Government of Western Australia
Department of Water and Environmental Regulation

Licence Amendment Report

Licence Number	L5008/1991/13
Licence Holder	Kamarah Pty Ltd
ACN	619 995 729
File Number	2010/005964-1
Premises details	Kamarah Piggery 310 West Wannamal Road Mindarra WA 6503 Legal description - Lot 21 on Plan 74381 Certificate of Title Volume 2807 Folio 573 As depicted in Schedule 1 of the Amended Licence
Date of Amendment	26 September 2019
Status of Report	Final

Amendment

The Chief Executive Officer (CEO) of the Department of Water and Environmental Regulation (DWER) has amended the above Licence in accordance with section 59 of the *Environmental Protection Act 1986* (EP Act), as set out in this Amendment Notice. This Amendment Notice constitutes written notice of the amendment in accordance with section 59B(9) of the EP Act.

Paul Byrnes

Manager, Process Industries

an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA).

Definitions and interpretation

Definitions

In this Amendment Notice, the terms in Table 1 have the meanings defined.

Table 1: Definitions

Term	Definition
NEGIP	refers to the National Environmental Guidelines for Indoor Piggeries, Australian Pork Ltd, 2018
SPU	refers to standard pig unit, as defined in NEGIP

Licence Amendment

This amendment is made pursuant to section 59 of the *Environmental Protection Act 1986* (EP Act) to amend Licence L5008/1991/13 granted under the EP Act for an intensive piggery on Lot 21 on Plan 74381, West Wannamal Road, Mindarra.

Details of the amendment are set out in the form of a revised licence document.

The Licence Holder applied to amend the Licence on 8 February 2019 (the Application) as it had completed expansion works undertaken as per the Amendment Notice 1 granted on 21 February 2017 (the Amendment Notice). Recommended operational phase regulatory controls were determined in the assessment for the above-mentioned Amendment Notice.

The following guidance statements have informed the decision made on this amendment

- *Guidance Statement: Regulatory Principles* (July 2015);
- *Guidance Statement: Risk Assessment* (February 2017);
- *Guidance Statement: Setting Conditions* (October 2015); and
- *Guideline: Decision Making* (June 2019).

Background

Kamarah Piggery located in Mindarra in the Shire of Gingin is a grower facility for raising pigs bred at other facilities. In 2016, the Licence Holder applied for a licence amendment to undertake expansion works to increase the holding capacity from approximately 9,250 animals to 21,888 animals (equivalent to 25,384 SPU). The Licence Holder proposed the following works:

- three new convention sheds with pull plug effluent drainage system;
- twenty four new ecoshelters;
- a screw press fan separator with solids storage bunker;
- an additional uncovered anaerobic pond; and
- two carcass composting bunkers.

The risk of emissions and discharges for both the construction and operational phases were assessed through the decision to grant an Amendment Notice on 21 February 2017 (Appendix 2). However, the amended conditions in the Amendment Notice applied to the construction phase only.

Amendment description

The Licence Holder has completed expansion works authorised through the Amendment Notice and submitted compliance documentation to the Department. The Licence Holder seeks to amend the licence to reflect the new production capacity (25,384 SPU) and ensure it reflects the new infrastructure and equipment constructed on the premises.

Documentation submitted by the Licence Holder relevant to the Delegated Officer's assessment of the Application is listed in Table 2.

Table 2: Documentation submitted by the Licence Holder

Documents	Date received	DWER records ID
Licence amendment application lodged by Aurora Environmental via email and including • Application Form signed and dated 16/1/19; • Five digital photos; • WBS construction certificate for the conventional sheds • MCS concrete certification; and • CMW Geosciences technical memorandum on the anaerobic pond clay testing and investigation	08/02/2019	A1763432
Emailed letter from Aurora Environmental dated 15/05/2019 providing additional information as requested by DWER in writing on 21/03/2019.	15/05/2019	A1802845

Compliance documentation

Compliance documentation was initially submitted by the Licence Holder as part of the Application on 8 February 2019. The Delegated Officer reviewed compliance documentation prior to accepting the Application and requested further information from the Licence Holder on 21 March 2019. Further information was received from the Licence Holder on 15 May 2019 and reviewed by the Delegated Officer. On the basis of the additional information, the Delegated Officer formed a view that works had been completed in accordance with the conditions of the Amendment Notice and accepted the Application.

Risk Assesment

The risk associated with emissions and discharges from the operational phase of the expanded piggery have been previously assessed following the *Guidance Statement: Risk Assessment* in the Amendment Notice Decision Report (Appendix 2). The operational aspects of the expanded piggery are described in section 4.2 of this document and the risk assessment of these aspects is documented in Chapter 8. The key risks which were identified and subject to detailed risk assessment in the Amendment Notice Decision Report include odour (section 8.4), discharges to land (section 8.5) and seepage from the wastewater treatment ponds (section 8.6).

Determined regulatory controls

Regulatory controls for the operational phase of works completed in accordance with the Amendment Notice were previously determined in accordance with the *Guidance Statement: Setting Conditions* through the assessment of the proposed works. The assessment and determination of recommended regulatory controls is detailed in sections 9.3 and 9.4 the Amendment Notice Decision Report in Appendix 2. The Delegated Officer has given regard to the recommended regulatory controls in determining the amendments to the Licence. The recommended operational phase controls can be summarised as follows:

- stocking rate limits for the whole of premises, conventional sheds and ecoshelters;
- requirements for the ongoing operation of infrastructure (i.e. ponds, conventional sheds, ecoshelters, screw press fan separator and compost bunkers) to control the risk of odour, discharges to land and seepage;
- requirements for the application of ecoshelter spent bedding to land; and
- anaerobic pond desludging requirements.

Amendment history

Table 3 provides the amendment history for L5008/1991/13.

Table 3: Licence amendments

Instrument	Issued	Amendment
L5008/1991/13	26/09/2019	Amended Licence upon the completion of expansion works
L5008/1991/13	21/02/2017	Amendment Notice 1 – Expansion works to increase capacity to 25,384 SPU
L5008/1991/13	29/04/2016	Licence expiry extended until 18/10/2026

Decision

In accordance with Section 59 of the EP Act, the Delegated Officer has granted amendments to the conditions of Licence L5008/1991/13. The specific amendments to the licence were determined by the Delegated Officer having regard to:

- the Licence Holder's Application including the compliance documentation;
- recommended regulatory controls for the operational phase of the expanded piggery determined the Amendment Notice Decision Report (Appendix 2); and
- the Department's *Guidance Statement: Setting conditions*.

The Delegated Officer determined that the risk profile of operational phase emissions and discharges had not changed from the previous assessment in the Amendment Notice 1 Decision Report. The amended conditions are therefore consistent with the controls previously recommended, except that in some instances (i.e. infrastructure and equipment operational requirements in condition 2 and piggery waste management requirements in condition 5) have been simplified and condensed while still achieving the same regulatory outcome.

Details of the amendments are set out in the form of an Amended Licence based on the risk of emissions and discharges from a production capacity of 25,384 SPU.

Licence Holder's comments

The Licence Holder was provided with the draft Amended Licence and Amendment Report on 10 September 2019. Comments received from the Licence Holder's representative, Aurora Environmental, on 13 September 2019 and have been considered by the Delegated Officer as shown in Appendix 3.

Appendix 1: Key documents

	Document title	In text ref	Availability
1	Amendment Notice granted on 21/02/2017 and attached Decision Report	the Amendment Notice / Amendment Notice Decision Report	www.dwer.wa.gov.au
2	Application to amend licence L5008/1991/13 received by DWER on 08/02/2019 and supplementary information received on 15 May 2019	the Application	DWER records (A1763432 and A1802845)
3	DER, July 2015. *Guidance Statement: Regulatory Principles.* Department of Environment Regulation, Perth.	N/A	accessed at www.dwer.wa.gov.au
4	DER, October 2015. *Guidance Statement: Setting Conditions.* Department of Environment Regulation, Perth.		
5	DER, November 2016. *Guidance Statement: Environmental Siting*. Department of Environment Regulation, Perth.		
6	DER, February 2017. *Guidance Statement: Risk Assessments.* Department of Environment Regulation, Perth.		
7	DWER, June 2019. *Guideline: Decision Making*. Department of Water and Environmental Regulation, Perth.		
8	DER, February 2017. *Guidance Statement: Risk Assessment*. Department of Environment Regulation, Perth.		
9	Licence L5008/1991/13 granted 8/9/2011 and amended on 14 June 2013	Licence L5008/1991/13	
10	National Environmental Guidelines for Indoor Piggeries, Australian Pork Ltd, 2018	NEGIP	www.australianpork.com.au

Appendix 2: Decision Report for L5008/1991/13 Amendment Notice 1

Government of Western Australia
Department of Environment Regulation

Decision Report

Application for Licence Amendment

Division 3, Part V *Environmental Protection Act 1986*

Licence Holders:	Mr Errol John Howard and Mrs Annette Rose Howard
ABN:	86 822 886 415
Licence Number:	L5008/1991/13
File Number:	2010/002610
Premises:	Kamarah Piggery 310 Wannamal Road MINDARRA WA 6503 Lot 21 on Plan 74381 Certificate of Title Volume 2807 Folio 573
Date of report:	Tuesday, 21 February 2017
Status of Report	Final

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Definitions of terms and acronyms

Term	Definition
AER	Annual Environmental Report
AACR	Annual Audit Compliance Report
Application	Application Form dated 11/7/2016 and supporting documentation.
Category/Categories (cat.)	categories of prescribed premises described in Schedule 1 of the EP Regs
CCW	Conservation category wetland
Conventional sheds	As defined and described in NEGP
Decision Report	this document
Delegated Officer	An officer under section 20 of the EP Act
DER	Department of Environment Regulation
Eco shelters	As defined and described in NEGP
EP Act	means the *Environmental Protection Act 1986*
EPASA Lagoon Guidelines	Wastewater Guidelines, Wastewater lagoon construction, Environmental Protection Authority South Australia, November 2014
EPA Statement 4	*Environmental Protection of Wetlands Position Statement No. 4,* Environmental Protection Authority, November 2004
EP Regs	means the *Environmental Protection Regulations 1987*
GIS	geographic information system
Licence Holders	Mr Errol John Howard and Annette Rose Howard
MUW	Multiple use wetland
NEGP	*National Environmental Guidelines for Piggeries* (Australian Pork Limited, 2010)
Noise Regulations	*Environmental Protection (Noise) Regulations 1997*
Premises	as defined in the EP Act, means residential, industrial or other premises of any kind whatsoever and includes land, water and equipment
Prescribed Premises	premises of the types listed in Schedule 1 of the EP Regs.
Primary activities	has the meaning in point 8 of DER's published *Guidance Statement: Risk Assessments*
REW	Resource enhancement wetland
RIWI Act	*Rights in Water and Irrigation Act 1914*

Term	Definition
SPU	Standard Pig Unit. *"A unit for defining piggery capacity based on by-products output. The manure and waste feed produced by one SPU, contains the amount of volatile solids (VS) typically produced by an average size grower pig (90 kg VS/yr). SPU multipliers for other pig classes are based on their comparative VS production."*
TEC	Threatened ecological community
WQPN 27	*Water Quality Protection Note 27: Liners for containing pollutants, using engineered soils*, Department of Water, 2013.
WNMP	the report *Kamarah Piggery Expansion Waste & Nutrient Management Plan 310 Wannamal road West Mindarra, WA*, Aurora environmental, 2 February 2017

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Table 24: Risk rating of emissions

1. Purpose and Scope of Assessment

An application to amend Licence L5008/1991/13 (***the Application***) was lodged on 15 June 2016 by the ***Licence Holders*** of the Kamarah Piggery (Category 2: Intensive piggery) located at West Wannamal Road, Mindarra. The Licence Holders propose works to expand the capacity of the piggery from its current holding of 9,250 animals to 21,888 animals (25,384 ***SPU)***. The piggery is a grower facility raising pigs bred on other sites.

The Licence Holders are seeking approval under the provisions of the ***EP Act*** for construction and operation of three conventional piggery sheds (pull-plug), 24 eco shelters, and associated supporting infrastructure.

The assessment of the Application has been undertaken in accordance with DER's published Regulatory Framework. The scope of assessment includes:

- assessment of the design of the proposed works;
- a risk-based assessment of the emissions and discharges to the environment that may occur at the construction stage; and
- a risk-based assessment of the emissions and discharges associated with the operation of the expanded capacity (25,384 SPU).

The ***Delegated Officer*** has given effect to determined conditions for the construction phase of the works through an Amendment Notice. The Amendment Notice does not authorise an increase beyond the currently approved capacity and does not authorise emissions and discharges in respect of operating the proposed infrastructure and equipment once constructed. The Delegated Officer has proposed controls in sections 9.3, 9.4 and 9.5 of this Decision Report that will be applied to a revised licence, if granted, once works are complete and the Licence Holders have complied with the conditions of the Amendment Notice.

2. Background

The existing Licence L5008/1991/13 is for an intensive piggery as described in **Table 4** below. The Licence Holders are both the owners and occupiers of the premises.

Table 4: Prescribed Premises Category

Classification of Premises	**Description**	**Current Production Capacity** (from existing licence)	***Proposed Production Capacity*** *(from the Application)*	**Schedule 1 Category Threshold**
Category 2	Intensive piggery: premises on which pigs are fed, watered and housed in pens.	4,500 animals[1]	*21,888 animals (25,384* SPU)[2]	1,000 animals or more

*Note 1: Does not account for 4,750 animals held in **eco shelters**.*
Note 2: Accounts for proposed capacity including existing and proposed numbers held in eco shelters.

Section 2.1 (page 3) of the Application provides a description of the site history which has been summarised in **Table 5**.

Table 5: Summary of site history (from the Application)

Date	Event
1980	Land purchased by occupiers
1986 – 1992	Piggery constructed comprising eight ***conventional sheds*** and the wastewater treatment system
2001	19 domed eco shelters constructed
2012	Four domed eco shelters constructed
January 2016	Approx. 4,000 animals housed in conventional sheds with an additional 4,750 housed in eco shelters

Licence L5008/1991/13 specifies a production or design capacity of 4,500 animals. The Delegated Officer noted that the premises have existing eco shelters with capacity for 4,750 animals which are not described in the assessed capacity. The Delegated Officer also noted the Application includes the construction of 24 new eco shelters increasing the total capacity to 11,600 animals in eco shelters.

The description of category 2 in Schedule 1 of the ***EP Regs*** details premises on which pigs are fed, watered, and housed in pens. The Delegated Officer had regard to DER's published *Guidance Statement: Risk Assessments* and considered that pigs to be held in the proposed and existing eco shelters are ***primary activities*** which may be subject to conditions in the amended licence that grants approval for the Application. The scope of the assessment, therefore, includes animals held and to be held in conventional sheds and eco shelters.

The assessment will be based on the maximum number of SPU proposed to be held on the premises at any one time.

3. Proposal

The Licence Holders lodged an application for a licence amendment on 15 June 2016.

The Licence Holders amended the application on 11 July 2016 upon a request for additional information from the Delegated Officer. The revised application and the additional supporting information were accepted by the Delegated Officer for assessment.

The following additional documents and supporting information were provided to the Delegated Officer in further support of the Application lodged on 15 June:

- Application Form dated 11 July;
- A letter on behalf of the Licence Holders by Aurora Environmental dated 15 July 2016 in response to specific questions raised by the Delegated Officer on 4 July 2016; and
- A proposal document *Kamarah Piggery Expansion Licence Amendment Application 310 Wannamal Road West, Mindarra WA*, on behalf of the Licence Holders by Aurora Environmental dated 15 July 2016—including ten appendices.

4. Overview of Kamarah Piggery

4.1 Infrastructure

The existing and proposed infrastructure at the Kamarah Piggery is detailed in **Table 6** and **Table 7**. A site layout of existing and proposed infrastructure is shown in **Figure 1**.

Table 6: Kamarah Piggery Category 2 existing infrastructure

	Existing Infrastructure	Reference
1	8 x conventional sheds	Figure 1
2	23 x Eco shelters (including three for weighing/sorting pigs and one for storing machinery)	
3	2 x anaerobic ponds	
4	1 x facultative/evaporation pond	
5	Piggery solids and sludge compound	

Table 7: Kamarah Piggery Category 2 proposed infrastructure

	Proposed Infrastructure	Proposed design and construction notes (from the Application)	Reference
1	3 x conventional sheds (pull-plug drainage system)	• Partly slatted concrete floor; • Under floor pits to collect spilt feed, water, urine and faeces; • Pull-plug flush system using clean or recycled water; and • Drainage system	Figure 1
2	1 x Fan (screw press) separator with concrete bunker/solids collection area	• Fan (screw press) separator with a concrete bunker/solids collection area under the screw press to capture separated solids; • Liquid from the fan separator directed to the anaerobic ponds.	
3	24 x eco shelters	• Steel domed framework; • High tensile fabric positioned over the steel; and • Concrete footings and a concrete floor.	
4	1 x anaerobic pond	• Liner and walls constructed using in situ clays; • Clay to be excavated from the centre of the pond to a depth of 6m, and walls pushed up using earthmoving equipment; • Clay at the base and sides of the pond will be compacted using a padfoot roller to a minimum thickness of 300 mm with a target compaction maximum dry density of 1.90 t/m^3 and optimum moisture content of 14%; • Maximum dry density greater than 98% and resultant compacted in-situ permeability of the clay liner being less than 10^{-9} m/s; • Verification testing in accordance with AS 1289.6.7.1 (2001) to validate the liner permeability meets the criteria and testing regime in *Water Quality Protection Note 27: Liners for containing pollutants, using engineered soils*, Department of Water, 2013; and • Refer to Appendix 3 – Map of new anaerobic pond design	
5	2 x concrete carcass composting bunkers	• Dimensions 10m long by 3m wide by 2.4m deep and covered with a colorbond steel roof; • Layering of straw/sawdust, pig carcasses and covered with used straw from eco shelters and manure; • Rotation of bunkers; and • Estimated compost production of 600 – 700 tonnes per year.	

Figure 1: Site layout of current and proposed infrastructure (from the Application)

4.2 Operational Aspects

Kamarah Piggery is a grower facility which accepts pigs aged from three weeks (weaners) and grows them out until approximately 22 weeks of age (grower/finishers). The Licence Holders propose to build additional eco shelters and conventional sheds to increase the size of the piggery.

The Application contained a table with the existing and proposed animal numbers, converted to SPU. This table is extracted and shown below in Table 8.

Table 8: Proposed stock numbers (from the Application)

Pig Class[1]	SPU Factor[1]	Stock		Housing
		Number of animals	SPU	
Weaners	0.5	7,649	3,825	Eco shelters
Porkers	1.0	3,604	3,604	Eco shelters
Growers	1.6	5,941	9,506	Conventional Sheds
Finishers	1.8	4,694	8,449	Conventional Sheds
Total		**21,888**	**25,384**	

Note 1: Refer to Section 4.3 of NEGP for further explanation of SPU and SPU factors

The existing conventional sheds are naturally ventilated with concrete floors, which are manually hosed to flush accumulated manure into drains and to the two anaerobic ponds. Wastewater from the anaerobic ponds is directed to a final facultative/evaporation pond. The proposed new conventional sheds will also be a pull-plug design, similar to the existing conventional sheds. Manure falls through slatted floors into underfloor pits and is released on rotation every one to four weeks.

Wastewater will be re-directed from the existing and proposed conventional sheds through a new solids separator to reduce the solids loading to the anaerobic ponds.

Eco shelters (also known as a deep litter housing system) are a series of hooped metal frames covered in a waterproof fabric over concrete floors. Pigs are bedded on straw to absorb manure and spent bedding is replaced on a 12-week basis.

Current and altered operational aspects of waste management for the premises include:

- Effluent treatment via anaerobic ponds and disposal via facultative/evaporation pond or reuse for flushing of new conventional sheds;
- Piggery solids and sludge contained on a bunded hardstand with return leachate to the anaerobic ponds;
- Spent bedding from eco shelters will be applied to land (onsite paddocks);
- Carcass disposal to be altered from burial to composting;
- Solid waste is to be partially removed from wastewater prior to entering the anaerobic ponds; and
- Screened solid waste and waste from composted carcasses will be periodically removed from site by a third party.

4.2.1 Solid waste management from eco shelters

The Licence Holders remove bedding from eco shelters using a mechanical loader and the material is placed directly into a spreader. The material is preferentially spread on paddocks used for cropping, where nutrients will be absorbed by crops. The balance of material is placed on pasture paddocks. The Licence Holders state that the paddocks that receive spend bedding are not fertilised with any other nutrient source.

The Application states that currently 30m^3 of bedding is cleaned from each of the existing eco-shelters. Three eco-shelters are cleaned out per fortnight meaning all 19 shelters (current eco-shelters) are cleaned out every 12 weeks. The current total volume of bedding removed is approximately 570m^3 every 12 weeks. The rate of application of spent bedding material is 15m^3 per hectare, and the approximate area available for spreading is 571 ha, which excludes tree stands and wetland areas. Every 12 weeks, spreading occurs across a 38ha area.

The Licence Holders have advised that approximately 33.5m^3 of bedding will be cleaned-out from each new eco shelter (with four eco shelters cleaned-out per fortnight), in addition to the 30m^3 from each of the existing eco shelters (three eco shelters cleaned per fortnight). Therefore, every 12 weeks there will be a total of 1380m^3 of bedding to be spread over 92ha, at the same application rate (15m^3/ha). Given the total area of land available for spreading, 74 weeks will elapse before bedding is reapplied to the same area of land.

As part of comments on the draft Amendment Notice and Decision Report, the Delegated Officer requested the Licence Holders provide a descriptive map of areas to which spent bedding may be applied. The Delegated Officer also requested a nutrient balance for the application of spent bedding to land. The Licence Holders provided a copy of the report *Kamarah Piggery Expansion Waste & Nutrient Management Plan 310 Wannamal road West Mindarra, WA*, Aurora environmental, 2 February 2017 (WNMP) to address this request. The WNMP was prepared to address conditions of the Shire of Gingin planning approval outlined in section 5.1.

Figure 5 of the WNMP provides a map depicting spent bedding land application areas which the executive summary states are 571 ha or 38.4% of the entire property. The Licence Holders propose to split the application area into three approximate 180 ha areas to be used alternatively over a three-year cycle. The Delegated Officer is satisfied that the WNMP demonstrates that the area stated in the Application is available and notes that it incorporates separation distances that are consistent with proposed controls in section 9.4.1.

4.2.2 Wastewater treatment system - overview

The existing and proposed wastewater treatment system are summarised in **Table 9**.

Table 9: Wastewater treatment system components (from the Application)

Component	Existing Treatment System	Proposed Combined Treatment System
Solids screen and concrete collection bunker (new)	-	Screw Press Fan Separator with concrete collection bunker
Anaerobic Pond 1	50m x 50m x 10m (min) (9,132m^3)	50m x 50m x 10m (min) unchanged
Anaerobic Pond 2	50m x 50m x 10m (min) (9,132m^3)	50m x 50m x 10m (min) unchanged
Anaerobic Pond 3 (new)	-	50m x 80m x 6m (min) New (10,914m^3)
Facultative/Evaporation Pond	140m x 160m x 6m (min)	140m x 160m x 6m (min)

The Delegated Officer noted the existing pond that is referred to as a facultative/evaporation pond is considered to be acting as a treatment pond rather than just an evaporative pond given its depth is 6m. Evaporation ponds are normally shallow with a large surface area. This pond hereafter is referred to as a facultative pond.

The Licence Holders modelled the waste and wastewater generation from the proposed expanded piggery using PigBal v4.090.

4.2.3 Waste water treatment system – water balance

The Application contained a water balance to assess the volumetric capacity of the wastewater treatment system (new pond included). The water balance indicated that the facultative pond would fill to within 1m of the top of its embankment after approximately 3.5 years. Once full, the Licence Holders propose to reuse treated wastewater for flushing the effluent pits in the pull-plug design conventional sheds. The Delegated Officer was satisfied that the wastewater treatment system has enough capacity, provided that wastewater is reused as proposed. The Delegated Officer noted that irrigation of wastewater is not proposed or needed to maintain enough capacity for high rainfall events.

4.2.4 Waste water treatment system – anaerobic pond capacity

The Licence Holders provided design calculations for the size of the anaerobic pond, sufficient to maintain adequate treatment capacity. The Delegated Officer accepted the proposed size of the third pond to be built (10,914m^3). However, the Application proposes to have one pond in service at any one time with the other two ponds being out of service for desludging and maintenance. As such, the duty service of the active pond is limited by its capacity to about 12 months of continuous service, after which it would need to be taken offline and desludged.

4.2.5 Pond Desludging

The Application states that the existing anaerobic ponds have not been desludged due to their deep nature and large capacity. The construction of a new anaerobic pond will mean the Licence Holders will successively desludge the two existing anaerobic ponds by pumping effluent to the new fan separator to remove solids. The Delegated Officer considered that the supernatant liquid from desludging should not be directed to the active anaerobic pond so as to avoid solids overloading. Separated solids will be removed off site by a third party and liquid directed to the new anaerobic pond to help establish an optimal bacteria population.

The Licence Holders propose to use anaerobic ponds in a systematic pattern with one operational, and the other two drying out and being desludged. The Delegated Officer deduced that one pond would be placed into service each year and subsequently desludged, and on that basis, the anaerobic ponds will need to be built to withstand frequent desludging.

The Delegated Officer noted the proposed method of pond desludging through the use of excavation equipment poses an inherent risk of damage to the clay liner of the ponds and will be further considered in the risk assessment and determination of any regulatory controls.

4.2.6 Waste management and disposal summary

A summary of waste management and disposal on the premises is provided in Table 10 below.

Table 10: Summary of waste management and disposal

Waste Type	Management	Disposal
Eco shelter spent bedding	Cleaned out every 12 weeks	Applied to paddocks within the premises
Conventional shed effluent	Directed through the separator to reduce solids. Facultative pond wastewater reused as flushing water within pull-plug conventional sheds	Evaporation only. No disposal of untreated or treated effluent occurs within the premises
Pig mortalities	Composted within onsite compost bunkers	Final compost removed from premises by a contractor. No disposal of compost or burial of pig mortalities within the premises
Pond sludge	Directed through the fan separator to reduce solids	No disposal of pond sludge occurs within the premises
Fan separator wastes	Extracted solids are collected in the bunker beneath the fan separator. Remaining effluent is directed to the anaerobic ponds	Solids in the fan separator bunker are removed from the premises by a contractor. No disposal of fan separator wastes occurs within the premises

5. Legislative Context

5.1 Planning Approval

The Shire of Gingin advised DER in writing on 14 October 2016 that the expansion is subject to a development application.

The Licence Holders provided comments on the draft Amendment Notice and Decision Report on 2 February 2017. This included a copy of the Shire of Gingin development approval dated 3 January 2017.

The Delegated Officer had regard to the imposed planning conditions and did not identify any inconsistencies with controls proposed in the Amendment Notice.

The Delegated Officer noted that the planning approval:

- is for the same maximum SPU as the licence amendment application lodged with DER;
- requires submission of a Nutrient Management Plan and a Waste Management Plan to the Shire of Gingin;
- requires composting to be carried out in accordance with Australian Standard *AS2254-2012 Composts, Soil Conditions and Mulches.*

The Licence Holders provided DER with a copy of the Waste and Nutrient Management Plan as part of their comments on the draft Amendment Notice and Decision Report.

5.2 Applicable Regulations, Standards and Guidelines

The Delegated Officer has referred to the NEGP as the appropriate Industry Guideline during the assessment of this application.

5.3 Part V of the EP Act

5.3.1 Works Approvals

Two works approvals have been granted in respect of the Premises: W627/1991/1 was granted on 25 February 1991 and W1206/1991/1 granted on 22 February 1995. The approved works have been completed and were put into operational service several years ago.

5.3.2 Licences

The Licence Holders have continuously held licenses for the premises since 1991, and they are the current licence holders for the premises.

5.3.3 Compliance Matters

The Delegated Officer considered that it was reasonable to review inspection reports in the previous five years to inform decision-making on the Application. The premises were inspected on 3 June 2011 and 26 March 2016.

One compliance matter was identified during the inspection of 3 June 2011. Wastewater was discharging to land rather than directly to the facultative pond. DER records confirm that the discharge pipe between the anaerobic ponds and the facultative pond was extended to rectify this issue.

The inspection of 26 March 2016 did not identify any compliance related matters.

5.3.4 Annual Audit Compliance Reports

The Annual Audit Compliance Reports (***AACRs***) for the last three reporting periods were reviewed as part of this assessment and no matters arose for consideration of the Application.

5.3.5 Annual Environmental Reports

The Annual Environmental Reports (***AERs***) for the last three reporting periods were reviewed as part of this assessment and no matters arose for consideration of the Application.

5.3.6 Complaint History

The Licence Holders and DER maintain records of complaints (if any) about off-site environmental impacts from the premises and records of incidents that have occurred.

The Licence Holders have advised that they have not received any complaints and DER's records do not show that it has received complaints or notification of incidents at the premises.

The Delegated Officer considers that the complaint history (no complaints) and the records of incidents (no incidents) are relevant considerations for the Application and will be used in the risk assessment.

6. Consultation

The Delegated Officer referred the Application to the Shire of Gingin for comment on 10 August 2016 who replied in writing on 14 October 2016 advising that the Shire is currently assessing a development application for the premises. Development application advertising closed on 21 October 2016.

Copies of the draft Amendment Notice and Decision Report were provided to the Licence Holders on 12 January 2017 who returned comments on 2 February 2017. Refer to Appendix 2 for a summary of the Licence Holders' comments and the Delegated Officer's considerations.

7. Location and Siting

7.1 Siting Context

The premises are located in Mindarra in the Shire of Gingin. It is approximately 25km north east of Gingin townsite, which is approximately 84km north of Perth (see Figure 2 below). The premises is on land zoned general rural under the Shire of Gingin Local Planning Scheme No. 9 (District Scheme).

The Town of Wannamal in the Shire of Chittering is located 3,060m to the south-east of the premises. About 50 people reside in the Town of Wannamal.

Properties surrounding the premises are zoned general rural. Land zoned parks and recreation include the Boonanarring Nature Reserve, Lake Wannamal Nature Reserve, and Betts Nature Reserve, which are located approximately 2,381m south-west, 1,430m northeast, and 774m south-east of the premises boundary respectively. There is land zoned Agricultural Resource approximately 3,000m to the east.

A nearby piggery located at 369 Wannamal Road, consists of 33 eco shelters and is located approximately 2.9km south, south-west of the premises.

Figure 2: Kamarah Piggery location

7.2 Residential and Sensitive Premises

The closest residential premises to the piggery are located in an area zoned rural as shown in Figure 3 below.

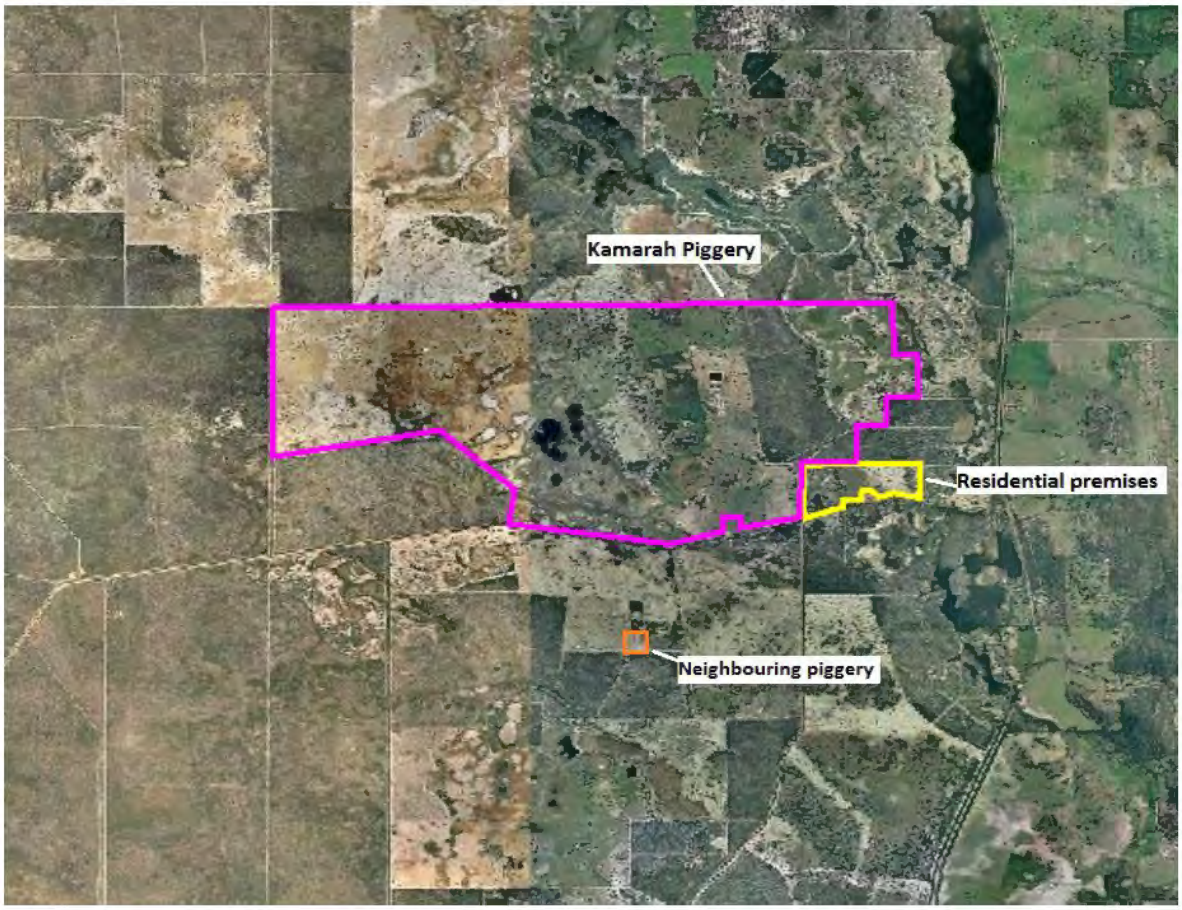


Figure 3: Aerial image of the closest residential premises to Kamarah Piggery

Table 11 outlines the separation distances that the Delegated Officer considers are applicable to the premises. Table 12 details the closest residential and sensitive receptors along with the measured separation distance.

Table 11: Separation distances

Category	Description	Emission and Distance (m)
2	Intensive piggery (1,000 animals or more) Premises on which pigs are fed, watered and housed in pens	Noise 1,000 Odour S-Factor Refer to Level 1 of the *National Environmental Guidelines for Piggeries* (Australian Pork Limited, 2010) and section 7.2.1 of this Decision Report.

Table 12: Receptors and distance from prescribed activity

Residential and Sensitive Premises	Distance from Prescribed Activity
Residential Premises (zoned rural)	1,140m south-east
	2,260m east
	2,270m south
	2,333m east
	2,530m east
	2,540m east
Town (Wannamal)	3,060m south-east
Assessment of separation distance	*Meets separation distance for noise.* *Separation distance requirements for odour detailed in Table 14.*

7.2.1 S-Factor Separation Distance

The S-Factor calculation detailed in the NEGP has been used by the Delegated Officer to calculate the separation distances.

The NEGP classifies residential receptor types taking into account population density, odour sensitivity, and risk of exposure. The three receptor types within the NEGP are rural dwelling, rural residential, and town. The NEPG states that the receptor definitions should be based on local authority classifications. Receptors surrounding the premises are classified as rural dwelling or town, captured under either the Shire of Gingin Local Planning Scheme No. 9 (District Scheme) or the Shire of Chittering Town Planning Scheme No. 6 (District Scheme).

Figure 4 below depicts the location of the nearby receptor to the Premises.

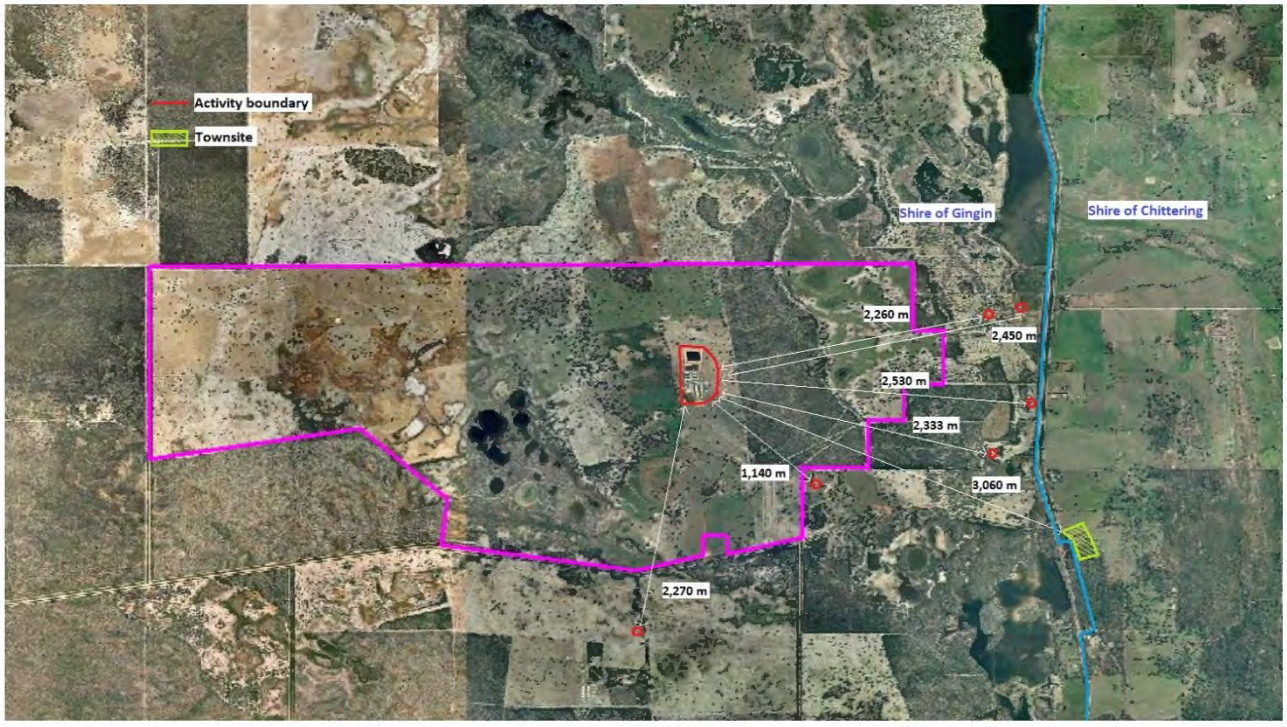


Figure 4: Aerial image of Kamarah Piggery and distances to closest sensitive receptors

The Level 1 recommended distance for a rural dwelling has been calculated for the four closest residences. The recommended distances vary due to surface roughness and the type of terrain between the piggery and receptors. The Delegated Officer's measurements have been taken from the activity boundary of the piggery relevant to the location of receptors or the Town boundary.

The Delegated Officer did not accept the S-Factor calculation provided by the Applicants as it did not calculate the entire piggery site as whole, but rather considered the site in two separated parts (conventional sheds and eco shelters considered separately).

The Delegated Officer's determination of the separation distance using the S-Factor calculation is detailed below in Table 10 and a summary is provided in Table 11.

Table 13: S-Factor calculations

Receptor Type	SPU	S Factor	S Factor Value	Separation distance
Rural Dwelling 1 (RD) (1,140m south east)	25,384	$S1_R$*	1.0	2,195m
		$S1_T$*	0.82	
		$S2_R$	11.5	
		$S2_S$**	0.88	
		S3	1	
Rural Dwelling 2 (RD) (2,260m east)	25,384	$S1_R$*	1.0	2,145m
		$S1_T$*	0.82	
		$S2_R$	11.5	
		$S2_S$***	0.86	
		S3	1	
Rural dwelling 3 (RD) (2,270m directly to the south)	25,384	$S1_R$	1.0	2,495m
		$S1_T$*	0.82	
		$S2_R$	11.5	
		$S2_S$	1	
		S3	1	
Rural Dwelling 4 (RD) (2,333 m east)	25,384	$S1_R$*	1.0	2,120m
		$S1_T$*	0.82	
		$S2_R$	11.5	
		$S2_S$	0.85	
		S3	1	
Rural residential	25,384	$S1_R$*	1.0	3,254m
		$S1_T$*	0.82	
		$S2_R$	15	
		$S2_S$	1	
		S3	1	
Town	25,384	$S1_R$*	1.0	5,044m
		$S1_T$*	0.82	
		$S2_R$	25	
		$S2_S$****	0.93	
		S3	1	

* The effluent treatment and removal factors have been weighted according to the number of SPU's included in each shed system (conventional and eco shelters). The S1 factor for the piggery design is 0.82.

** The land between the piggery and the RD may be described as "level wooded country ($S2_s$ =0.85) associated with "limited ground cover/short grass ($S2_S$ = 1). A composite factor (as suggested by NEPG) of 0.88 would be an appropriate value for $S2_S$.

*** The land between the piggery and the RD may be described as "level wooded country ($S2_s$ =0.85) associated with "limited ground cover/short grass ($S2_S$ = 1). A composite factor (as suggested by NEPG) of 0.86 would be an appropriate value for $S2_S$.

****The land between the piggery and the town site boundary may be described as "level wooded country ($S2_s$ =0.85) associated with "limited ground cover/short grass ($S2_S$ = 1). A composite factor (as suggested by NEPG) of 0.93 would be an appropriate value for $S2_S$.

Table 14: Summary of S-Factor and measured distances to sensitive receptors

Factors	Rural Dwelling (1)	Rural Dwelling (2)	Rural Dwelling (3)	Rural Dwelling (4)	Rural Residential	Town
Level 1 recommended distance (m)*	2,195m	2,145m	2,495m	2,120m	3,254m	5,044m
Actual Distance (m)**	1,140m	2,260m	2,270m	2,333m	NA	3,060m
Distance within Level 1 Recommended separation distance	**1,055m**	Acceptable separation distance	**225m**	Acceptable separation distance	NA	**1,986m**

* Delegated Officer calculation – refer to Table 13 for specific details

Delegated Officer measurement – refer to **Figure 4.

The summary of the S-Factor determined separation distances detailed in Table 11 above show that the recommended separation distance for Rural Dwellings 1 and 3 and the Town of Wannamal cannot be met.

The measured distances from the piggery to Rural Dwellings 1 and 3 do not meet the Level 1 recommended S1 separation distances as shown in Table 14. The premises are located between 225m and 1,055m less than the recommended separation distances. Rural Dwellings 2 and 4 have more than the recommended separation distances.

The Wannamal townsite, within the Shire of Chittering is located 3,060m from the piggery. The town site has less than the recommended separation distance for a Town, being 1,986m within the recommended separation distance.

To consider the likelihood of adverse odour impacts occurring at the identified locations, the Delegated Officer decided that it was appropriate to consider the local wind and weather patterns. The Delegated Officer's risk assessment of odour is detailed in Section 8.4.

7.3 Specified Ecosystems

Table 15: Specified ecosystems

Specified ecosystems	Distance from Premises
Geomorphic wetlands of the following management categories: • Conservation Category Wetland (***CCW***); • Resource Enhancement Wetland (***REW***) • Multiple Use Wetland (***MUW***) Refer to Figure 5 for a visual representation of wetlands within and immediately surrounding the premises.	Northeast: A large REW existing approx. 1 km from the activity boundary in the north-east corner of the premises. Three MUWs are also within this general area. Northwest: Part of an REW intersects the northern premises boundary approx. 1.6 km north-west of the activity boundary. West/Southwest: A series of 17 CCWs exist in the south-west portion of the premises approximately 1.2 km south-west of the activity boundary. There are seven REWs approx. 1.5 south-west and seven MUWs approx. 1.5 km west. (based on available geographic information systems (***GIS***) dataset–Geomorphic wetlands).

Specified ecosystems	Distance from Premises
RIWI Act: Proclaimed Surface Water Area – Gingin Brook Catchment Area	Does not intersect with the premises, however, it commences at the property boundary of the premises, approx. 1.6 km south of the activity boundary.
Public drinking water source area (***PDWSA***) Priority 1	35km to the south-west
Threatened ecological communities (***TEC***s) (threatened)	3km and 7km north of the premises boundary (based on available GIS dataset–Threatened Ecological Sites Buffered).
TECs (priority)	Number of TEC buffered sites located between approximately 500m and 10 km south of the premises boundary
Rare flora	Number of threatened and priority flora located approximately between 2km and 4km from the eastern boundary of the premises. (based on available GIS dataset–Threatened and Priority Flora).
Other relevant ecosystem values	**Distance from Premises**
Boonanarring Nature Reserve	2,381m south-west of the premises boundary
Lake Wannamal Nature Reserve	1,430m east of the premises boundary
Betts Nature Reserve	774m north east of the premises boundary
Lake Wannamal The premises is located in the Swan-Avon catchment	2,730m northeast of the premises boundary
Brockman River A major tributary of Brockman River runs through the premises, entering at the southern boundary. The tributary runs into the geomorphic wetlands onsite.	2,370m east of the premises boundary
Moore River	13.6km north of the premises boundary

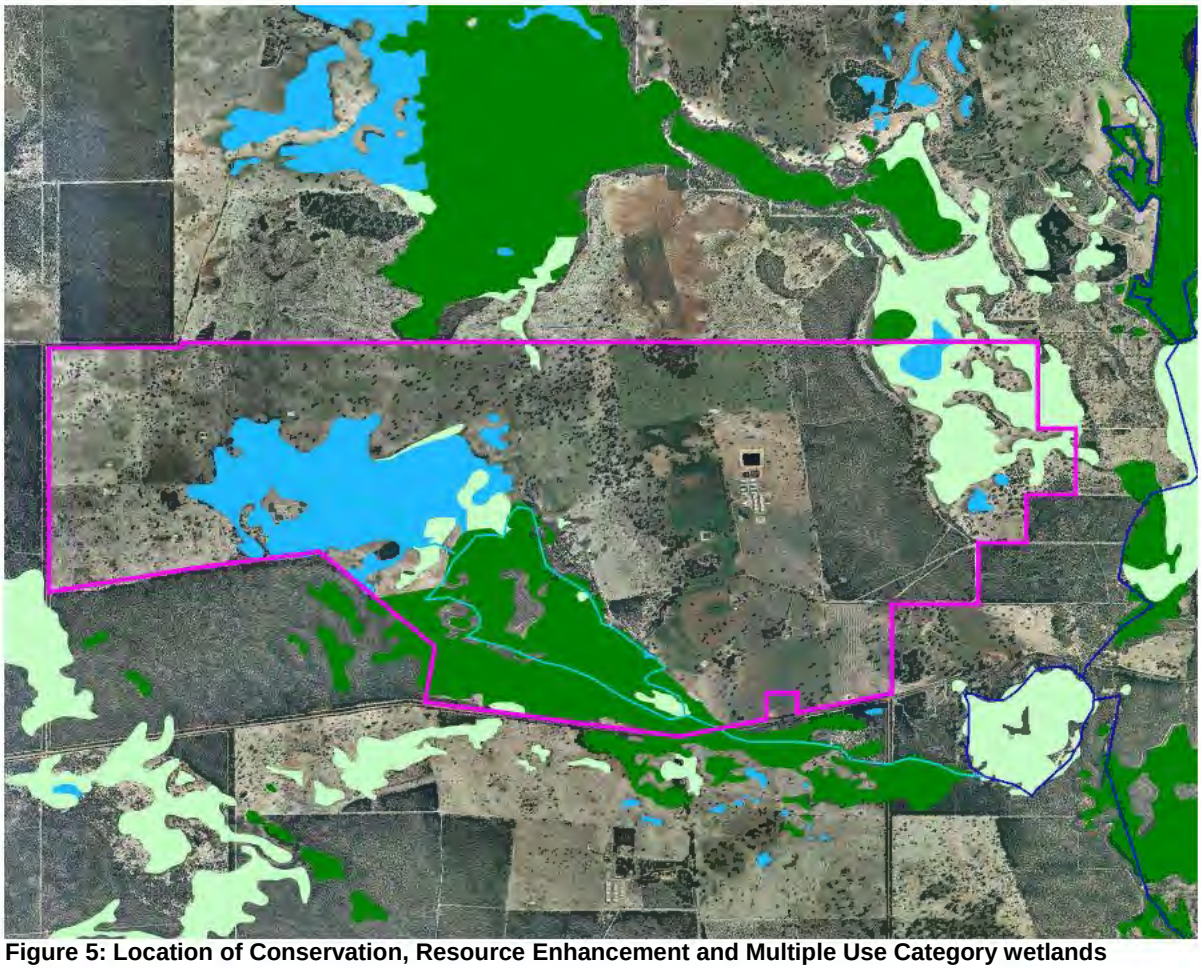


Figure 5: Location of Conservation, Resource Enhancement and Multiple Use Category wetlands

(Management categories of wetlands: dark green – CCW; lime green – REW; blue –MUW)

7.4 Groundwater and water sources

Table 16: Groundwater and water sources

Groundwater and water sources	Distance from Premises	Environmental Value
The Licence Holders provided general information on several aquifers that underlie the premises as referenced from the Department of Water Gingin Groundwater Allocation Plan (www.water.wa.gov.au)	The Licence Holders state that two groundwater bores have historically been installed on the premises. The original bore log recorded depth to groundwater at 60 m below ground level (bgl). Onsite measurements by the Licence Holders put the groundwater level at approx. 80 m (bgl).	Salinity mapping indicates that that the TDS across the site ranges from 1,000 to 7,000mg/L (based on data from GIS Groundwater salinity statewide). Groundwater is likely to have ecosystem values and be non-potable.
Bore users (public health)	The four closest bores to the east are 40 m, 1,152m, 2,228 m and 2,344 m from the premises boundary (GIS WIN Groundwater sites)	All of the bores are listed as 'no current owner' and for purposes including irrigation, livestock and domestic/household use. TDS values range between 740 to 1500mg/L.

7.5 Soil Type

The Licence Holders stated the following in the Application:

"The Perth 1:250 000 Geology Map Sheet (GWSA, 1978) identified the site as containing colluvium, soil and undifferentiated sands over laterite of Coastal Plain with minor alleviated areas."

DER's GIS database provides the following general description of soils encountered in the localised area:

"Broad valleys and undulating interfluvial areas with some discontinuous breakaways and occasional mesas; lateritic materials mantle the area: chief soils are sandy acidic yellow mottled soils, containing much ironstone gravel in the A horizons, and forming a complex pattern with lateritic sandy gravels. Associated are leached sands underlain by lateritic gravels and mottled clays that occur at a progressively greater depth down slope".

7.6 Meteorology

The Licence Holders described the Gingin area having a Mediterranean climate, characterised by hot, dry summers and mild, wet winters. The Licence Holders sourced climate data from the Bureau of Meteorology's Gingin Aero Weather Station (Site number: 009178) for the period 1996 to 2016. Rainfall in the Gingin area is seasonal and generally confined to the winter months (June to August). Mean monthly rainfall is highest in July at 124.9 mm, with an average of 13.2 rainy days.

The mean rainfall and maximum temperature for the area are shown in Figure 6 below (mean maximum temperature (°C) for years 1996 to 2016, and mean rainfall (mm) for years 1996 to 2016).

Winds in the Gingin area during the warmer months are typically characterised by offshore (easterly) breezes during the daytime followed by corresponding onshore breezes (from the south-south-west) as the land cools during the evening.

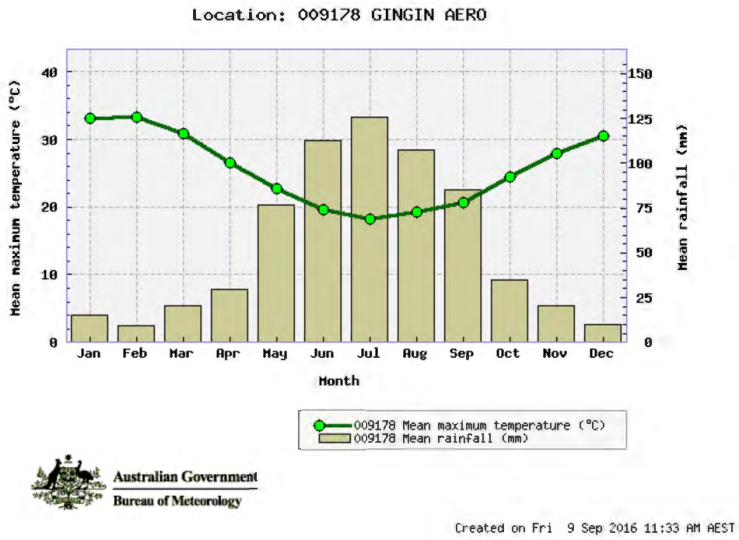


Figure 6: Mean temperature and rainfall for Gingin Aero

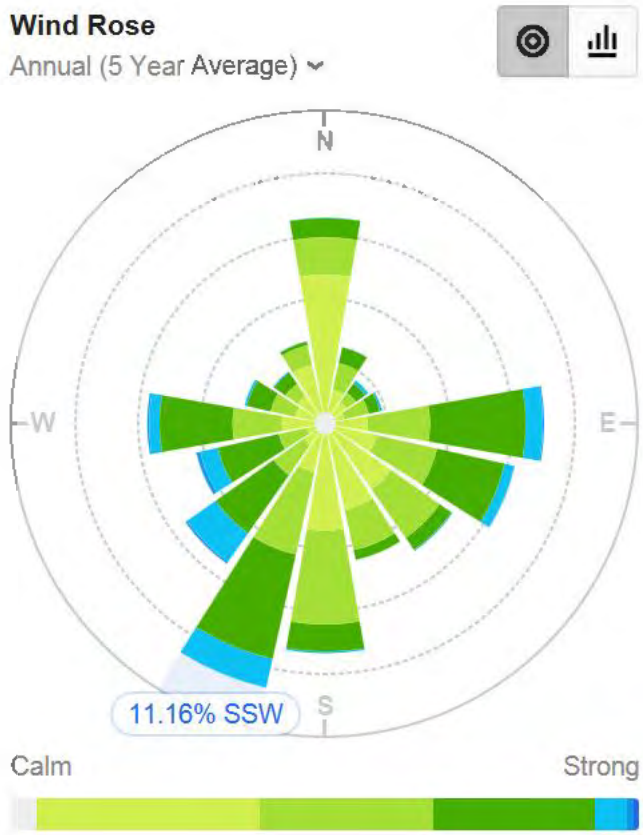


Figure 7: Wind roses for Wannamal

(Source: http://wind.willyweather.com.au/wa/wheatbelt/wannamal.html)

It is important to note that these wind roses show historical wind speed and wind direction data for Wannamal weather station and should not be used to predict future data.

8. Risk Assessment

8.1 Emission, pathway, receptor identification

Identification of key potential emissions, pathways, receptors and impacts are set out in Table 17 and Table 18 below. Table 17 and Table 18 also identify which potential emissions and impacts will be progressed to a full risk assessment. Some potential emissions/impacts may not receive a full risk assessment if a potential receptor or pathway cannot be identified.

Table 17: Identification of key emissions during construction

			Potential Emissions	Potential Receptors	Potential Pathway	Potential Impacts	Continued to detailed risk assessment?	Reasoning
Source (see Section 4.1 for infrastructure references)	**Construction and positioning of infrastructure**	Vehicle movements on unsealed access roads	Dust	Six residential premises receptors within approx. 2.5 km from activity boundary. Closest receptor is 1.14 km south-east.	Air / wind dispersion	Amenity and health impacts	No	Sufficient separation distance
		Construction of new buildings, plant and infrastructure	Noise			Amenity impacts	No	Sufficient separation distance

Table 18 : Identification of key emissions during operation

			Potential Emissions	Potential Receptors	Potential Pathway	Potential Impacts	Continued to detailed risk assessment?	Reasoning
Source (see Section x for infrastructure references)	**Accommodation of pigs and storage and processing of waste materials**	Existing and proposed conventional sheds and eco shelters	Odour	Six residential premises receptors within approx. 2.5 km from activity boundary. Closest receptor is 1.14 km south-east. Wannamal town approx. 3 km south-east.	Air / wind dispersion	Amenity impacts	Yes	See section 8.4
			Noise	Six residential premises receptors within approx. 2.5 km from activity boundary. Closest receptor is 1.14 km south-east.			No	Sufficient separation distance

			Potential Emissions	Potential Receptors	Potential Pathway	Potential Impacts	Continued to detailed risk assessment?	Reasoning
			Contaminated wastewater surface runoff and seepage	Surface water / wetlands (Table 15)	Direct discharge and surface runoff	Terrestrial / wetland ecosystem impacts	Yes	See section 8.5
				Groundwater (60 – 80 m bgl) Potential groundwater hydraulic link to wetlands (Table 15)	Direct discharge and infiltration through soil profile	Groundwater dependent ecosystems and wetland ecosystem impacts	No	Sufficient separation distance
	Collection, treatment and storage of waste materials	Existing and proposed anaerobic ponds and existing facultative pond	Odour	Six residential premises receptors within approx. 2.5 km from activity boundary. Closest receptor is 1.14 km south-east. Wannamal town approx. 3 km south-east.	Air / wind dispersion	Amenity	Yes	See section 8.4
			Wastewater discharge from ponds from overtopping, breach of containment, liner damage/faults. Rupture of wastewater transfer pipelines.	Surface water / wetlands (Table 15)	Direct discharge and surface runoff	Terrestrial / wetland ecosystem impacts	Yes	See section 8.5
				Groundwater (60 – 80 m bgl) Potential groundwater hydraulic link to wetlands (Table 15)	Direct discharge and infiltration through soil profile	Groundwater dependent ecosystems and wetland ecosystem impacts	Yes	See section 8.6
		Fan separator (screw press) (including use for desludging) and solid waste containment area	Odour	Six residential premises receptors within approx. 2.5 km from activity boundary. Closest receptor is 1.14 km south-east. Wannamal town approx. 3 km south-east.	Air / wind dispersion	Amenity	Yes	See section 8.4
			Wastewater discharges through breach of containment,	Surface water / wetlands(Table 15)	Direct discharge and surface runoff	Terrestrial / wetland ecosystem impacts	Yes	See section 8.5

			Potential Emissions	Potential Receptors	Potential Pathway	Potential Impacts	Continued to detailed risk assessment?	Reasoning
			runoff and seepage	Groundwater (60 – 80 m bgl) Potential groundwater hydraulic link to wetlands (Table 15)	Direct discharge and infiltration through soil profile	Groundwater dependent ecosystems and wetland ecosystem impacts	No	Sufficient separation distance
		Composting bunkers for treatment of carcasses	Odour	Six residential premises receptors within approx. 2.5 km from activity boundary. Closest receptor is 1.14 km south-east. Wannamal town approx. 3 km south-east.	Air / wind dispersion	Amenity	Yes	See section 8.4
			Leachate discharges through breach of containment, runoff and seepage	Surface water / wetlands (Table 15)	Direct discharge and surface runoff	Terrestrial / wetland ecosystem impacts	Yes	See section 8.5
				Groundwater (60 – 80 m bgl) Potential groundwater hydraulic link to wetlands (Table 15)	Direct discharge and infiltration through soil profile	Groundwater dependent ecosystems and wetland ecosystem impacts	No	Sufficient separation distance
		Solid and sludge storage area	Odour	Six residential premises receptors within approx. 2.5 km from activity boundary. Closest receptor is 1.14 km south-east. Wannamal town approx. 3 km south-east.	Air / wind dispersion	Amenity	Yes	See section 8.4
			Leachate discharges through breach of containment, runoff and seepage	Surface water / wetlands (Table 15)	Direct discharge and surface runoff	Terrestrial / wetland ecosystem impacts	Yes	See section 8.5
				Groundwater (60 – 80 m bgl) Potential groundwater hydraulic link to wetlands (Table 15)	Direct discharge and infiltration through soil profile	Groundwater dependent ecosystems and wetland ecosystem impacts	No	Sufficient separation distance

			Potential Emissions	Potential Receptors	Potential Pathway	Potential Impacts	Continued to detailed risk assessment?	Reasoning
	Waste disposal	Mechanical spreading of eco shelters spent bedding to land	Odour	Six residential premises receptors within approx. 2.5 km from activity boundary. Closest receptor is 1.14 km south-east. Wannamal town approx. 3 km south-east.	Air / wind dispersion	Amenity	Yes	See section 8.4
			Dust	Six residential premises receptors within approx. 2.5 km from activity boundary. Closest receptor is 1.14 km south-east.		Amenity and health	No	Sufficient separation distance
			Contaminated surface water runoff	Surface water / wetlands (Table 15)	Direct discharge and surface runoff	Terrestrial / wetland ecosystem impacts	Yes	See section 8.5
				Groundwater (60 – 80 m bgl) Potential groundwater hydraulic link to wetlands (Table 15)	Direct discharge and infiltration through soil profile	Groundwater dependent ecosystems and wetland ecosystem impacts	No	Sufficient separation distance

8.2 Risk Criteria

During the assessment, the risk criteria in **Table 19** below will be applied to determine a risk rating set out in section 8.7.

Table 19 : Risk Criteria

Likelihood	Consequence				
	Slight	Minor	Moderate	Major	Severe
Almost Certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	Extreme
Unlikely	Low	Medium	Medium	Medium	High
Rare	Low	Low	Medium	Medium	High

Likelihood		Consequence		
The following criteria has been used to determine the likelihood of the risk / opportunity occurring.		**The following criteria has been used to determine the consequences of a risk occurring:**		
			Environment	**Public Health* and Amenity (such as air and water quality, noise, and odour)**
Almost Certain	The risk event is expected to occur in most circumstances	Severe	• **on-site impacts**: catastrophic • **off-site impacts local scale**: high level or above • **off-site impacts wider scale:** mid level or above • Mid to long term or permanent impact to an area of high conservation value or special significance^ • Specific Consequence Criteria (for environment) are significantly exceeded	• Loss of life • **Adverse health effects:** high level or ongoing medical treatment • Specific Consequence Criteria (for public health) are significantly exceeded • **Local scale impacts:** permanent loss of amenity
Likely	The risk event will probably occur in most circumstances	Major	• **on-site impacts**: high level • **off-site impacts local scale**: mid level • **off-site impacts wider scale**: low level • Short term impact to an area of high conservation value or special significance^ • Specific Consequence Criteria (for environment) are exceeded	• **Adverse health effects:** mid level or frequent medical treatment • Specific Consequence Criteria (for public health) are exceeded • **Local scale impacts**: high level impact to amenity
Possible	The risk event could occur at some time	Moderate	• **on-site impacts**: mid level • **off-site impacts local scale**: low level • **off-site impacts wider scale**: minimal • Specific Consequence Criteria (for environment) are at risk of not being met	• **Adverse health effects:** low level or occasional medical treatment • Specific Consequence Criteria (for public health) are at risk of not being met • **Local scale impacts:** mid level impact to amenity
Unlikely	The risk event will probably not occur in most circumstances	Minor	• **on-site impacts**: low level • **off-site impacts local scale**: minimal • **off-site impacts wider scale**: not detectable • Specific Consequence Criteria (for environment) likely to be met	• Specific Consequence Criteria (for public health) are likely to be met • **Local scale impacts:** low level impact to amenity
Rare	The risk event may only occur in exceptional circumstances	Slight	• **on-site impact**: minimal • Specific Consequence Criteria (for environment) met	• **Local scale**: minimal to amenity • Specific Consequence Criteria (for public health) met

^ Determination of areas of high conservation value or special significance should be informed by the *Guidance Statement: Environmental Siting.*

* In applying public health criteria, DER may have regard to the Department of Health's, *Health Risk Assessment (Scoping) Guidelines* **"on-site"** means within the ***prescribed premises*** boundary.

8.3 Risk Treatment

DER will treat risks in accordance with the Risk Treatment Matrix below:

Table 20: Risk Treatment

Rating of Risk Event	Acceptability	Treatment
Extreme	Unacceptable.	Risk event will not be tolerated. DER may refuse application.
High	Acceptable subject to multiple regulatory controls.	Risk event will be tolerated and may be subject to multiple regulatory controls. This may include both outcome-based and management conditions.
Medium	Acceptable, generally subject to regulatory controls.	Risk event is tolerable and is likely to be subject to some regulatory controls. A preference for outcome-based conditions where practical and appropriate will be applied.
Low	Acceptable, generally not controlled	Risk event is acceptable and will generally not be subject to regulatory controls.

8.4 Risk of Odour Impact Analysis

8.4.1 General Hazard Characterisation and Impact

Odour sources include pig accommodation (eco shelters and conventional sheds), the solids separator (including solids storage), carcass compost areas, and ponds. Specific activities such as desludging anaerobic ponds and application of spent bedding to land also generate odour. Odour generated from intensive piggeries has the potential to cause amenity impacts on receptors. Odour emissions are likely to be variable dependent on activities occurring on the premises, day/night cycles, and weather conditions. The site is situated in a rural agricultural area, and the nearest residential premises are isolated rural dwellings.

As mentioned in section 7.2, the separation distance from the proposed expanded piggery premises to two rural dwellings and the Wannamal townsite does not meet the recommended distance.

8.4.2 Criteria for assessment

The Delegated Officer considers that assessment of odours should be in accordance with the criteria and methods detailed in the NEPG.

8.4.3 Licence Holders Controls

The following are the Licence Holders' proposed controls for odour management as summarised from the Application:

Table 21: Licence Holders controls for odour emissions

Control	***Description***
Siting/location	• *Activity boundary centrally located with separation to premises boundary.* • *Predominant winds are easterly and southwesterly that disperse odours away from the nearest sensitive receptor.*
Infrastructure	• *Conventional sheds to be constructed with underfloor pits for waste collection and flushing on a 1 to 4-week rotation using the pull-plug design system.*

Control	*Description*
	• *Fan separator to reduce solids loading in wastewater streams from new conventional sheds and anaerobic pond desludging.* • *Pig mortality composting bunkers and separated solids and sludge stored in areas with three sides and a roof.*
Procedures / Management	• *Regular pen cleaning/housekeeping.* • *Pig mortalities removed immediately from the shed or eco shelters, once noticed.* • *Pig mortalities covered with 200mm of sawdust or straw immediately after placement in the composting bunker.* • *No spreading of spent bedding on the portion of the property adjacent to the closest residence.* • *Management of pH in the new anaerobic pond in the 6.8 to 8.0 range to help bacteria establishment.* • *Direction of wastewater from existing anaerobic ponds to the new fan separator then back to the new anaerobic pond to help with optimal bacterial population establishment.* • *Separated solids and sludge removed off site.* • *Infrequent and short duration of desludging events during weather conditions with easterly winds.* • *Odour measurement at the boundary of the premises and closest residence during the operational phase to determine if additional management measures are required.* • *Complaints management.*

8.4.4 Key Findings

The Delegated Officer has reviewed the information regarding the odour impacts from the premises and has found:

1. *The proposed expanded piggery has less than the recommended separation distances (NEGP Level 1) from two rural dwellings and Wannamal town site.*
2. *The existing piggery has not caused odour related complaints or compliance issues in the past*

8.4.5 Consequence

Based on consideration to the location/siting of the premises and general hazard characterisation, odour emissions could have a low-level impact to amenity with any impact expected to be for short periods to isolated rural residences or a small population. Therefore, the Delegated Officer considers the consequence to be **Minor**.

8.4.6 Likelihood of Consequence

As mentioned in section 5.3, the review of the compliance, complaint and incident history did not identify that the existing piggery caused unacceptable odour impacts on nearby sensitive land uses.

As mentioned in section 7.2.1 of this report, the Delegated Officer considered that the likelihood of adverse odours occurring could also be informed by consideration of the local meteorology. Winds in Wannamal are typically from the south, and this will reduce the likelihood of adverse impacts occurring at Rural Dwellings 1 and 3 and at the Town of Wannamal.

The Delegated Officer considered that while odour impacts may occur at some locations, the lack of complaints about the existing piggery and local meteorology reduce the likelihood of adverse impacts occurring from the proposed expanded piggery. The Delegated Officer also considered that the receptors are located at isolated rural dwellings in a rural area and that approximately 50 people reside in Wannamal. The closest rural dwelling to the piggery is currently not permanently occupied. Therefore, the Delegated Officer considered the likelihood of the consequence to be **Unlikely.**

If in the event that the piggery has an unreasonable impact on sensitive land uses, there are infrastructure and management related options available to reduce odours.

8.4.7 Overall rating

The Delegated Officer has compared the consequence and likelihood ratings described above through the Risk Matrix in Table 19 and determined that the overall rating for the risk of odour emissions on sensitive receptors during operation is **Medium**.

8.5 Risk of Discharges to Land Impact Analysis

8.5.1 General Hazard Characterisation and Impact

Discharges to land may occur through contaminated runoff from hardstand surfaces, infrastructure loss of containment, spills and overtopping. Sources of wastewater and leachate discharges to land are summarised in Table 22.

Table 22: Potential sources of wastewater and leachate discharges to land

Source	Potential event
Pig accommodation (conventional sheds and eco shelters)	• Contaminated surface runoff
Wastewater treatment ponds	• Overtopping • Breach of containment • Liner damage/faults • Pipeline rupture spills
Fan separator	• Contaminated surface runoff • Breach of containment
Solid sludge storage	• Contaminated surface runoff • Breach of containment
Application of spent bedding to land	• Contaminated surface runoff
Carcass composting bunkers	• Contaminated surface runoff • Breach of containment

The Licence Holders provided a water balance for the wastewater treatment system including the inputs used and outputs determined from the PigBal modelling. Assessment of this information and the findings are included in section 4.2.3.

The NEGP provides typical data for the composition of piggery effluent and sludge from conventional piggeries which are shown in Table 23 and Table 24. Wastes are typically rich in nutrients (nitrogen and phosphorus), pathogens, potassium, sulfur and trace elements (e.g. zinc, copper and manganese).

Table 23: Characteristics of piggery pond irrigation effluent (as sourced from Table 14.1 in the NEGP)

Element	Units	Effluent at work[a]	DEEDI data[b]	
			average	range
Dry Matter	mg/L	3623	7900	1100-44300
Volatile Solids	mg/L	1809	1640	480-5290
pH		8.0	8.0	7.0-8.7
Total Nitrogen or {TKN}	mg/L	{384}	584	158-955
Ammonium Nitrogen	mg/L	249	144	25-243
Total Phosphorus	mg/L	44	69.7	19.3-175.1
Ortho-Phosphorus	mg/L	28.5	16.3	2.4 – 77.9
Potassium	mg/L	-	491	128-784
Sulphur	mg/L	22 (9 – 50)	-	-
Sulphate	mg/L	26	47.6	13.3-87.2
Copper	mg/L	-	0.09	0.00-0.28
Iron	mg/L	-	0.56	0.09-1.61
Manganese	mg/L	-	0.02	0.00-0.05
Zinc	mg/L	-	0.47	0.16-1.27
Calcium	mg/L	-	20.6	7.3 – 41.2
Magnesium	mg/L	-	25.0	6.6 – 72.3
Sodium	mg/L	603	399	41 – 1132
Chloride	mg/L	810	19.1	3.6 – 34.4
Conductivity	dS/m	-	6.4	2.5 – 11.7

DEEDI = Department of Employment, Economic Development & Innovation,
Qld, TKN = total Kjeldahl nitrogen

[a] Kruger *et al* (1995) - samples from piggeries in New South Wales, Queensland and Western Australia.

[b] Unpublished data – samples from 10 piggeries in southern Queensland.

Table 24: Characteristics of in situ piggery pond sludge (as sourced from Table 14.2 in the NEGP)

Element	Effluent at Work[a]	DEEDI data[b]	
		average	range
Dry matter	-	13.1% wet basis	6.9-17.1% wet basis
Volatile solids	-	6.9% wet basis	5.3-9.5% wet basis
pH	7.3	-	-
Carbon	-	28.1%	22.5-37.1%
Total Nitrogen or {TKN}	{2617}mg/L	3.41%	2.84-4.02%
Ammonium Nitrogen	1156 mg/L	2582 mg/kg	1472-4422 mg/kg
Total Phosphorus	1696 mg/L	4.69%	2.83-5.9%
Ortho-Phosphorus	1082 mg/L	-	-
Potassium	-	0.75%	0.27-1.33%
Sulphur	-	1.99%	1.53-3.08%
Copper	25 mg/L	1.02%	3.43-1.82%
Iron	-	1.17%	0.52 – 2.21%
Manganese	-	1050 mg/kg	786-1389 mg/kg
Zinc	-	3188 mg/kg	2184-3698 mg/kg
Calcium	2210 mg/L	7.08%	4.28-10.4%
Magnesium	-	1.93%	1.0-3.19%
Sodium	108 mg/L	0.52%	0.15-1.40 %
Selenium	-	0.59 mg/kg	0.07-2.41 mg/kg
Chloride	232 mg/L	-	-
Conductivity	8.5 dS/m	-	

DEEDI = Department of Employment, Economic Development & Innovation,
Qld; TKN = total Kjeldahl nitrogen

[a] Kruger et al (1995) - samples from piggeries in New South Wales, Queensland and Western Australia.

[b] Unpublished data – samples from 10 piggeries in southern Queensland.

Wastewater and leachate discharges to land into nearby terrestrial and wetland ecosystems would be expected to cause water quality impacts, may disrupt ecosystem processes and result in eutrophication. The premises does not have wastewater and leachate discharges to land under normal operating conditions, therefore, impacts would not be expected under normal circumstances. Wastewater and leachate discharges to land would be expected to occur as a result of an accident or malfunction of infrastructure and equipment or through

inadequate design.

The Licence Holders have existing eco shelters whereby spent bedding containing accumulated pig manure is applied to paddocks within the premises by mechanical spreader. The characteristics of this material are likely to be similar to the characteristics of wastewater and sludges. Land application of approximately 1,380 m^3 of spent straw will occur every twelve weeks; totalling 5,980 m^3 applied each year.

Spent bedding will be used to fertilise crops, with the uptake of nutrients by the crop. The application of spend bedding to land is further outlined in section 4.2.1 of this Decision report. There is potential for soil degradation/contamination and eutrophication of surface water bodies if runoff and leaching of nutrients/contaminants occur beyond the crop root zone.

8.5.2 Criteria for Assessment

Australian and New Zealand (ANZECC) Guidelines for Fresh and Marine Water Quality are considered appropriate assessment criteria to assess the potential impact on surface water quality.

8.5.3 Licence Holders controls

The Licence Holders' controls for discharges to land in Table 25 are sourced from the Application.

Table 25: Licence Holders controls for discharges to land

Site infrastructure	Description
Proposed conventional sheds	• *Three new conventional sheds with floors constructed of concrete and partly slatted to allow effluent to collect beneath the floor in concrete pits. The drainage system will be pull-plug system.*
Proposed eco shelters	• *Concrete floor with bunded sides to contain bedding material.* • *Spent bedding managed as per existing eco shelters.*
Proposed composting bunkers	• *Roof to prevent rainfall ingress and minimise leachate generation.* • *Pig mortalities are immediately covered with a minimum of 200mm of sawdust/straw on deposition.* • *Pig mortalities are placed within the composting bunkers upon becoming aware of the mortality.*
Proposed anaerobic pond	• *Capable of capturing rainfall associated with a 1 in 10 year ARI rainfall event of 72-hour duration without overtopping.* • *Stormwater directed away from the pond.*
Proposed fan separator and collection bunker	• *Solid wastes from the fan separator are collected and contained within a bunker with a concrete floor, concrete sides and a roof.* • *Solid wastes including any leachate is contained within a bunded hardstand surface.* • *Accumulated solid wastes in the bunker are collected by a third party and removed from the Premises on an as needs basis.*
Existing conventional sheds	• *All effluent is contained within hardstand surfaces of the sheds.* • *Effluent enters an open channel or drain and is flushed or hosed to direct it into the wastewater treatment system.*
Existing eco shelters	• *All effluent is contained within hardstand surfaces consisting of concrete floors layered with straw/sawdust and partial height concrete sides.* • *A high tensile fabric roof is fitted to minimise rainfall ingress.* • *24 new eco shelters will have concrete footings and floors with a high tensile fabric over a steel framework acting as a roof.* • *Spent bedding in eco shelters is cleaned out for application to*

Site infrastructure	Description
	land at a rate of four eco shelters per fortnight. • *A mechanical spreader is used to apply spent bedding to land on the Premises.* • *Spent bedding is applied at a rate not exceeding 15m^3/ha.* • *Spent bedding is preferentially applied to crops prior to sowing or during active growth.* • *Spent bedding is applied to land evenly.* • *Spent bedding is not applied during rainfall.* • *Spent bedding is not applied to any portion of the Premises within 100m of a geomorphic wetland*
Existing wastewater treatment ponds	• *All ponds are designed to capture rainfall from a 1 in 10 ARI rainfall event of 72-hour duration without overtopping.* • *All ponds maintain a minimum top of embankment freeboard of 500 mm.* • *Effluent from the facultative pond is reused through the proposed conventional sheds for flushing.* • *All pond inner and outer embankments are maintained free of emergent vegetation.* • *Stormwater runoff is directed away from all ponds.* • *All pond embankments are designed to prevent erosion as a result of stormwater runoff.* • *Anaerobic ponds are desludged on a 3.5-year rotational basis.* • *Ponds are visually inspection on a daily basis to ascertain freeboard.*
Proposed and existing Effluent transfer pipelines	• *Effluent is transported in PVC pipes.* • *PVC pipes are visually inspected on a daily basis*

8.5.4 Key Findings

The Delegated Officer has reviewed the information regarding the discharges to land impacts from the premises and has found:

1. *The only direct discharge to land is the mechanical spreading of spent bedding from the eco shelters. All other potential sources are likely to the result of accidents, malfunctions or infrastructure/equipment failures causing effluent discharge or contamination of stormwater.*
2. *There are extensive wetland areas on the premises and suitable separation from these areas should be maintained with respect to infrastructure, equipment and waste reuse activities*

8.5.5 Consequence

Based on the distance to environmental receptors (wetlands on the premises) outlined in section 7.3 and the hazard characterisation, discharges to land may have a mid-level on-site impact. There is a risk of specific consequence criteria not being met (i.e. ANZECC). Therefore, the Delegated Officer considers the consequence to be **Moderate.**

8.5.6 Likelihood of Consequence

There are no direct wastewater discharges to land expected under normal operating circumstances. Wastewater discharges would occur as a result of an incident or malfunction and be of short-term duration. Solid waste discharges to land are limited to the application of eco shelter spent bedding to paddocks. Based on consideration of the hazard characterisation, complaint/incident records and Licence Holders' controls, the Delegated Officer considers the consequence to be **Unlikely.**

8.5.7 Overall rating

The Delegated Officer has compared the consequence and likelihood ratings described above through the Risk Matrix (Table 19) and determined that the overall rating for the risk of discharges to land on sensitive receptors during operation is **Medium.**

8.6 Risk of Wastewater Treatment Pond Seepage Analysis

8.6.1 General Hazard Characterisation and Impact

Seepage from ponds can occur through damage, malfunction or faults that occur during installation or the operational life of the liner. Seepage may result in transmission of stored effluent through the soil profile to groundwater. Seepage can occur at varying degrees depending on the nature of the damage, malfunction or fault over a long period of time. Contamination of groundwater has the potential to impact on groundwater dependent ecosystems and may impact on surface water resources (e.g. wetlands) where hydraulic links exist. Activities such as mechanical desludging of anaerobic ponds have the potential to damage liners and result in seepage. Depth to groundwater is between 60–80 m below ground level. Impacts to groundwater from seepage are not expected under normal operation conditions where a liner has been installed to an acceptable standard, tested and is protected from activities such as desludging.

8.6.2 Criteria for Assessment

Australian and New Zealand (ANZECC) Guidelines for Fresh and Marine Water Quality are considered appropriate assessment criteria to assess the potential impact on groundwater.

With reference to the installation and testing of liners using engineered soils, the Delegated Officer had regard to W*ater Quality Protection Note 27: Liners for containing pollutants, using engineered soils*, Department of Water, 2013 (***WQPN27***) and the *Wastewater Guidelines, Wastewater lagoon construction*, Environmental Protection Authority South Australia, November 2014 (***EPASA Lagoon Guidelines***). These guidelines do not contain specifications which must be met but rather provide guidance on general design specification for the purposes of risk-based assessment of proposed design specifications.

8.6.3 Licence Holders controls

The Licence Holders controls for seepage from wastewater treatment ponds in Table 26 is sourced from the Application.

Table 26: Licence Holders controls for seepage from wastewater treatment ponds

Control	Description
Siting/location	• *Separation to sensitive receptors.* • *Depth to groundwater is between 60m to 80m below ground level*
Engineering design	*Existing ponds (two anaerobic and one facultative)* • *permeability <10^{-9} m/s with clay liner* *Proposed anaerobic pond* • *Use of in situ clay to construct anaerobic pond liner* • *Clay at the base and sides of the pond will be compacted using a padfoot roller to a minimum thickness of 300mm.* • *Target maximum dry density of greater than 98% and resulting compacted in situ permeability of liner being <10^{-9} m/s.* • *Testing and validation consistent with WQPN27*

8.6.4 Key Findings

The Delegated Officer has reviewed the information regarding the risk to groundwater and surface water impacts from the premises and has found:

1. *The proposed method of pond desludging through the use of excavation equipment poses an inherent risk of damage to the clay lining of ponds.*

8.6.5 Consequence

Based on the hazard characterisation, depth to groundwater and the Licence Holders controls, the Delegated Officer has determined that the impact of seepage from ponds would be low-level on-site impact. Therefore, the Delegated Officer considers the consequence to be **Minor**.

8.6.6 Likelihood of Consequence

Based upon the Licence Holders controls, depth to groundwater and receptors, the Delegated Officer has determined that a minor consequence will probably not occur. Therefore, the Delegated Officer considers the consequence to be **Unlikely**.

8.6.7 Overall rating

The Delegated Officer has compared the consequence and likelihood ratings described above through the Risk Matrix (Table 19) and determined that the overall rating for the risk of seepage from ponds on sensitive receptors during operation is **Medium**.

8.7 Summary of Risk Assessment and Acceptability

The risk items identified in section 8.1 including the application of risk criteria and the acceptability with treatment are summarised in Table 27 below.

Table 27: Risk rating of emissions

	Emission		Pathway and Receptor	Proponent controls	Impact	Risk Rating	Acceptability with treatment (conditions on instrument)
	Type	**Source**					
1.	Fugitive odour (operation)	Pig effluent, separated solid wastes, carcasses, carcass composting, spent bedding application to land	Air, moving with direction of wind. Sensitive receptors located northeast, east, south-east and south.	Infrastructure, siting / location and management controls	Amenity	Minor consequence Possible **Medium risk**	Acceptable subject to Licence Holders' controls conditioned and regulatory conditions
2.	Discharges to land (operation)	Mechanical application of spend bedding to land. Infrastructure spills, leaks overtopping and contaminated runoff.	Direct discharge to land. Terrestrial ecosystem / wetland ecosystem.	Management controls and siting / location	Ecosystem Surface water contamination	Moderate consequence Unlikely **Medium risk**	Acceptable subject to Licence Holders' controls conditioned and regulatory controls
3.	Wastewater pond seepage (operation)	Anaerobic ponds and facultative pond.	Direct discharge and infiltration through the soil profile. Groundwater and wetland ecosystems	Infrastructure and management controls	Groundwater contamination impacting beneficial use. Impacts on groundwater dependent ecosystems and wetland ecosystems.	Minor consequence Unlikely **Medium risk**	Acceptable subject to Licence Holders' controls conditioned

9. Determined Regulatory Controls

9.1 Summary of Controls

		Controls			
		9.2 Infrastructure Design or Construction Requirements	9.3 Requirements Regarding Operation of Infrastructure	9.4 Solid Waste Application to Land	9.5 Specified actions
Risk Items	1. Fugitive odour	•	•	•	
	2. Discharges to land	•	•	•	•
	3. Seepage from wastewater ponds	•	•		

9.2 Infrastructure Design or Construction Requirements

9.2.1 Conventional sheds

Infrastructure	Requirements (design and construction)
Conventional sheds	(a) All sheds must have concrete pits underneath to enable pull-plug effluent management system. (b) All sheds must comprise of concrete and partially slatted floors. (c) All sheds must enable the flushing of wastewater from the facultative pond for flushing. (d) All underfloor pits must direct effluent to the anaerobic ponds via the fan separator. (e) Stormwater runoff is to be directed away from all sheds. (f) All sheds must be separated by a distance of at least five times their height to maximise ventilation.

Note: Requirements derived from the Licence Holders' Application, except for the requirement for shed spacing.

Grounds: The proposal to house 25,384 SPU at the premises does not meet the recommended separation distance for the nearest rural dwellings as calculated in section 7.2. However, the Delegated Officer notes the lack of previous complaints history, the siting/location of the premises in a rural area, and the distance to the nearest rural dwelling is 1.14 km. The proposed conventional sheds will be required to have a separation of at least five times their height to maximise ventilation. This is consistent with the NEGP (Table 8.1) that provides this design consideration as adequate ventilation removes piggery gases, odour, controls air temperature and relative humidity, removes excess heat and moisture, dilutes and removes airborne disease organisms, and maintains oxygen levels.

9.2.2 Eco shelters

Infrastructure	Requirements (design and construction)
Eco shelters	All eco shelters must have a concrete floor with bunded sides to contain bedding material.

Note: Requirements derived from the Licence Holders' Application.

9.2.3 Composting bunkers

Infrastructure	Requirements (design and construction)
Composting bunkers	(a) Bunkers must be 10 m long, 3 m wide and 2.4 m deep. (b) Bunkers must have a roof to prevent the ingress of rainfall. (c) Bunkers must have a hardstand concrete floor and three concrete sides with a front access gate. (d) The hardstand concrete floor must prevent stormwater runoff entering the bunker.

Note: Requirements derived from the Licence Holders' Application.

9.2.4 Fan separator and solids collection bunker

Infrastructure	Requirements (design and construction)
Fan separator and solids collection bunker	The bunker must: (a) be located underneath for the capture of fan separated solids; (b) have a concrete floor and sides to contained solids; (c) have a roof to prevent the ingress of rainfall.

Note: Requirements derived from the Licence Holders' Application.

9.2.5 Anaerobic pond

Infrastructure	Requirements (design and construction)
Anaerobic Pond	(a) Designed and constructed to the dimensions specified in the Schedule 1: Anaerobic pond drawing. (b) Embankments designed and constructed to prevent erosion as a result of stormwater runoff. (c) Designed to allow access for desludging. (d) A clay liner must meet the following specification: (i) Minimum 150 mm subgrade preparation to provide a sound and stable base for liner construction. Subgrade preparation must include compaction until no rutting or pumping is observed. (ii) Soils used for the liner must be free from plant roots and reactive, soluble and organic matter; (iii) The liner material must meet the following criteria a. percentage fines with acceptability of: i. more than 25 percent passing a 75-micron sieve; ii. more than 15 percent passing a 2-micron sieve, tested using AS 1289 3.6.1; iii. liquid limit with acceptability of 30 to 70 percent tested using AS 1289 3.1.2; iv. plasticity index with acceptability of more than 15, tested using method AS 1289 3.3.1; and v. Emerson class number with acceptability of 5 to 6 tested using AS 1289 3.8.1. (e) The liner material must be homogeneous in nature and properties, with no sandy patches exceeding the liner specification or rocks retained on a 37.5mm sieve. (f) The liner must be installed in at least two layers of equal thickness to ensure adequate compaction is achieved and be moisture-conditioned to achieve the maximum design soil density exceeding the 95 percent maximum (in place) dry density (MDD) determined using AS 1289 .5.2.1 and AS 12895.4.1. (g) The minimum thickness of the compacted soil liner should be 300 mm with a tolerance of 5mm. (h) The compacted liner must uniformly cover both the base and perimeter of the pond to achieve one integrated holding pond. (i) The preparation and construction of the pond subgrade and liner must be supervised by a competent and experienced geotechnical professional. (j) The liner must be certified in accordance with section 17 (Liner certification) of *Water Quality Protection Note 27 – Liners for containing pollutants, using engineered soils*, Western Australian Department of Water (August 2013). (k) A minimum 300mm thickness layer of inert granular or gravel material is to cover the liner at the base of the pond to protect the liner during desludging. The cover must be applied in a manner that does not damage the lining and allows access for machines to desludge the lagoon without damage to the liner.

Note: Requirements are derived from the Licence Holders' Application and requirements consistent with the guidance in WQPN27.

Grounds: The design and construction requirements for the anaerobic pond address the risk of discharge to land and the risk of seepage. The Application provided basic specifications for liner construction and included statements regarding testing and validation in accordance with WQPN27. Requirements specified above for liner construction and testing are consistent with WQPN27 which is an appropriate reference document for engineered soil liners given the hazard characteristics of effluent and the depth to groundwater.

Desludging presents an inherent risk of liner damage. Design requirements relating to desludging are consistent with the guidance in WQPN27.

9.2.6 Effluent transfer pipelines

Infrastructure	Requirements (design and construction)
Effluent transfer pipelines	Effluent pipelines from the proposed conventional sheds to the anaerobic ponds via the fan separator are to be impermeable ***PVC*** piping.

Note: Delegated Officer requirement for the effluent transfer pipelines.

Grounds: The Application did not provide specifications for pipelines. Existing transfer pipelines at the premises are PVC, and continued use of this material for the proposed works is acceptable in consideration of the nature and characteristics of the effluent and the wastewater treatment system.

9.3 Requirements for Ongoing Operation of Infrastructure

9.3.1 Controls for odour

Infrastructure / equipment	Description	Operation details
Controls for odour		
Number of pigs held on the premises in the conventional shed, eco-shelters and in total.	The application has been assessed on holding 25,384 SPU in total with 7,429 SPU held in eco-shelter and 17,954 SPU held in conventional piggery sheds.	The number of pigs held should not exceed 25,384 SPU in total, 7,429 SPU in eco-shelters or 17,954 in conventional sheds at any time.
Conventional Sheds	Conventional sheds either have manual flush effluent drainage system or underfloor pits with pull – plug effluent management system design.	Manual flush effluent management system conventional sheds are cleaned at least on a daily basis. Conventional sheds with underfloor pits are flushed on a 1 to 4-week rotation using the pull – plug effluent management system design. Conventional sheds are swept and hosed to keep lanes, pens and handling areas clean.
Eco shelters	Straw/sawdust is used as bedding material for the absorption of effluent. Bedding material must be applied at a rate of 0.5 – 1 kg/pig/day and must be cleaned out and replaced prior to allowing each new batch of pigs into the shelters. Shelters are stocked in accordance with Table 5, Appendix 3 of the *Model Code of Practice for the Welfare of Animals - Pigs*, Third Edition, CSIRO 2008.	Spent bedding is cleaned out for application to land at a rate of four eco shelters per fortnight. Spent bedding is not applied to any portion of the Premises within 300 m of a rural dwelling not within the Premises and 25 m from the Premises boundary.
Composting bunkers	Pig mortalities are composted within the composting bunkers (or disposed off-site).	Pig mortalities are added to the compost bunkers upon becoming aware of the mortality. Pig mortalities are placed in layers 0.5 m thick with alternating layers of sawdust/straw and eco shelters spent bedding. Compost is not turned and groundwater bore water is added dependent on weather

Infrastructure / equipment	Description	Operation details
		conditions. Bunkers are used on rotation for 3 to 6 months or until full and compost within a bunker is not removed for at least 3 months once full. Final compost product is removed from the premises by a third party. Burial of deceased animals is to cease on completion of the works
Fan separator	Effluent from all conventional sheds and sludge removed from anaerobic ponds is treated by the fan separator to reduce the solids loading in waste streams.	Sludge treated by the solids separator is removed from the Premises by a third party. The solids separator shall remove at least 25% of the total solids. The solids separator must be operational for more than 95% of the time. The solids separator must not be out of service for more than 3 consecutive days in any period of outage.

Note: Requirements are derived from the Licence Holders' Application. Eco shelter stock rate requirements and conventional shed housekeeping requirements are additional regulatory controls.

Grounds: The proposal to house 25,384 SPU at the premises does not meet the recommended separation distance for the nearest rural dwellings as calculated in section 7.2. However, the Delegated Officer notes the lack of previous complaints history, the siting/location of the premises in a rural area and the distance to the nearest rural dwelling is 1.14 km. The Licence Holders will be required to manage eco shelter stocking rates. Section 8.2 of NEGP outlines that stocking rates in eco shelters need careful management to control odour generation. The NEGP refers to Appendix 3 of the *Model Code of Practice for the Welfare of Animals: Pigs*, CSIRO 2008 for recommended minimum space allowances for adult pigs and growing pigs, i.e. weaners, growers and finishers in eco shelters. Section 8.2 of NEGP also provides for bedding top-ups at a rate of 0.5 – 1 kg/pig/day to maintain dry, low odour conditions within the shelters. Table 8.1 of NEGP outlines that the dustier a piggery is, the more odorous it will be. Section 8.1 of NEGP states that *"conventional sheds need regular sweeping and hosing to keep lanes, pens and handling areas clean."*

The application has been assessed and granted on the basis that a solids separator is used to reduce the total solids and volatile solids loading on the anaerobic pond, which will reduce odours. If the solids separator is not operational, there is a risk that the anaerobic pond may be overloaded and cause a significant odour event.

9.3.2 Controls to minimise discharges to land

Site infrastructure / equipment	Description
Conventional sheds	All effluent is contained within hardstand surfaces of the sheds. Effluent from existing conventional sheds enters an open channel or drain and is flushed or hosed to direct it into the wastewater treatment system. Effluent from the proposed conventional sheds falls through partly slatted concrete floors into contained concrete pits and is directed to the wastewater treatment system using a pull – plug effluent management system design. Water from the facultative pond is reused for flushing the pits
Eco shelters	All effluent is contained within hardstand surfaces consisting of concrete floors layered with straw/sawdust and partial height concrete sides. A high tensile fabric roof is fitted to minimise rainfall ingress.
Wastewater treatment ponds	At least one anaerobic pond is online at any given time while two anaerobic ponds are offline in stages of desludging and sludge drying. All ponds are designed to capture rainfall from a 1 in 10 ARI rainfall event of 72-hour duration without overtopping. All ponds maintain a minimum top of embankment freeboard of 500 mm. Reuse of treated effluent from the facultative pond occurs as flushing water in pull-plug conventional sheds once the facultative pond reaches a top of embankment freeboard of 1 m. All pond inner and outer embankments are free of emergent vegetation. Stormwater runoff is directed away from all ponds. All pond embankments are designed to prevent erosion as a result of stormwater runoff. Ponds are visually inspection on a daily basis to ascertain freeboard.
Effluent transfer pipelines	Effluent is transported in PVC pipes. PVC pipes are visually inspected on a daily basis
Composting bunkers	Two compost bunkers with a concrete floor with three concrete sides and a front access gate for the purpose of composting pig mortalities. Any leachate generated remains contained within the bunkers. Stormwater runoff is directed away from the bunkers.
Fan separator and solids collection bunker	Solid wastes from the fan separator are collected and contained within a bunker with a concrete floor, concrete sides and a roof. Solid wastes including any leachate is contained within a bunded hardstand surface. Accumulated solid wastes in the bunker are collected by a third party and removed from the Premises on an as needs basis.

Note: Requirements are derived from Licence Holders' controls.

9.3.3 Controls to minimise seepage

	Site infrastructure / equipment	Description
	Wastewater treatment ponds	All ponds are clay lined with engineered soils to achieve a permeability of $<10^{-9}$ m/s. A minimum 300 mm thickness layer of inert granular or gravel material is covering the liner at the base of the anaerobic ponds at the completion of desludging and prior to operational use. Desludging of anaerobic ponds does not breach the pond embankment or lining or result in any effluent runoff.

Note: Requirement for permeability is derived from Licence Holders' controls. Desludging requirements are Delegated Officer derived requirements.

Grounds: Desludging requirements are risk-based consistent with the risk assessment outcomes of section 8.6 and guidance within WQPN27 relating to the protection of engineered soil liners from mechanical activities.

9.4 Solid Waste Application to Land

9.4.1 Eco shelter spent bedding

Infrastructure	Waste type	Requirements / operation details
Eco shelters	Spent bedding	• Spent bedding in eco shelters is cleaned out for application to land at a rate of four eco shelters per fortnight. • Spent bedding is applied to land within the green shaded area of the Spent bedding application to land map. • A mechanical spreader is used to apply spent bedding to land on the Premises. • Spent bedding is applied at a rate not exceeding $15m^3$/ha. • Spent bedding is preferentially applied to crops prior to sowing or during active growth. • Spent bedding is applied to land evenly. • Spent bedding is not applied during rainfall. • Spent bedding is not applied to any portion of the Premises within 100m of a geomorphic wetland as depicted in the Geomorphic wetlands map. • Spent bedding is not applied to any portion of the Premises within: a. 300m of a rural dwelling not within the Premises; and b. 25m from the Premises boundary.

Note: Requirements are derived from the Licence Holders controls in section 8.5.3. Specific values for separation to dwelling and environmental receptors are additional regulatory controls. The spent bedding application to land map will be sourced from Figure 5 of the WNMP.

Grounds: Table 6.1 of NEGP provides recommended separation distances for waste reuse areas from watercourses. The recommended distance for *"spent bedding that is spread immediately (i.e. not stockpiles / composted) and remains on the soil surface for more than 24 hours"* is 100m. A separation to wetlands on the premises reduces the likelihood of environmental impacts.

Table A.10 in Appendix A of NEGP provides recommended separation distances surrounding by-product reuse areas. The recommended distances for "spent bedding that is spread immediately (i.e. is not stockpiled / composted) and remains on the soil surface for more than 24 hours (i.e. is not immediately ploughed in) are 300 m for a rural dwelling and 25 m from the

property boundary. These values are reasonable in the context of the hazard characterisation and siting context. A separation to dwellings reduces the likelihood of odour amenity and fugitive dust impacts on receptors.

9.5 Specified Actions

The Licence Holders must desludge all three anaerobic ponds on a three-year desludging interval where one anaerobic pond is desludged per year.

Note: Additional regulatory controls.

Grounds: The Licence Holders have two existing anaerobic ponds and propose to construct a third. They propose to have one anaerobic pond online receiving effluent with two anaerobic ponds offline in stages of desludging. However, PigBal modelling in the Application assumes the full anaerobic pond capacity is in one anaerobic pond and was based on a five-year desludging interval. Information available suggests that an anaerobic pond would need to be desludged approximately every 1.6 years or potentially every year in actuality to maximise the drying summer months for sludge drying. The Delegated Officer has conservatively specified the desludging interval in the absence of additional information or proposals from the Licence Holders.

10. Setting Conditions

10.1 Construction Phase

The conditions in the Amendment Notice have been determined in accordance with DER's *Guidance Statement on Setting Conditions*.

Condition Ref	Grounds
Location of Works Condition 6.1.1	This condition is valid, risk-based and consistent with the EP Act (see section 8 of this decision report).
Infrastructure Design and Construction Requirements Conditions 6.2.1 – 6.2.5	These conditions are valid, risk-based and contain appropriate controls (see section 8 of this decision report).

DER notes that it may review the appropriateness and adequacy of controls at any time and that following a review, DER may initiate amendments to the licence under the EP Act.

10.2 Post-Construction Phase

The Amendment Notice authorises works associated with the Application. At the completion of proposed works and subject to the Licence Holders fulfilling requirements of the Amendment Notice, a Revised Licence may be issued to give effect to the controls specified in sections 9.3, 9.4 and 9.5.

11. Licence Holders Comments on Risk Assessment

The Licence Holders was provided with the draft decision report and draft Amendment Notice on 12 January 2017. The Licence Holders' comments and the Delegated Officer's consideration are contained in Appendix 2.

12. Conclusion

This assessment of the risks of activities on the premises has been undertaken with due consideration of a number of factors, including the documents and policies specified in this decision report (summarised in Appendix 1). This assessment also considers the Application from the Licence Holders relating to a proposed expansion.

Based on this assessment, it has been determined that the Amendment Notice will be granted subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

Jonathan Bailes
A/Senior Manager – Industry Regulation

An officer delegated under section 20 of the Environmental Protection Act 1986

Appendix 1: Key Documents

	Document Title	Availability
1	Licence L5008/1991/13	http://www.der.wa.gov.au
2	• *Environmental Protection Act 1986* • *Environmental Protection Regulations 1987* • *Environmental Protection (Noise) Regulations 1997*	www.slp.wa.gov.au
3	Licence Amendment Application, Aurora Environmental, 15 July 2016	DER records
4	• *Water quality protection note 27, Liners for containing pollutants, using engineered soils*, Department of Water, August 2013 • Gingin Groundwater Allocation Plan	http://www.water.wa.gov.au
5	*National Environmental Guidelines for Piggeries, Second Edition (Revised) 2010,* Australian Pork Limited	www.australianpork.com.au
6	*Australian and New Zealand (ANZECC) Guidelines for Fresh and Marine Water Quality*	www.environment.gov.au
7	Compliance Inspections – 03/06/2011 and 26/03/2016	DER records
8	Annual Audit Compliance Reports	DER records
9	Annual Environmental Reports	DER records
10	The Perth 1:250 000 Geology Map Sheet (GSWA, 1978)	http://www.geoscience.gov.au
11	DER *Guidance Statement: Regulatory principles*	http://www.der.wa.gov.au
12	DER *Guidance Statement: Setting conditions*	
13	DER *Guidance Statement: Licence duration*	
14	DER: *Guidance Statement: Decision Making*	
15	DER *Guidance Statement: Risk Assessment*	
16	*Kamarah Piggery Expansion Waste & Nutrient Management Plan 310 Wannamal road West Mindarra, WA*, Aurora environmental, 2 February 2017	DER records

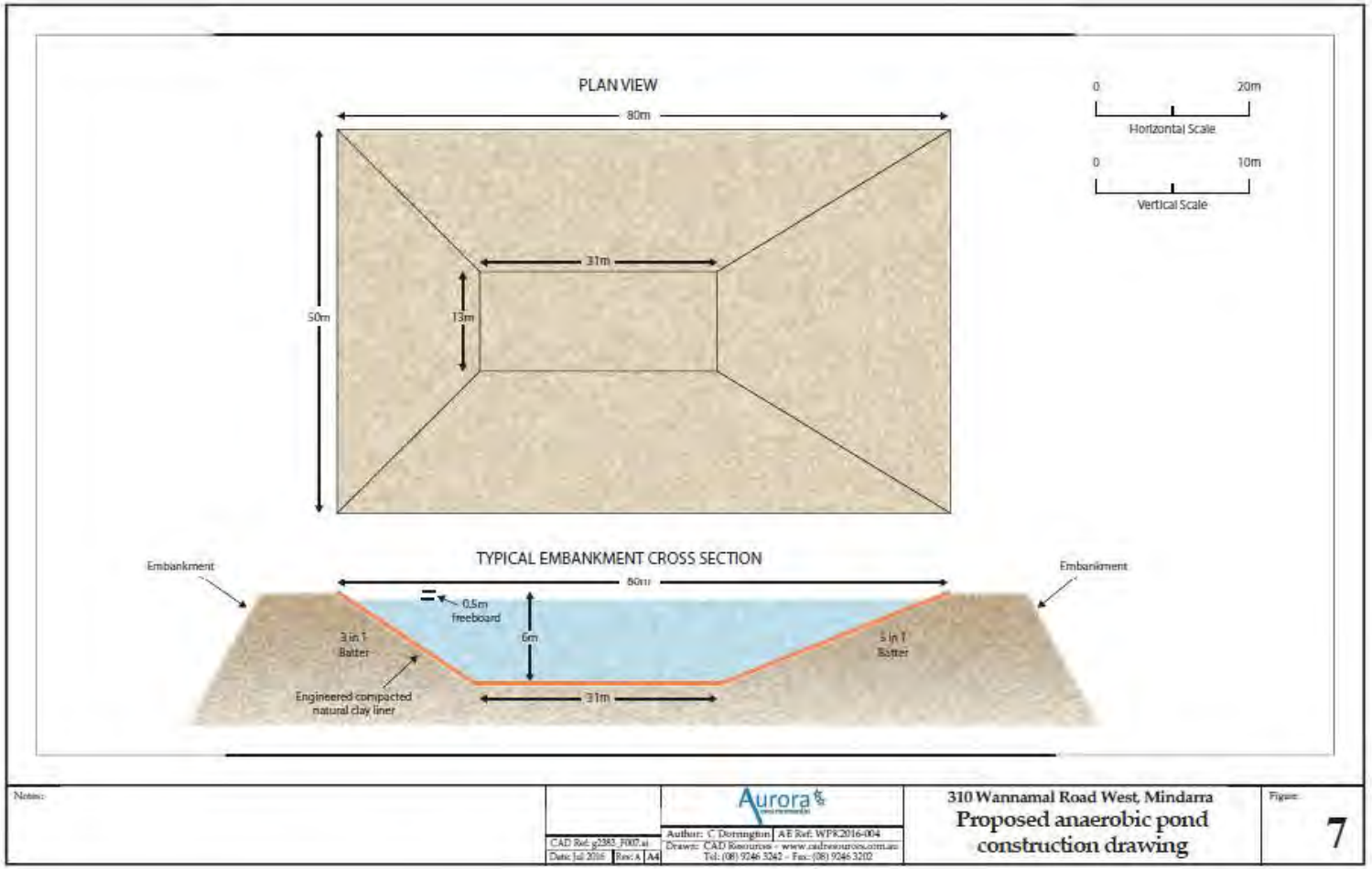
Appendix 2: Summary of Licence Holders Comments on Risk Assessment and Draft Conditions

Licensee comment (as summarised by the Delegated Officer)	Delegated Officer considerations
Amendment Notice	
Higher resolution drawings of the fan separator and collection bunker were provided as requested by the Delegated Officer.	Drawings in Schedule 3 of the Amendment Notice replaced with higher resolution drawings provided by the Licence Holders.
Edits suggested for clarity. Table 6.2.1 – Column 2: (c) All sheds must be designed to enable the use of wastewater from the facultative pond for flushing ~~enable the use flushing of wastewater from the facultative pond for flushing~~. (e) Stormwater runoff, including from roofs, is to be directed ~~aware~~ away from sheds.	Table 6.2.1 updated consistent with wording and corrections suggested by the Licence Holders.
Decision Report	
Purpose and scope: Reference to 23 eco shelters should be 24 ecoshelters.	Corrected to 24 eco shelters which aligns with row 3 in Table 4.
Table 4: • Fan (screw press) separator with a concrete bunker/solids collection area under the screw press to capture separated solids ~~from the underfloor pits~~. • Correct reference to Appendix 4: Map of new anaerobic pond design to Appendix 3.	• Agreed. Row 2 updated to reflect Licence Holders' suggested wording, noting that solids may also relate to pond desludging. • Corrected to reference Appendix 3.
Section 4.2.1: Maps of ecoshelters spent bedding application to land and application nutrient balance provided through a Waste and Nutrient Management Plan prepared for clearance of planning conditions.	Noted.
Section 5.1: Copy of planning approval provided.	Noted. Section 5.1 of the Decision Report updated.
Figure 3: ~~Arial~~ Aerial image of the closest residential premises to Kamarah Piggery.	Figure 3 caption corrected.

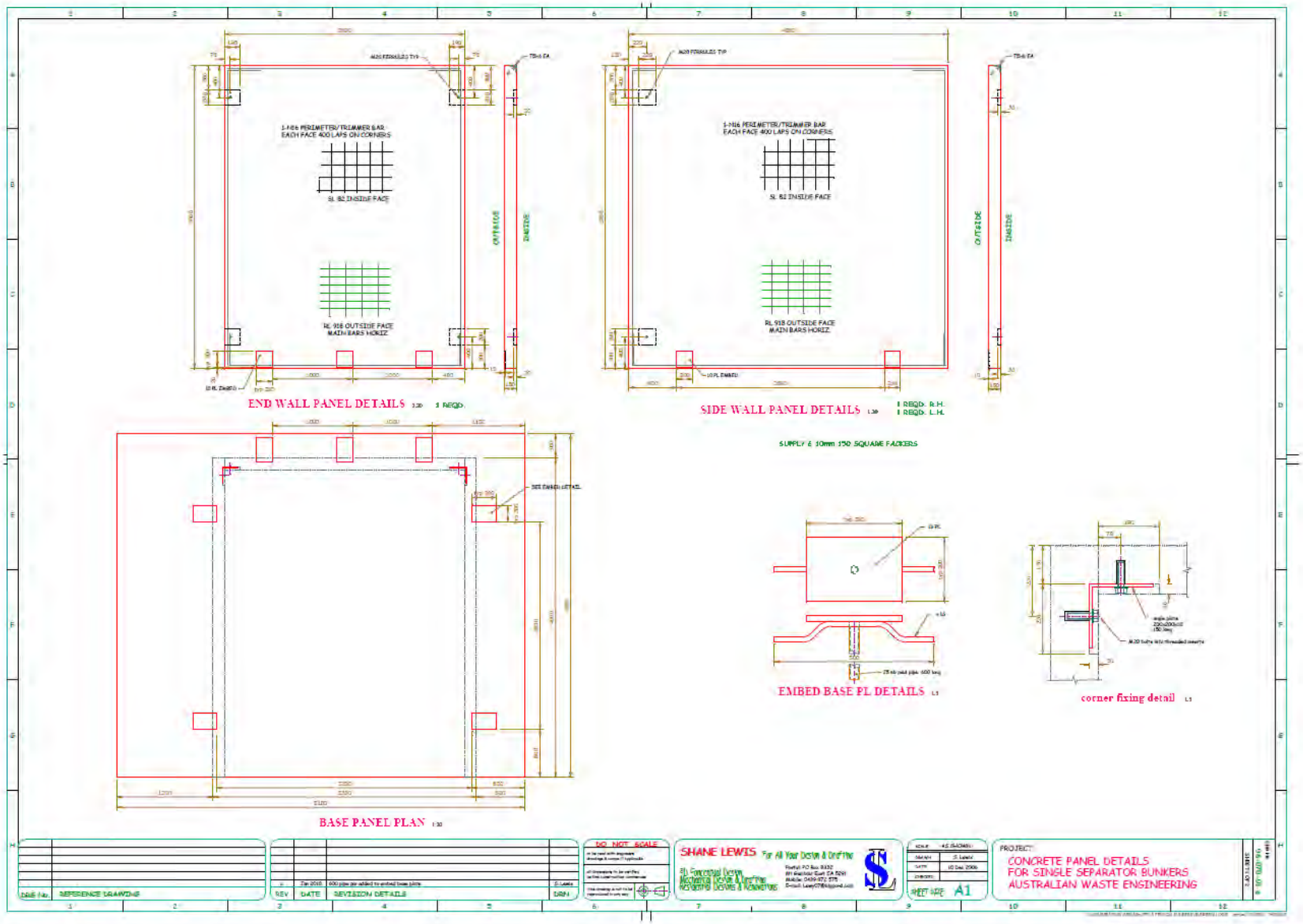
Licensee comment (as summarised by the Delegated Officer)	Delegated Officer considerations
Table 10: Table Note - The S1 factor for the piggery design is ~~0.81~~ 0.82.	Table 10 table note corrected.
Section 8.5.3 (Table 23) and 9.3.2: Visual pond and pipe inspections confirmed as daily.	Noted and updated in the Decision Report.
Section 9.3.1: Manual flushing of existing conventional sheds confirmed as daily.	Noted and updated in the Decision Report.

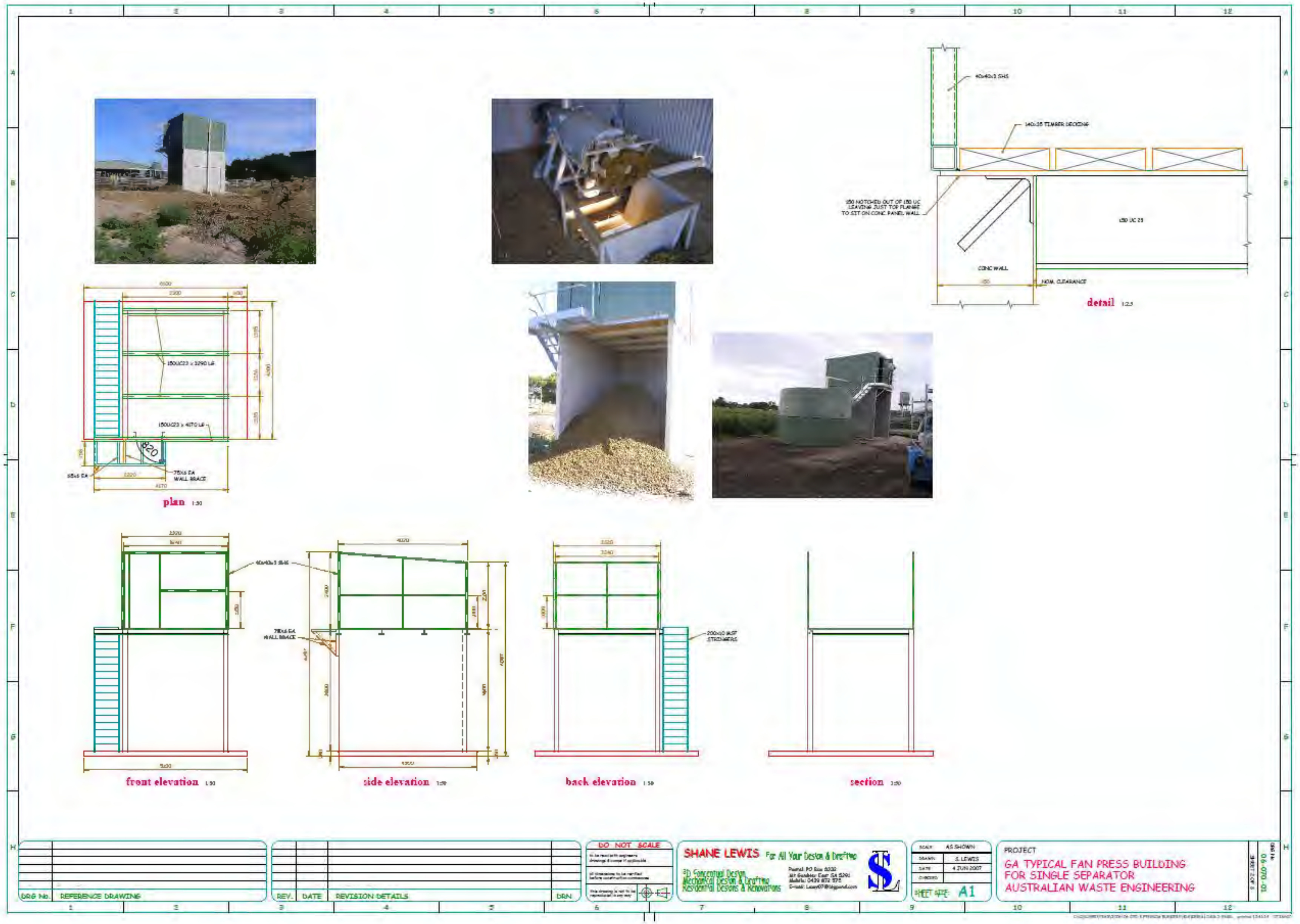
Appendix 3: Licence Holders Infrastructure Proposed Construction Drawings

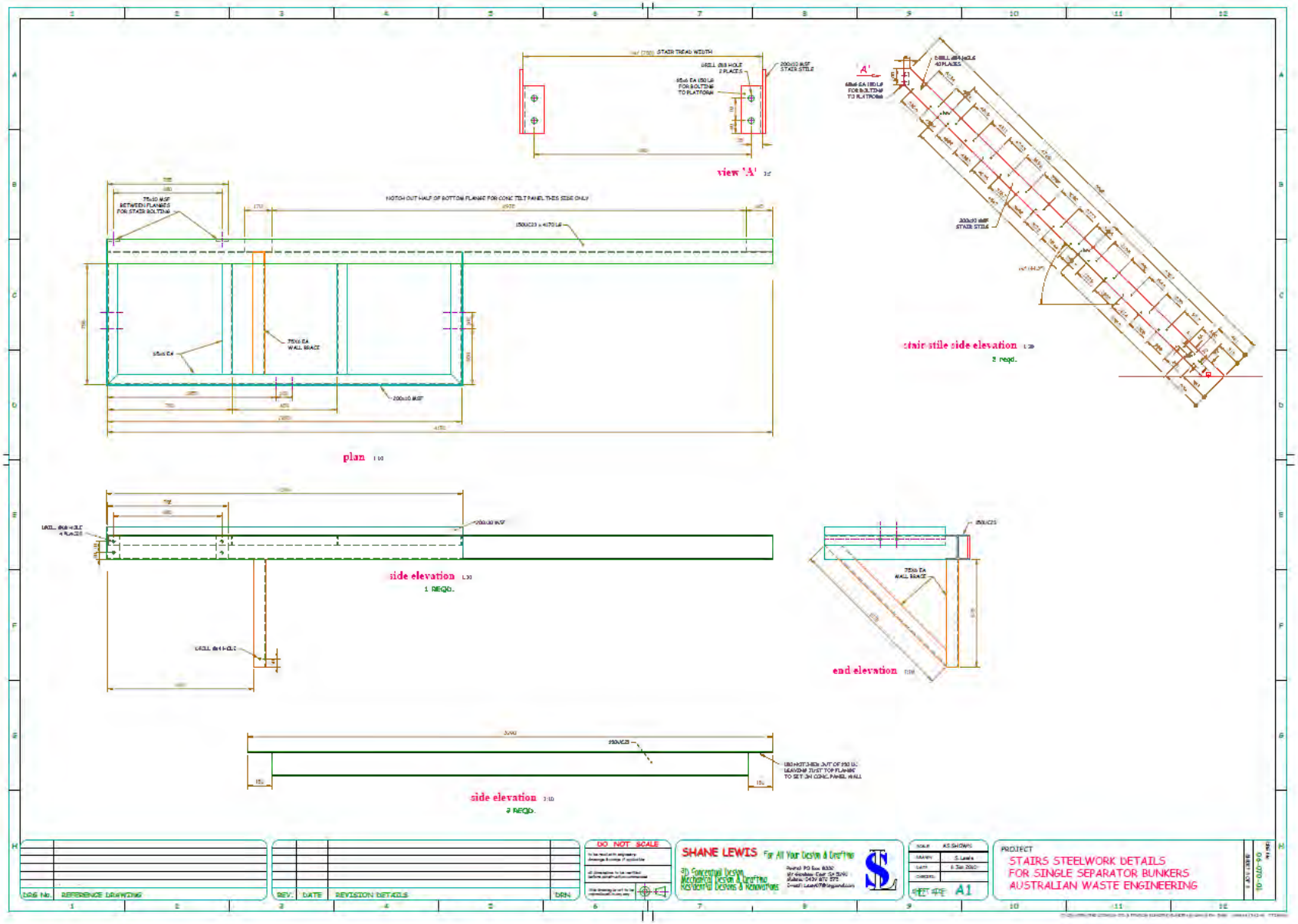
Anaerobic pond design drawing



Fan separator and collection bunker drawings




40x40x3 SHS
140x35 TIMBER DECKING
CONC WALL
NOM. CLEARANCE
detail 1:2.5
plan 1:50
front elevation 1:50
side elevation 1:50
back elevation 1:50
section 1:50
DO NOT SCALE
SHANE LEWIS For All Your Design & Drafting
3D Conceptual Design
Mechanical Design & Drafting
Residential Designs & Renovations
SCALE AS SHOWN
DRAWN S. LEWIS
DATE 4 JUN 2007
CHECKED
SHEET SIZE A1
PROJECT
GA TYPICAL FAN PRESS BUILDING
FOR SINGLE SEPARATOR
AUSTRALIAN WASTE ENGINEERING
DRG No 06-070-01
DRG No. REFERENCE DRAWING
REV. DATE REVISION DETAILS DRN


STAIR TREAD WIDTH
DRILL Ø18 HOLE 2 PLACES
65x6 EA 150 LG FOR BOLTING TO PLATFORM
200x10 MST STAIR STILE
view 'A'
NOTCH OUT HALF OF BOTTOM FLANGE FOR CONC TILT PANEL THIS SIDE ONLY
75x10 MST BETWEEN FLANGES FOR STAIR BOLTING
150UC23 x 4170 LG
75x6 EA WALL BRACE
65x6 EA
200x10 MST
plan
DRILL Ø18 HOLE 40 PLACES
65x6 EA 180 LG FOR BOLTING TO PLATFORM
200x10 MST STAIR STILE
stair stile side elevation
2 reqd.
DRILL Ø18 HOLE 4 PLACES
200x10 MST
side elevation
1 REQD.
DRILL Ø18 HOLE
150UC23
75x6 EA WALL BRACE
end elevation
150UC23
side elevation
2 REQD.
DRG No. REFERENCE DRAWING
REV. DATE REVISION DETAILS DRN
DO NOT SCALE
SHANE LEWIS For All Your Design & Drafting
3D Conceptual Design
Mechanical Design & Drafting
Residential Designs & Alterations
SCALE AS SHOWN
DRAWN S. Lewis
DATE 6 Jan 2010
CHECKED
SHEET SIZE A1
PROJECT
STAIRS STEELWORK DETAILS
FOR SINGLE SEPARATOR BUNKERS
AUSTRALIAN WASTE ENGINEERING
DRG No 04-070-01
SHEET 1 OF 1

Appendix 3: Summary of Licence Holder comments

The Licence Holder was provided with the draft Amended Licence and Amendment Report on 10 September 2019 for review and comment. A response was provided on 13 September 2019. The following comments were received.

Condition	Summary of Licence Holder comment	DWER response
	Requested the Licence Holder is amended to Kamarah Pty Ltd.	The Licence Holder has been amended as per the request.
Condition 2 – Table 3	The clause requiring a granular or gravel material to be maintained on top of the clay liner to protect it during desludging is only applicable to Anaerobic Pond 3 as the existing Anaerobic Ponds 1 and 2 have not been constructed with this type of lining.	An alternate operational requirement has been included for Anaerobic Ponds 1 and 2 requiring desludging activities to not impact the integrity of the pond lining.
	Remove the requirement for anaerobic ponds not to be operated for more than 12 months prior to desludging as this activity can be undertaken with a range of methodologies, including dredging, which needs to be undertaken with water in the pond.	The operational requirement has been retained as regular desludging is required to minimise odour emissions. The wording of the operational requirement has been amended to ensure it does not restrict the desludging methodology used.
	Remove the requirement for the screw press fan separator collection bunker to be roofed as it has not been constructed with a roof, and is drained to ensure leachate is managed.	The condition wording was corrected to reflect the as constructed infrastructure.
	Remove the operational requirement for leachate/stormwater from the composting bunker to be directed to the anaerobic pond as the area is roofed to minimise water ingress, and leachate/stormwater is contained in the hardstand area.	The condition wording was corrected to reflect the as constructed infrastructure.
Condition 4 – Table 4	There is no green shaded area in the map for ecoshelter spent bedding application to land, which is referred to in Table 4.	The condition wording was corrected to refer to the premises boundary as the area for ecoshelter spent bedding application to land.
Condition 5 – Table 5	Remove the requirement for pond sludge to be directed through the fan separator as it cannot be directed through this infrastructure and will be removed from the premises for disposal.	The requirement was removed.
Schedule 2 – Table 7	Correction of 11 x conventional sheds with “pull plug” effluent drainage system to 3 of these and 8 x conventional sheds with flushing effluent drainage system to reflect the as constructed infrastructure.	The condition wording was corrected to reflect the as constructed infrastructure.