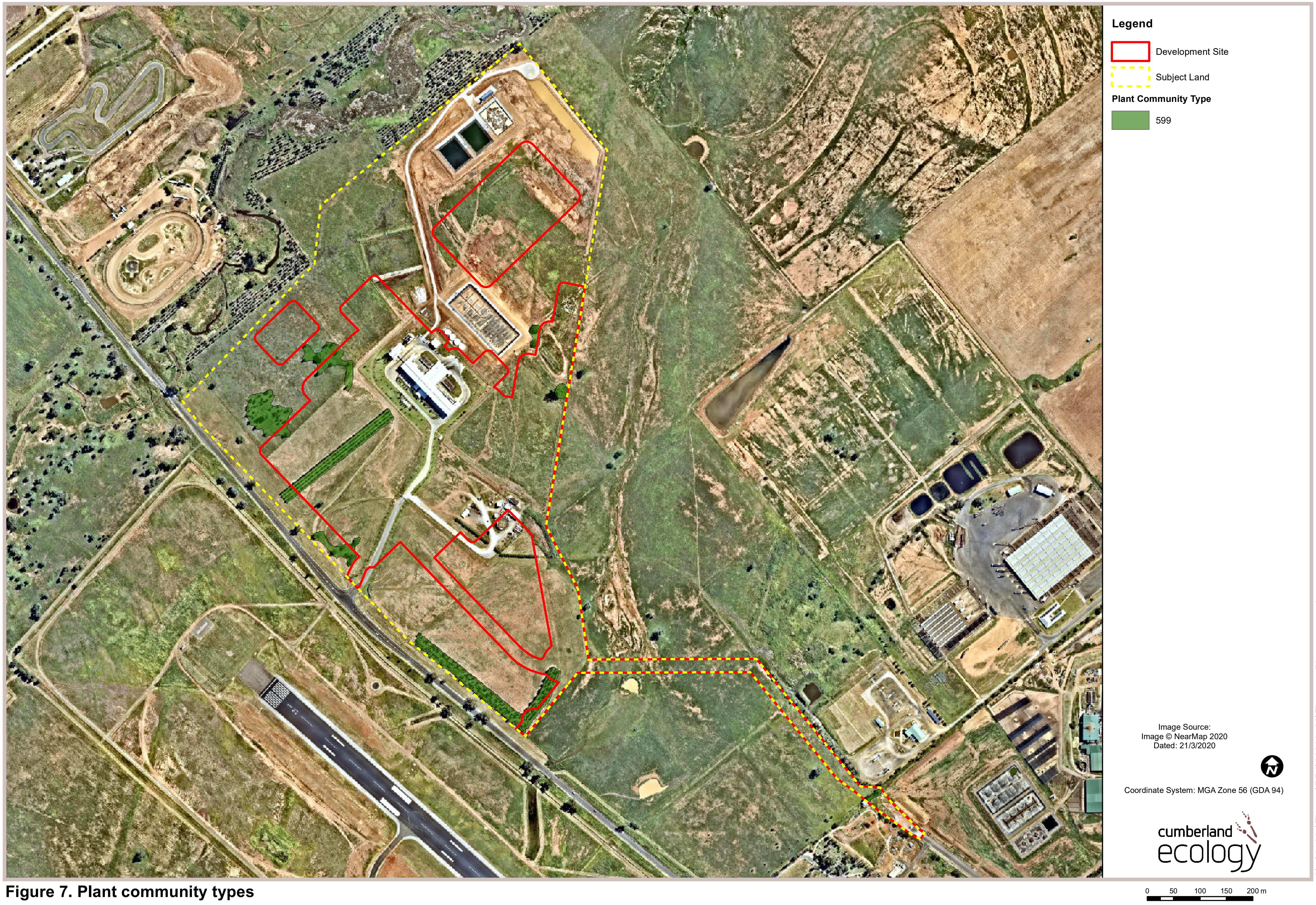


Figure 7. Plant community types

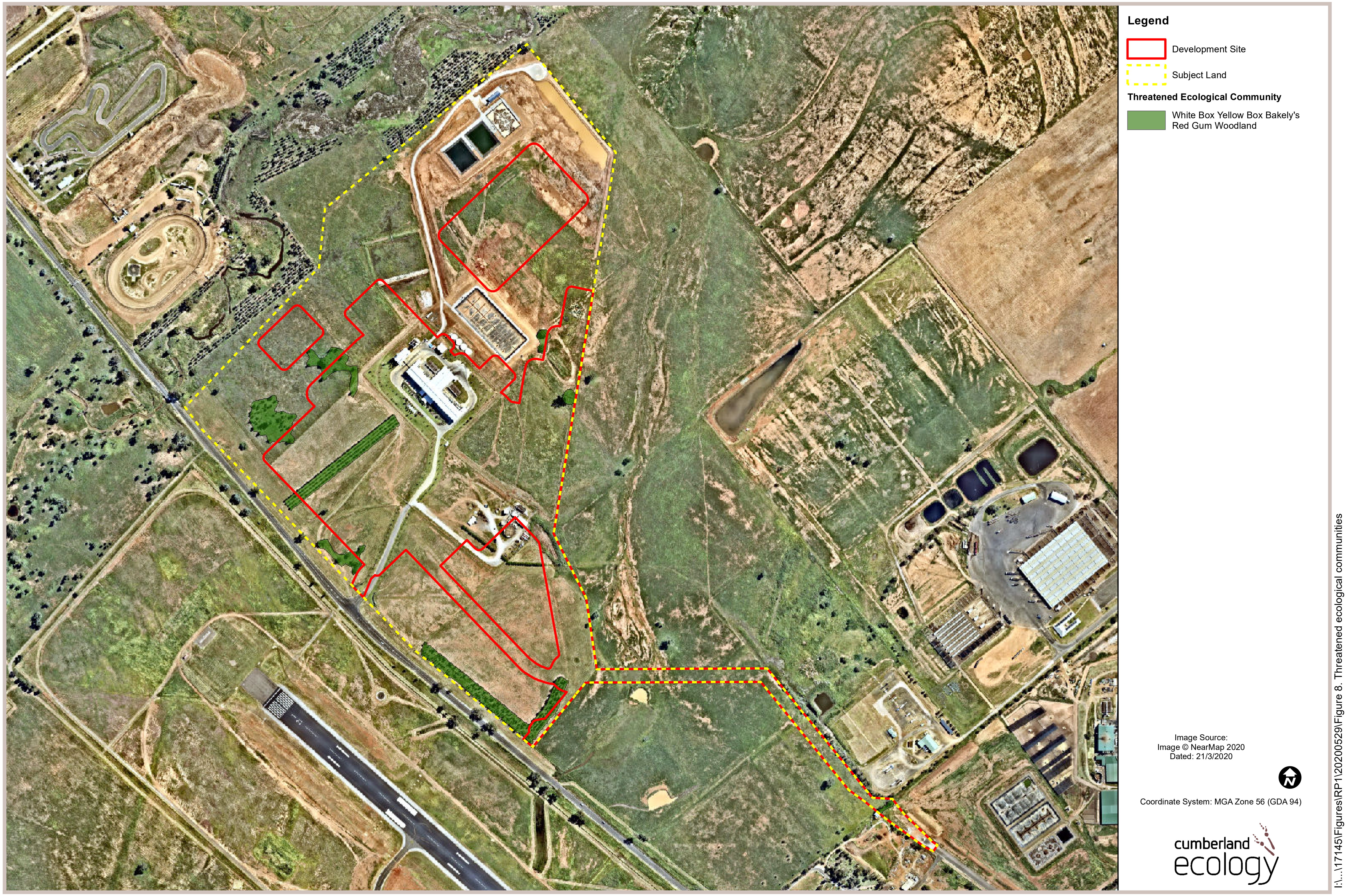


Figure 8. Threatened ecological communities

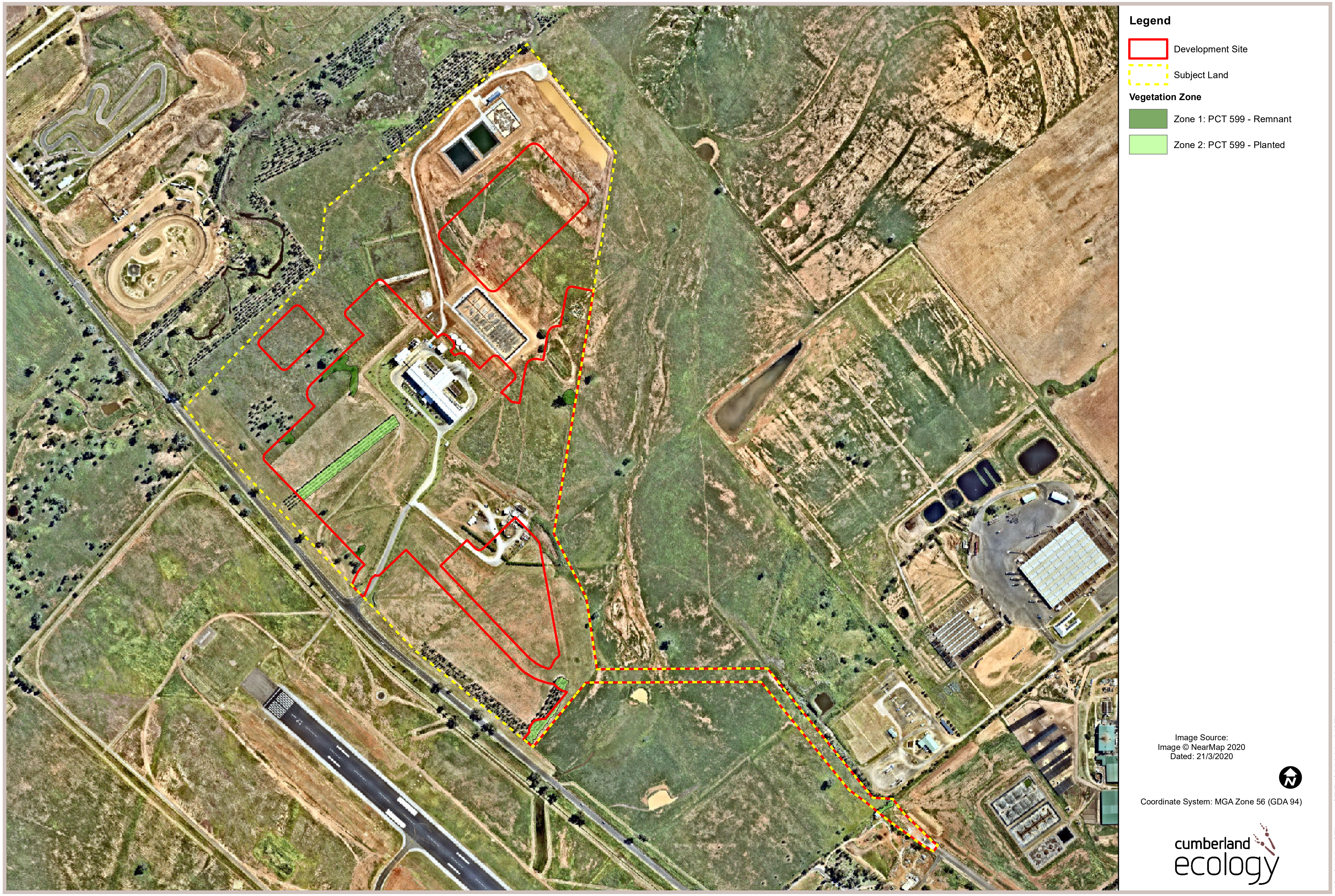


Figure 9. Vegetation zones

ATTACHMENT 10: TRAFFIC IMPACT ASSESSMENT ADDENDUM

AP10

Our Ref: 18089

22 June 2020

Baiada Poultry Pty Ltd
c/o PSA Consulting (Australia)
PO Box 10824 Adelaide Street
BRISBANE QLD 4000

Attention: Ms Nicole Boulton

Dear Nicole,

RE: OAKBURN PROCESSING PLANT – ADDENDUM TO ROAD TRANSPORT ASSESSMENT

In 2019, The Transport Planning Partnership (TTPP) prepared an assessment of the road transport implications of a new processing plant on the site of Baiada Poultry Pty Limited's (Baiada) Oakburn rendering plant near Tamworth. The findings of that assessment are presented in *Oakburn Poultry Processing Plant Road Transport Assessment* (TTPP, 2019). In response to various matters raised, Baiada now proposes amendments to the proposed processing plant. The road transport aspects of the proposed amendments have been reviewed by TTPP, and our findings are presented herein.

Proposed Development

Consistent with the original proposal, the proposed processing plant would have capacity to process three million birds per week, and the existing rendering plant would increase its production from 120 tonnes per day to 240 tonnes per day of finished product. A new vehicular access would be constructed for the use of staff and deliveries, and the existing access on Oxley Highway retained for visitors and emergency access only.

External Impacts of the Proposed Development

The amendments relate only to the internal layout of the site, therefore would result in no changes to the impacts of the proposed development on the surrounding road network compared with those assessed by TTPP. The existing road network has sufficient capacity to accommodate the traffic generated by the processing plant with acceptable impacts on the operation of the key intersections.

In its response to the original proposal, Transport for New South Wales (formerly RMS) noted that the assessment did not provide details "of the impacts from turning movement of large vehicles at key junctions. The determining authority should be satisfied that such movements can safely take place and meet the Austroads warrants for turning traffic." The access roads for the site are those of the purpose-built West Tamworth Glen Artley industrial subdivision, which are approved for use by 25/26m B-doubles[1] hence further assessment of their suitability to accommodate the heavy vehicles expected to be generated by the processing plant is not justified. It is acknowledged that at the time of writing, construction of Workshop Lane is incomplete, and so it is not included in the currently-approved B-double routes. It is however constructed to a similar standard to Armstrong Street and is used by heavy vehicles, hence no concerns are raised regarding its future use by heavy vehicles travelling to and from the proposed processing plant. It is expected that an application would be made to formalise Workshop Lane as an approved B-double route following approval of the processing plant Development Application.

With regard to Austroads warrants, it is noted that the intersections of Oxley Highway with Goddard Lane and Wallamore Road with Goddard Lane have both recently been upgraded and include channelised treatments in the major road for right turns, and auxiliary turn lanes in the major road for left turns. These current treatments represent those warranted by the highest combinations of turning and through traffic[2], and meet or exceed the treatments warranted by the long term peak hour forecast turning movements at those intersections (TTPP, 2019). Similarly, the long term peak hour forecast turning movements at the intersection of Goddard Lane with Armstrong Street would warrant the minimum left and right turn treatments in Goddard Lane, which is consistent with its current layout.

Car Parking Provision

The amendments do not materially change the proposed provision of car parking at the site. The proposed provision of car parking exceeds the minimum requirements of the *Tamworth Regional Development Control Plan 2010*, which requires 531 spaces based on the proposed 39,810 m^2 GFA or 588 spaces based on the total of 1,176 employees. The proposed provision of car parking is expected to accommodate the peak demand generated by staff with additional spaces available for visitors. Consistent with the original proposal, it is recommended that a minimum of eight spaces be allocated to people with a disability.

[1] https://www.rms.nsw.gov.au/business-industry/heavy-vehicles/maps/restricted-access-vehicles-map/map/index.html
[2] Austroads (2020), *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossing Management.*

Internal Layout – Staff and Visitor Car Parking

The amended design of the car parking area has been reviewed with regard to Australian Standard 2890.1 (2004). The design meets or exceeds the minimum requirements of that Standard with regard to the dimensions of the parking bays, aisles and the internal access road. Consistent with the original proposal, it is recommended that:

- "Type 1" speed humps be provided in the long aisles and driveway in accordance with AS2890.1 (2004) to provide positive speed control; and
- the car parking spaces allocated to people with a disability be designed and marked in accordance with the Australian Standard AS2890.6 (2009).

Internal Layout – Truck Loading and Unloading Arrangements

The internal layout of the processing plant roadways has been assessed for suitability by considering the swept paths of the heavy vehicles expected to use each part of the site, as advised by Baiada. The proposed road layouts are satisfactory for two-way manoeuvring of those vehicles, with independent access available to and from all loading docks by the relevant vehicle. Some minor amendments to the internal road widths are recommended to allow the heavy vehicles to pass each other when turning at all intersections. This would be appropriately addressed at the detailed design stage.

Summary and Conclusion

The amendments to the proposed processing plant on the site of the Oakburn rendering plant near Tamworth would not result in any changes to its proposed operations compared with those previously assessed by TTPP (2019). It follows that the conclusions of that study regarding external traffic impacts remain valid, with the existing road network having sufficient capacity to accommodate the traffic generated by the processing plant, with acceptable impacts on the operation of key intersections. The roads which are proposed to be used for heavy vehicle access are approved B-double route, with the exception of Workshop Lane, which is constructed to a similar standard to Armstrong Street and is considered suitable for B-double access. Current intersection treatments at key intersections meet or exceed Austroads warrants.

Consistent with the original proposal, the proposed amended staff car parking provision would exceed the requirements of the *Tamworth Regional Development Control Plan 2010* and the peak demand for parking. The design of the car parking area complies with the relevant Australian Standard, and it is recommended that a minimum of eight spaces be allocated to people with a disability, to be designed in accordance with AS2890.6 (2009).

The proposed internal road network and loading areas would satisfactorily accommodate the heavy vehicles expected to use them, and some minor amendments to road widths are recommended to permit the heavy vehicles to pass at all locations within the site.

We trust the above is to your satisfaction. Should you have any queries regarding the above or require further information, please do not hesitate to contact the undersigned on 8437 7800.

Yours sincerely,

Penny Dalton
Associate Director

ATTACHMENT 11: REVISED CAPITAL INVESTMENT VALUE REPORT

AP11

OAKBURN PROCESSING FACILITY

CAPITAL INVESTMENT VALUE (CIV)

Issue 2.0

24th June 2020

Job No: 19082

Level 8
67 Albert Avenue
Chatswood NSW 2067

T +61 2 9411 2777
E mail@wwsydney.com

www.wildeandwoollard.com

DOCUMENT ISSUE SHEET

Issue No	Document	Issue Date	Prepared By
1.0	CIV	11/06/2019	JR/ IT
2.0	CIV	23/06/2020	JR/ IT

Level 8
67 Albert Avenue
Chatswood NSW 2067

T (02) 9411 2777
F (02) 9411 7645

E mail@wwsydney.com

www.wildeandwoollard.com

ABN 69 081 162 496

24th June 2020

Baiada Poultry Pty Limited
PO Box 21
Pendle Hill NSW 2145

For the attention of Dean Kent

Dear Dean,

RE: OAKBURN PROCESSING FACILITY
PLANNING APPLICATION – CAPITAL INVESTMENT VALUE (CIV)
QUANTITY SURVEYORS CERTIFICATE

As instructed we have prepared a revised preliminary budget estimate on the above project and we confirm the following for you.

The Capital Investment Value (CIV) has been calculated in accordance with the following definition of CIV as provided in State Environmental Planning Policy Amendment (Capital Investment Value) 2010.

*The **capital investment value** of a development includes all cost necessary to establish and operate the project, including the design and construction of buildings, structures, associated infrastructure and fixed or mobile plant and equipment, other that the following costs:*

a) amounts payable, or the cost of land dedicated or any other benefit provided, under a condition imposed under Division 6 or 6A of Part 4 of the ACT or a planning agreement under that Division,
b) costs relating to any part of the development or project that is subject of a separate development consent or project approval,
c) land costs (including any costs of marketing and selling land),
d) GST (within the meaning of A New Tax System (Goods & Services Tax) Act 1999 of the commonwealth.

In accordance with our revised preliminary budget estimate dated 23rd June 2020 (refer summary enclosed) the Capital Investment Value (CIV) of the above project would be **$215,980,752** plus an allowance for consultant's fees of **$5,827,990.**

Accordingly, the Capital Investment Value (CIV) for the project including consultant's fees is **$221,808,742** (Excl. GST)

We trust the enclosed is in accordance with your requirements should you have any further queries in relation to same please do not hesitate to contact the undersigned.

Yours faithfully,

Ian Tucker
Director
AIQS (Affil.) Reg #3303

Ref:\19082_CIV Oakburn Processing Facility_2.00

PROJECT: OAKBURN PROCESSING FACILITY
DATE: 24th June 2020

CAPITAL INVESTMENT VALUE - SUMMARY OF COSTS

	$
v Base Building	$56,869,600
v Fitout	$32,313,072
v Weigh Bridges	$1,200,000
v Fire Services	$3,000,000
v Processing Plant and Equipment	$70,281,000
v Landscaping [incl. site prep]	$1,128,250
v Roads/ Kerbs/ Drainage [incl. site prep]	$6,446,250
v Fencing, Security Gates & Gate House	$300,000
v Services [incl. sub/ Advance, Pot & Waste Water]	$39,000,000
v Carpark [incl.Drainage/ Lighting/ Kerbing]	$5,622,580
Sub-total	**$205,980,752**
v Consultants Fees	$5,827,990
Total	**$221,808,742**

Capital Investment Value as at June 2020 is $221,808,742

We note our estimate excludes allowances for the following items based on advice provided by the NSW Department of Planning (*Circular PS 10-008 issued 10 May 2010*);

- Development Application and Construction Certificate fees
- Authority Fees
- Escalation for potential cost increases beyond June 2020

- Loose Furniture, Fittings and Equipment
- Finance costs

ATTACHMENT 12: REVISED MANAGEMENT AND MITIGATION MEASURES

AP12

IDENTIFIED IMPACT	MITIGATION MEASURES AND MANAGEMENT MEASURES
TRAFFIC	• Staff and processing plant traffic are to be directed to use the proposed driveway connecting to Workshop Lane. • Direct access to the Oxley Highway is to be maintained for visitors to the site and emergency access only. • 820 car parking spaces are to be provided on site with a minimum of 8 spaces be designated for people with a disability. • Car park design and line-marking is to be undertaken in accordance the Australian Standard 2890.1 (2004). • Due to the length of aisles, speed humps be provided in in accordance with AS2890.1 to provide positive speed control. • Detailed design of the car park to incorporate minor amendments to the internal road widths are recommended to allow the heavy vehicles to pass each other when turning at all intersections.
AIR QUALITY	• Implement the Odour Management Plan and update the OMP on an as needs basis. **Child Care Centre** • Adaption of a hybrid high-efficiency particulate air and carbon filter system to protect the indoor airspace environment of the childcare activities during atypical or upset conditions. During normal operating conditions, odour impact risks are very unlikely under the odour management protocol adopted for the PPF operations; and • Vegetative landscaping for the outdoor areas to provide a level of screening, attenuation and visual disconnection from the PPF operations.
NOISE	**Noise Mound/Barrier Adjacent to Live Bird Area and Cooling Towers** • An acoustic mound or barrier 2700mm above FGL is to be erected along the west side of the Live Bird Module/Shelter areas. • An acoustic mound or barrier 2100mm above FGL is to be erected along the north side of the cooling towers and associated plant. **General Noise Control Recommendations** • All access roads should be kept in good condition, i.e. no potholes, etc. • Trucks and other machines should not be left idling for extended periods unnecessarily. Machines found to produce excessive noise compared to industry best practice should be removed from the site or stood down until repairs or modifications can be made. • A regular maintenance schedule should be adopted for all mobile and fixed plant items. Items found producing high noise should be stood down until repairs are completed. • A noise monitoring program, during commissioning, or in the early life of the site is recommended. This program will verify our predictions and in the unlikely event that complaints may arise, enable noise control strategies to be implemented, where required. **Site Child Care Centre** • An acoustic fence 1800mm above FGL is to be erected at the perimeter of the child care centre outdoor area. • Windows to the Cot Rooms must be upgraded to achieve an acoustic rating of Rw32. This can typically be achieved with the use of laminated glass and Q-Lon seals at sliders.

IDENTIFIED IMPACT	MITIGATION MEASURES AND MANAGEMENT MEASURES
	• Consideration should be given to installing ceiling fans to supplement air conditioning. **Noise Monitoring Program** • Noise monitoring should be carried out at the commencement of each process/activity that has the potential to produce excessive noise. **Acoustic Barriers/Screening** • Place acoustic enclosures or screens directly adjacent to stationary noise sources such as compressors, generators, drill rigs, etc. **Consultation/Complaints Handling Procedures** • The construction contractor should analyse proposed noise control strategies in consultation with the Acoustic Consultant as part of project pre-planning. **Equipment Selection** • All combustion engine plant, such as generators, compressors and welders, should be carefully checked to ensure they produce minimal noise, with particular attention to residential grade exhaust silencers and shielding around motors, where necessary. **Risk Assessment** • A risk assessment should be undertaken for all noisy activities and at the change of each process.
ECOLOGICAL	Should any works need to be conducted within the Peel River Tributary, in order to minimise any impact to amphibians, works are to be: • Undertaken during the winter months when movement of amphibian species is not occurring; or • Undertaken during periods of no ephemeral pooling of water in the tributary; or • Undertaken after a pre-clearance inspection by a qualified ecologist determines no amphibian presence at that time. **Preclearance Surveys:** In order to avoid impacts to fauna species during construction, pre-clearance surveys will be conducted in all areas that are required to be cleared. • Pre-clearing surveys will be undertaken ahead of clearing, to limit fauna injury and mortality and to identify habitat features to be relocated. Pre-clearance surveys will be conducted by suitably qualified ecologists and all fauna found during these surveys will be encouraged to move on or relocated by the ecologists in areas of similar habitat nearby that will not be impacted. **Delineation of Clearing Areas:** • Areas that require clearance will be flagged and clearly delineated by temporary fencing to ensure that no areas intended for conservation will be inadvertently cleared during the construction process. **Weed Management:** • Undertake, appropriate weed control activities in accordance with all state, regional and local weed management plans. **Pre-clearance Surveys (Structures):** • In order to mitigate or avoid impacts to fauna species, (In particular the Eastern Bentwing-bat) during demolition of structures, pre-clearance

IDENTIFIED IMPACT	MITIGATION MEASURES AND MANAGEMENT MEASURES
	checks will be conducted of all human made structures proposed to be demolished prior to construction. • Pre-clearance surveys will be conducted by suitably qualified ecologists and all fauna found during these surveys will be encouraged to move on or relocated by the ecologists in areas of similar habitat nearby that will not be impacted. **Native vegetation:** • Provide an offset of a total of 5 ecosystem credits for PCT 599 for the Remnant Vegetation • The screening buffer is to be replaced with a new planted buffer also using vegetation species commensurate with PCT 599.
CULTURAL HERITAGE	**Aboriginal Objects Find Procedure:** If suspected Aboriginal material has been uncovered as a result of development activities within the Project Area: • work in the surrounding area is to stop immediately; • a temporary fence is to be erected around the site, with a buffer zone of at least 10 meters around the known edge of the site; • an appropriately qualified archaeological consultant is to be engaged to identify the material; and • If the material is found to be of Aboriginal origin, the Aboriginal community is to be consulted in a manner as outlined in the OEH guidelines: *Aboriginal Cultural Heritage Consultation Requirements for Proponents (2010).* **Aboriginal Human Remains:** In the unlikely event that Remains are found, all works should halt. Once the site is cordoned off the nearest police station should be contacted in conjunction with the Tamworth LALC and the OEH Regional Office. If no investigation is sought and the remains are of Aboriginal origin then the Aboriginal community and OEH should be consulted as to how the remains are to be dealt with. Work may resume once all parties are in agreement. **Notifying the OEH:** If Aboriginal cultural materials are uncovered as a result of development activities within the Project Area, they are to be registered as Sites on the AHIMS, managed by the OEH.
STORMWATER	• Provide all stormwater management treatment actions in accordance with the project Stormwater Management Plan prepared by MPN consulting engineers. • During prior to commencement of constriction, prepare and implement a detailed Erosion and Sediment Control Plan to ensure compliance with the *Protection of the Environment Operations Act 1997.*
WASTE	• Prepare and implement a Site Based Waste Management Plan consistent with Baiada's Australian Packaging Covenant Action Plan.
CHEMICAL USE	• Chemical handling and storage procedures will be undertaken in accordance with the Applicable Material Safety Data Sheets (MSDS) and all relevant Australian Standards.
CONSTRUCTION MANAGEMENT	The Construction Management Plan could address potential social impacts, including reducing stress and inconvenience to neighbouring businesses and residents, by • Identifying construction vehicle traffic routes that minimise impacts to neighbours, as far as possible;

IDENTIFIED IMPACT	MITIGATION MEASURES AND MANAGEMENT MEASURES
	• Providing arrangements for parking of worker and construction vehicles on-site • Storing all equipment on site; • Identifying management practices to minimise and manage interruptions to traffic flows; • Establishing practices to maintain traffic and pedestrian safety to local residents; • Minimising disruption proposed road closures, temporary traffic routes, loss of pedestrian or cyclist access or reversing manoeuvres; • Providing queueing space onsite for the standing of vehicles; • Providing clear signage to direct construction vehicles; and • Provide signage on site that provides a contact number for residents to direct enquiries and report incidents (e.g. theft or break and enter to the site while unattended), should they occur
ENVIRONMENTAL MANAGEMENT	• Prepare an implemented a detailed Environmental Management System for the Oakburn Processing Plant for certification in accordance with the AS/NZS/ISO 14001: 2015 Standard.

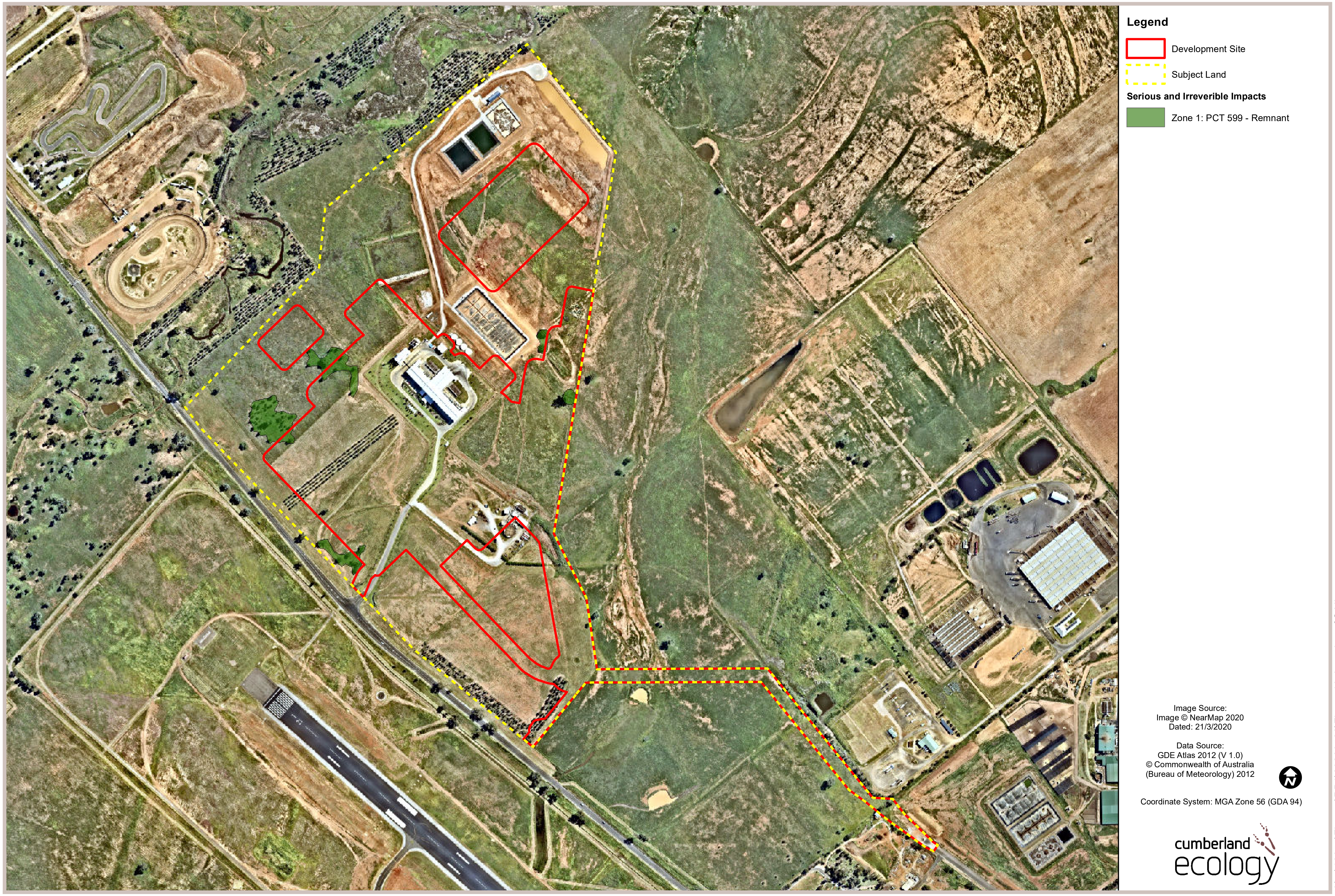


Figure 10. Location of serious and irreversible impacts

0 50 100 150 200 m

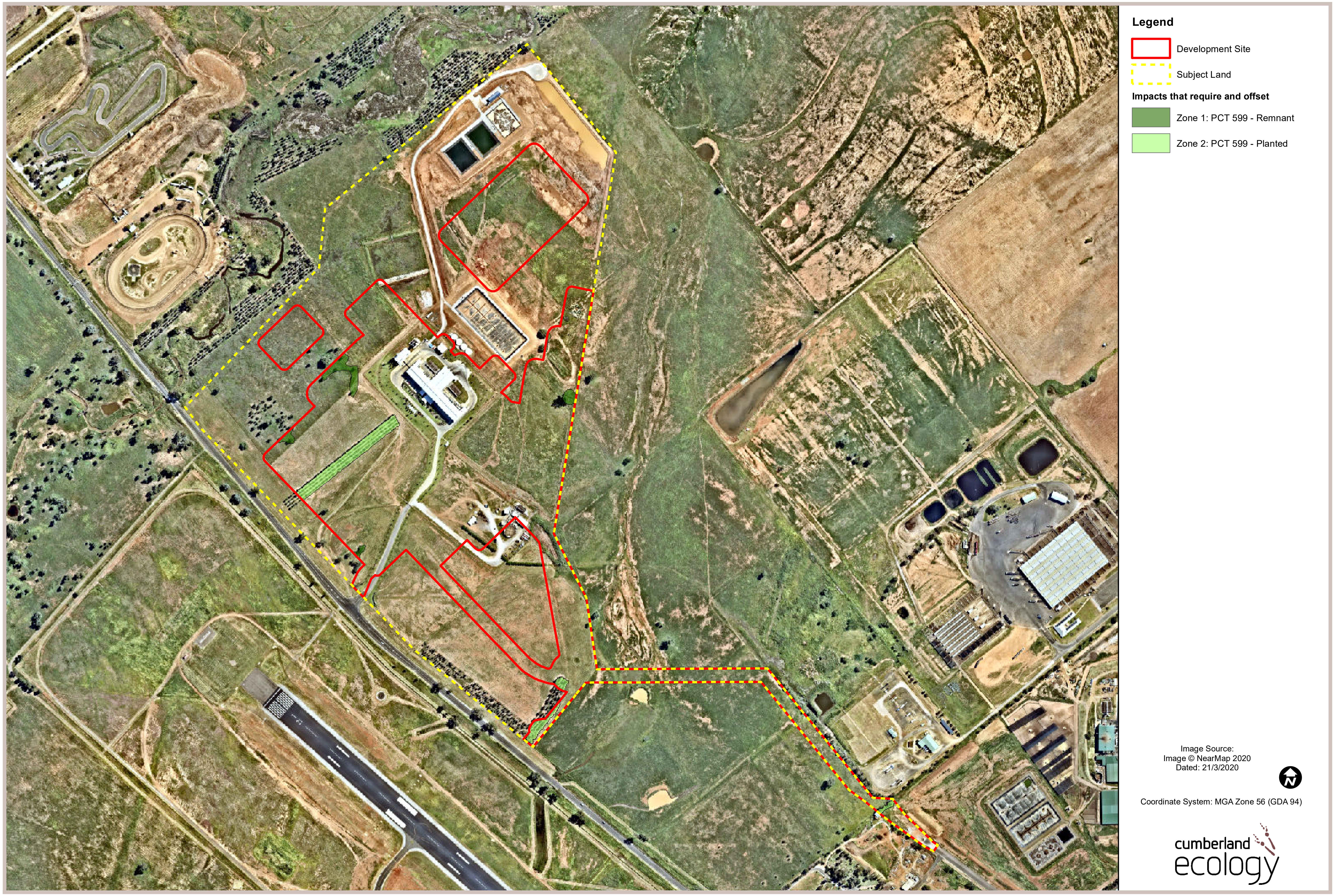


Figure 11. Location of impacts that require an offset

I:\...\18055\Figures\RP1\20200529\Figure 11. Location of impacts that require an offset

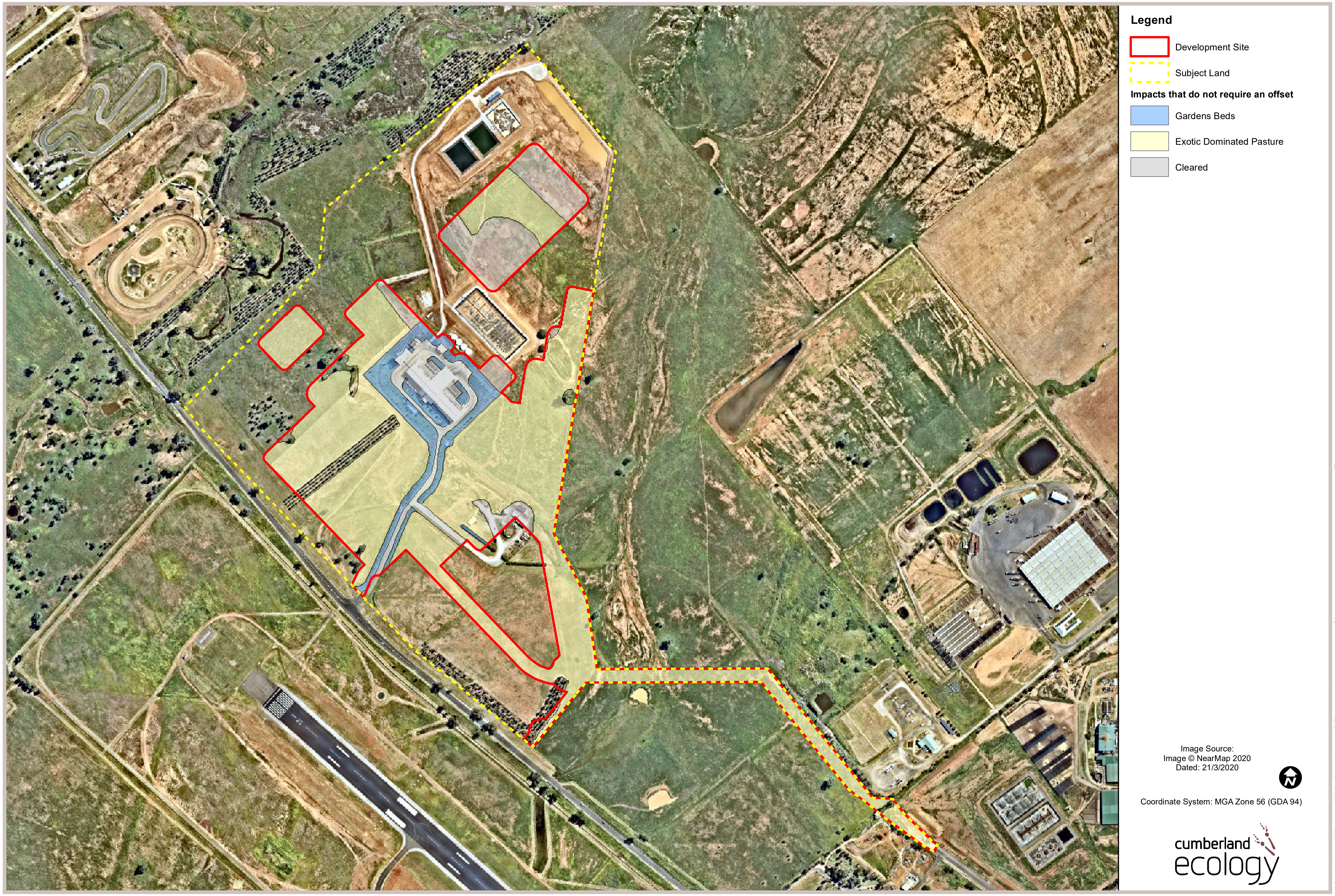
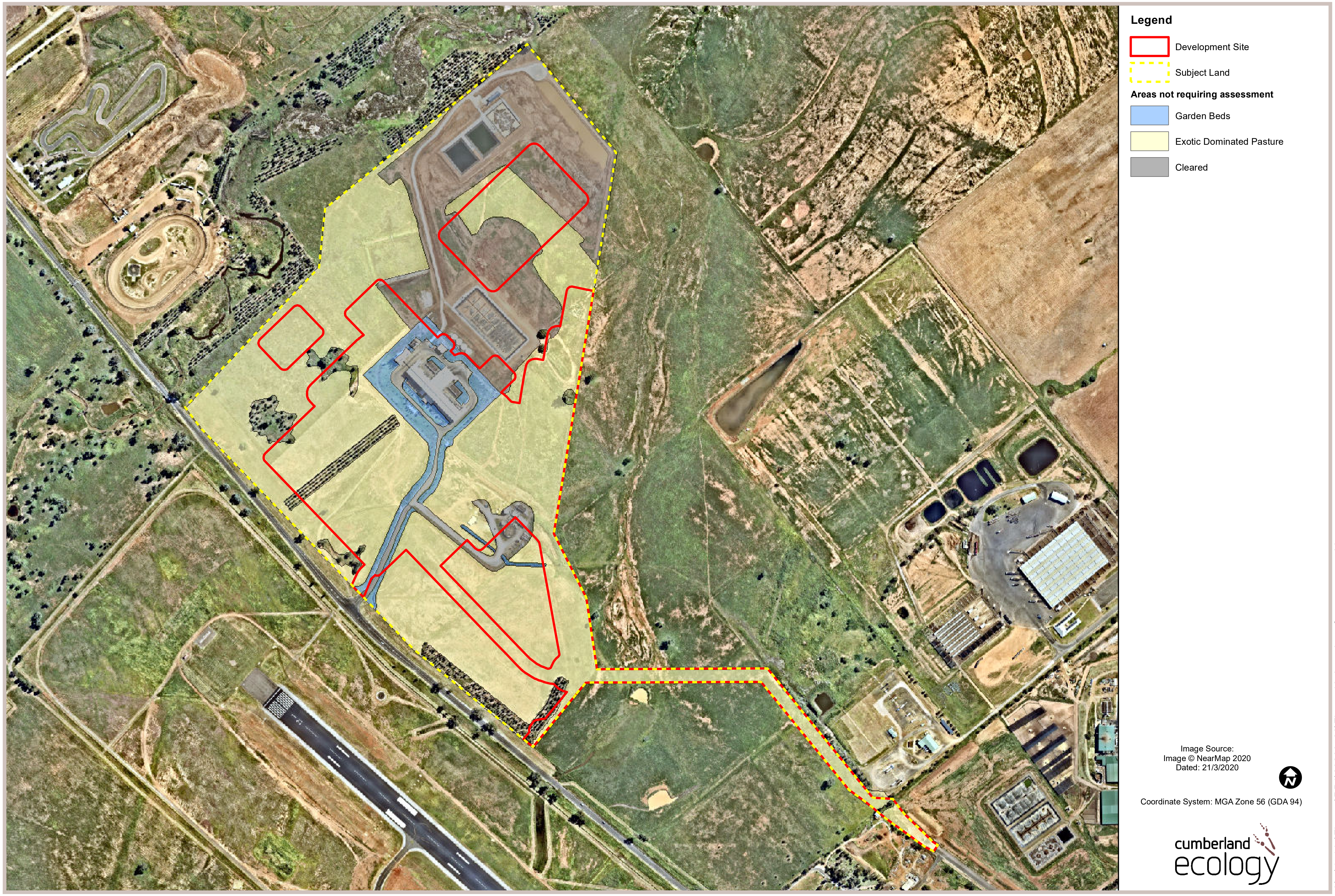


Figure 12. Location of impacts that do not require an offset



I:\...\17145\Figures\RP1\20200529\Figure 13. Location of areas not requiring assessment

Figure 13. Location of areas not requiring assessment

0 50 100 150 200 m