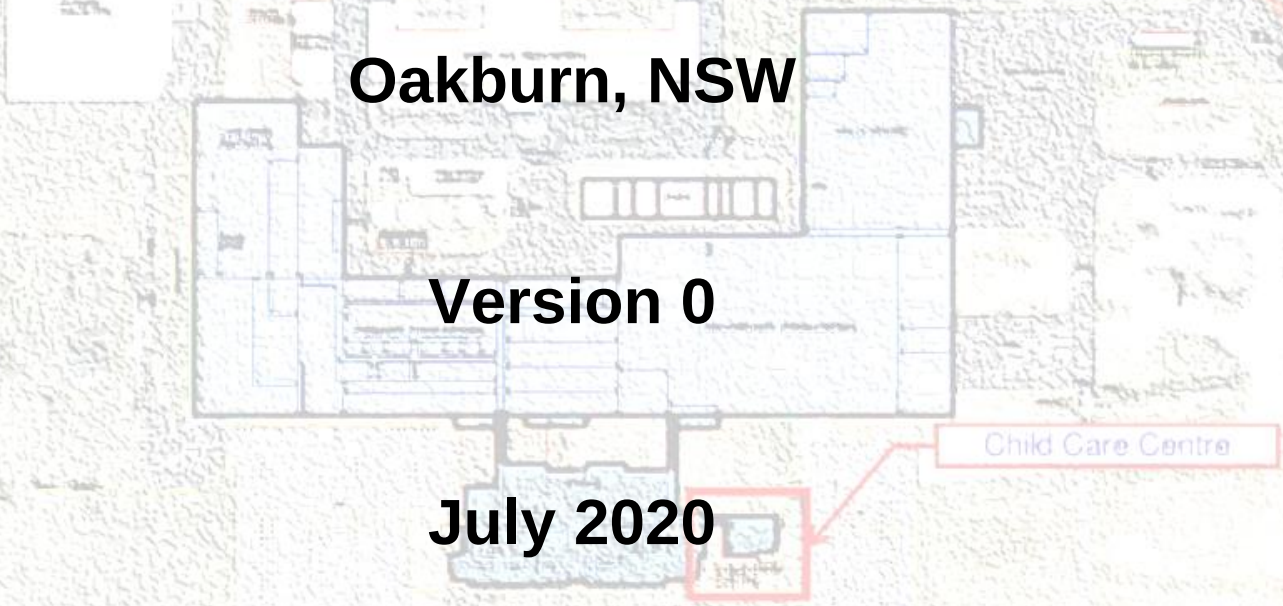
Baiada Poultry Pty Ltd

Proposed Oakburn Poultry Processing Facility –

Odour Management Plan



Oakburn, NSW

Version 0

July 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.

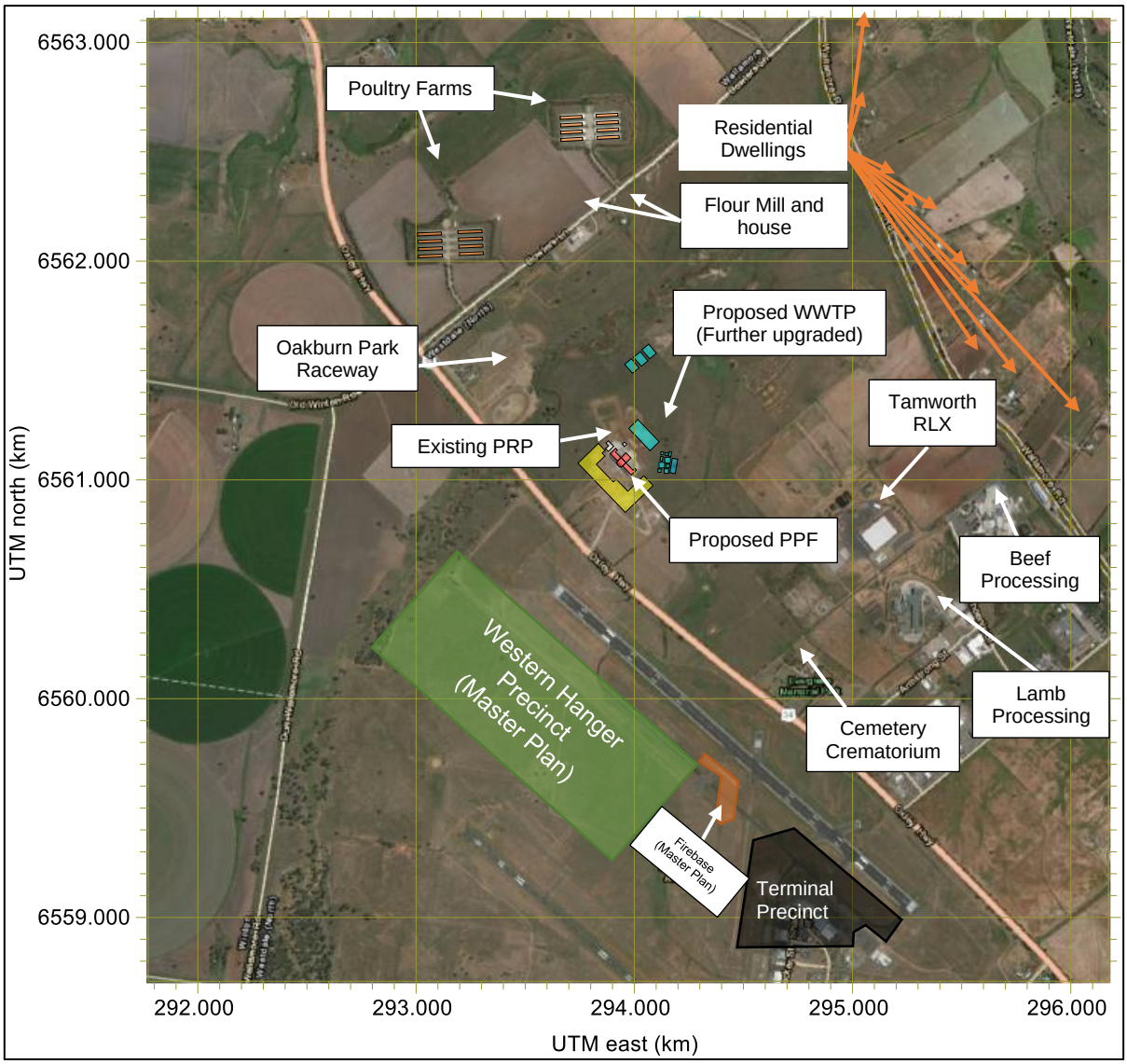


Figure 1.1 – Proposed PPF location, context and surrounds

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.

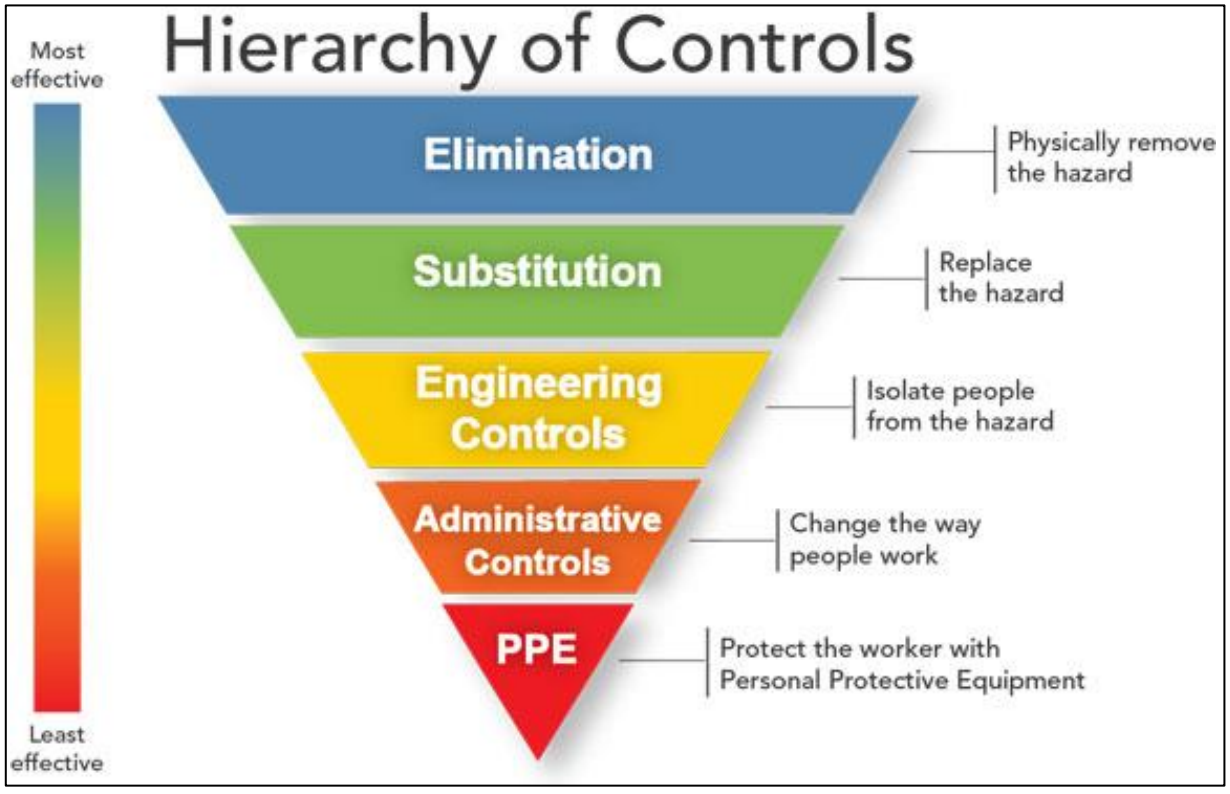


Figure 1.2 - Hierarchy of controls for the proposed PPF

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

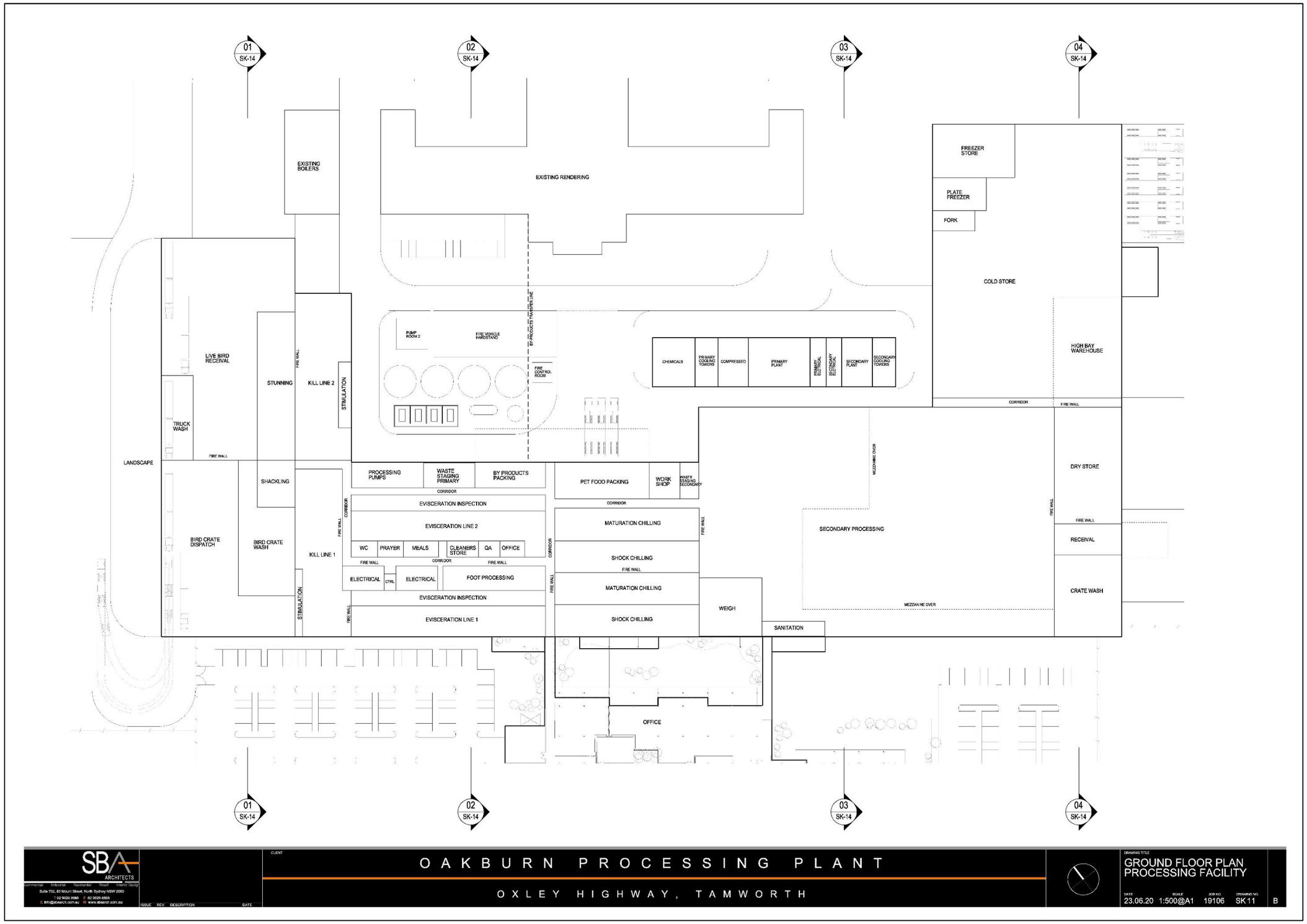


Figure 2.2 – Ground floor layout of the integrated PPF operations

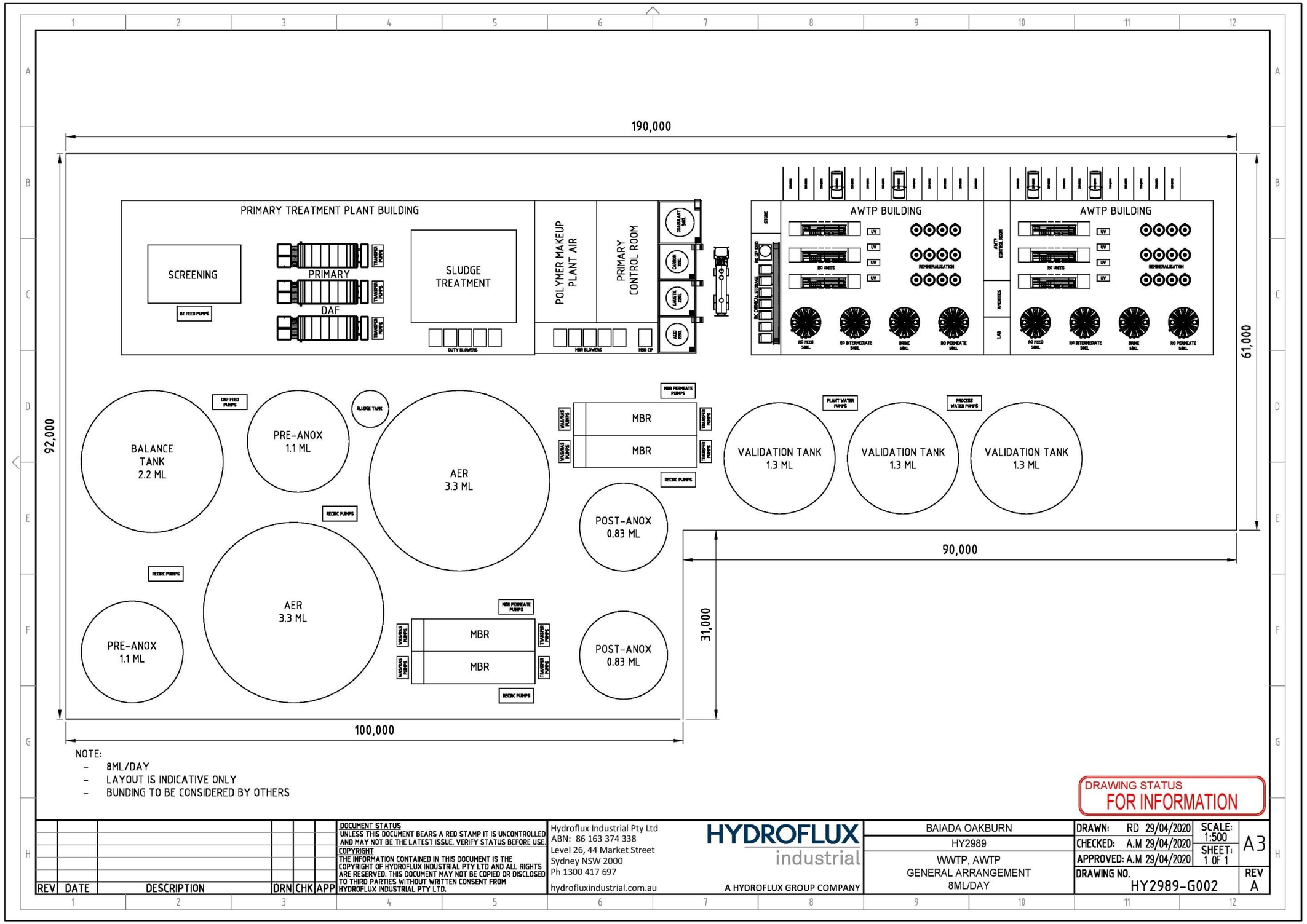
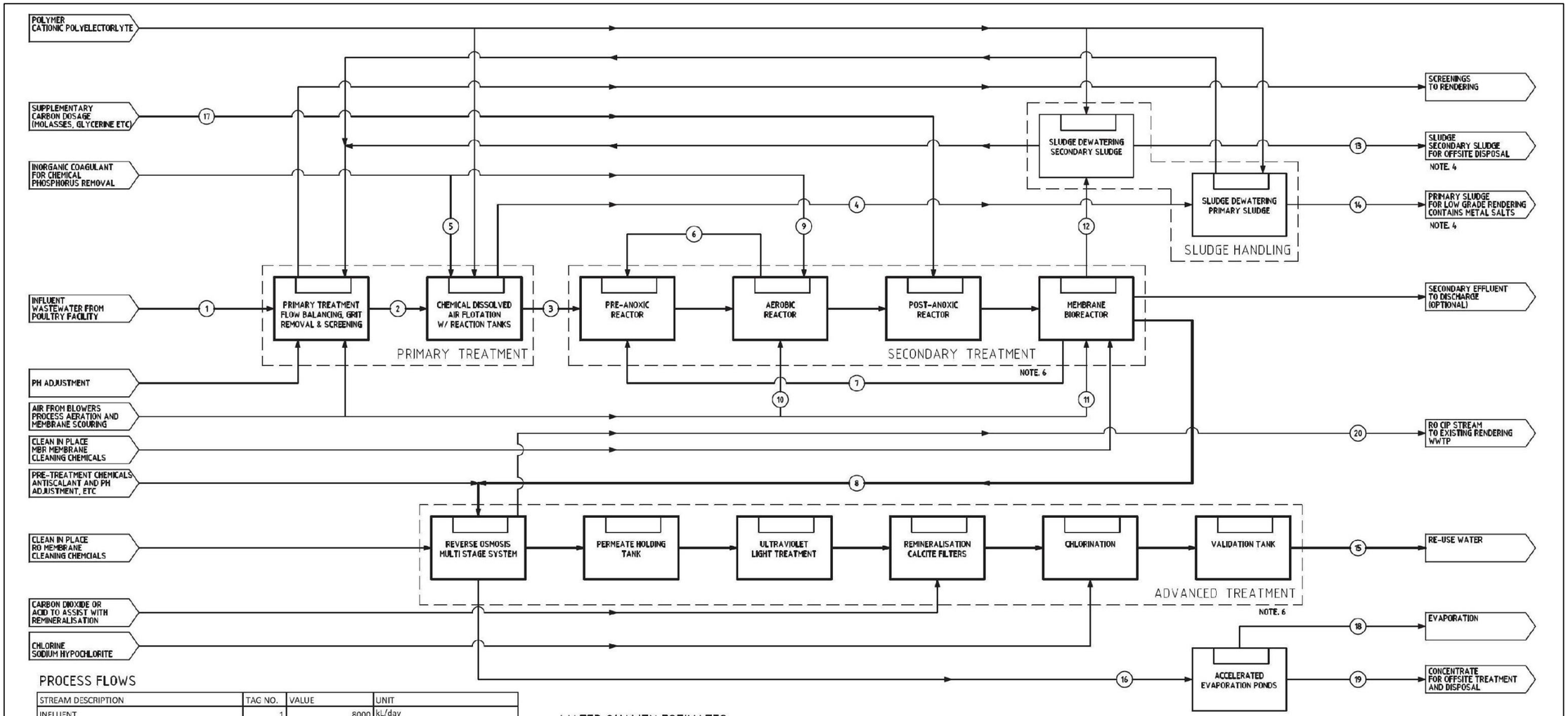


Figure 2.3 – Proposed PPF: General arrangement for the WWTP and AWTP



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 9,123.9 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** Very likely	**B** Likely	**C** Possible	**D** Unlikely	**E** 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**.

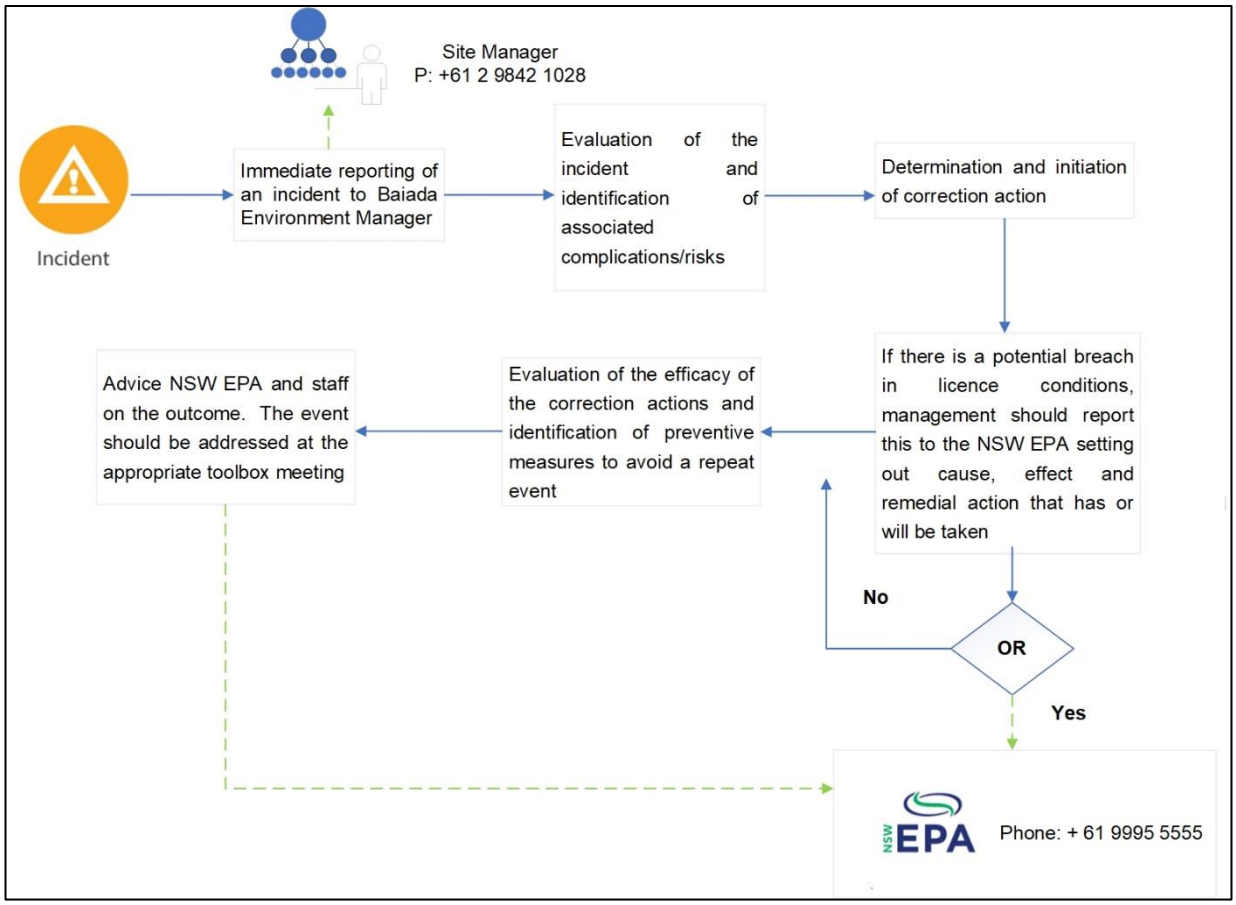

Figure 4.1 – Emergency/contingency plan workflow

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