WORKS APPROVAL APPLICATION

HILLCROFT FARM 2025

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Hillcroft Farm
Works Approval Application

Property Address:	**1395 Yornaning Rd, Lol Gray, WA**
Crown Allotment:	**Lot 4301 PS116163 and Lot 13054 PS146817**
Local Government:	**Shire of Cuballing**
Client:	**Hillcroft Farms Pty Ltd**
Author:	[redacted]

office address: 8/19 Norwood Crescent, Moonee Ponds, Victoria Australia 3039
postal address: 16 Learmonth Street, Moonee Ponds, Victoria Australia 3039
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DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
SCLE-25-09	Draft V1	22/07/2025	[redacted]	[redacted]	[redacted]
SCLE25-09	Draft Final	29/07/2025	[redacted]	[redacted]	[redacted]
SCLE25-09	Final	04/08/2025	[redacted]	[redacted]	[redacted]

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1 Introduction

"Hillcroft Farm" Piggery is operated by Hillcroft Farms Pty Ltd and is located at 1395 Yornaning Road, Lol Gray WA 6311. Hillcroft Farms (the site/premise) is located 13km south-southwest of Popanyinning in the Shire of Cuballing.

The premises has been operational since 1982 and comprises of a conventional indoor farrow-to-finish piggery and associated ancillary supporting infrastructure along with an animal feed manufacturing facility currently licensed as a Category 23: Animal Feed Manufacturing to produce up to 10,000 tonnes per annum.

The piggery is currently licenced Category 2: Intensive Piggery, 16,170 animals or 15,912 SPU[1].

Hillcroft farms Pty Ltd is proposing a strategic expansion of the site to increase the capacity of the piggery from 1400 sow farrow to finish operation to a 2500 sow farrow to finish operation. This equates to 32,460 animals or 33,225 SPU. The expansion will be located within the current footprint of the piggery complex. The current operation houses the breeders, growers and finishers from 11 weeks of age in conventional indoor sheds with remaining weaners and growers raised in deep litter shelters. The proposed expansion will house the breeders, weaners and finishers in the conventional indoor sheds with the growers from 12-16 weeks housed in the deep litter shelters.

To accommodate for the increase in production capacity and account for aging infrastructure, five old sheds will be demolished and replaced with nine new improved industry best practice sheds. Of the nine new sheds, four sheds will be constructed to house the increased number of animals on site. The new best practice sheds allow for improved climate controlled conditions and industry animal welfare spacing requirements for the farrowing sows. The current effluent system storage and treatment capacity has been assessed and an expansion of the effluent system is also proposed.

The feed mill on-site currently uses crops grown on other properties owned by Hillcroft Farms Pty Ltd to produce feed for the piggery. The feed mill is licenced to produce 10,000T per annum, however it has the manufacturing capabilities to increase production to accommodate for the increase in pig numbers on site. As such, an increase in the manufacturing licence is being sought as part of the proposed expansion plans to 20,000T.

[1] Standard pig unit (SPU) is a way of standardising pig numbers by equivalent manure output which influences the potential for environmental risk. A standard pig unit (SPU) is a unit for defining piggery capacity by manure production where the manure and waste feed produced by one SPU contains the amount of volatile solids (VS) equivalent to that typically produced by an average size grower pig (90 kg VS/yr). (APL, 2025)

1.1 Application Type- Works Approval

The following report has been prepared to provide the Department of Water, Environment and Regulation (DWER) specific site and operational details to demonstrate that proposed expansion will not increase the risk of harm to the environment.

As the piggery is a prescribed premise under *Environmental Protection Regulations 1987* (EP Regulations) it currently holds a Category 2: Intensive Piggery licence.

Following consultation with DWER Bunbury office, the need for a works approval rather than a licence amendment was required due to the substantial increase in pig numbers and proposed infrastructure works. A works approval is required by an occupier to establish or alter (including volume of wastes, emissions and discharges) a prescribed premise (section 52 of the EP Act).

The following report forms part of the "Application form: works approval, licence, renewal. Amendment, or registration (v16, August 2022)". As such the information contained herein provides a consolidation of all relevant information required as part of the works approval application assessment. General information in possession of DWER as part of the current licence such as occupier status etc. as discussed has not been repeated. All other information relevant to assess the site and operation as a stand alone application has been provided.

This report provides information to:

- Apply for works approval for increase pig numbers and associated works for the Category 2: Intensive Piggery licence # L8812/2014/2 and
- Amend licence L8812/2014/2 Category 23: Animal Feed Manufacturing to allow for an increase in production to 20,000T.

1.1.1 Additional Approvals

A planning permit amendment is also concurrently being sort from Cuballing Shire Council under the Land Use category of "Animal husbandry – intensive.

2 Applicant Details

Licence

Licence Number:	L8812/2014/2
Licence Holder:	Hillcroft Farms Pty Ltd.
DWER file Number	DER2014/000620-2
Duration:	15 June 2021 to 15 June 2041

Applicant:

Name:	Hillcroft Farms Pty Ltd.
ACN:	158 889 699
Registered Office Address:	Hillcroft Farms Byfields Paringa Business Centre Suite 2, 2 Williams Road NARROGIN WA 6312

Occupier Status:

DG & S Bradford & Co Pty Ltd.
Please see certificate of title and ASIC extract

Authorised Representative

Name:	[redacted]
Position:	Principal Consultant- Environment & Regulation
Organisation:	Scolexia Pty Ltd
Address:	8/19 Norwood Cresent Moonee Ponds, Victoria, 3039 (based in Canberra)
Telephone:	[redacted]
Email:	[redacted]
Contact Detail:	**As above.**

3 Premise Details

Name:	Hillcroft Farms
Address:	1395 Yornaning Road LOL GRAY WA 6311
Plan:	Lots 4301 on Deposited 116163 Lots 13054 on Deposited Plan 146817

A map of the premises is provided in **Figure 1**

Figure 1. Hillcroft Piggery Premise (NRInfo, 2025).

3.1 Land use

The site currently operates as a piggery with an on-site feed mill. There are no habitable dwellings located on the site. The premise is surrounded on the western and southern boundaries by thick vegetation. The surrounding land uses are primarily sheep and cropping activities. A large proportion of the land surrounding the piggery is owned by Hillcroft farms as a grazing and cropping enterprise.

The current and proposed piggery land use is categorised as "Animal Husbandry- Intensive" which is captured under category A in the zoning table (See Table 1). The land use is not permitted unless the local government has exercised its discretion by granting development approval after giving notice in accordance with clause 64 of the deemed provisions of the Shire of Cuballing Town Planning Scheme No. 2 20 May 2005- Updated 24/10/2023. Note an amendment to the current planning permit is being sought concurrently through the Shire of Cuballing.

Table 1. Zoning Table from Cuballing Town Planning Scheme.

LAND USE	Rural Townsite	Rural Residential	Rural
Abattoir	X	X	A
Agriculture-extensive	X	X	P
Agriculture-intensive	X	A	D
Ancillary dwelling	P	D	D
Animal establishment	X	A	D
Animal husbandry - intensive	X	X	A
Art gallery	D	A	D

3.2 Planning Controls

The following planning controls are provided as these are taken into consideration when assessing the potential risks posed by the piggery expansion on the surrounding environment and community amenity.

3.2.1 Zones

The subject site is located within the rural zone which has the following objectives:

- To provide for the maintenance or enhancement of specific local rural character.
- To protect broad acre agricultural activities such as cropping and grazing and intensive uses such as horticulture as primary uses, with other rural pursuits and rural industries as secondary uses in circumstances where they demonstrate compatibility with the primary use.
- To maintain and enhance the environmental qualities of the landscape, vegetation, soils and water bodies, to protect sensitive areas especially the natural valley and watercourse systems from damage.
- To provide for the operation and development of existing, future and potential rural land uses by limiting the introduction of sensitive land uses in the Rural zone.
- To provide for a range of non-rural land uses where they have demonstrated benefit and are compatible with surrounding rural uses.

3.2.2 Bushfire Prone Area

The subject land has bushfire prone areas along the boundary of the site (See **Figure 2**), however it does not trigger the State Planning Policy 3.7 Bushfire November 24 as the requirements are targeted at habitable buildings of which there are none in this proposed expansion.

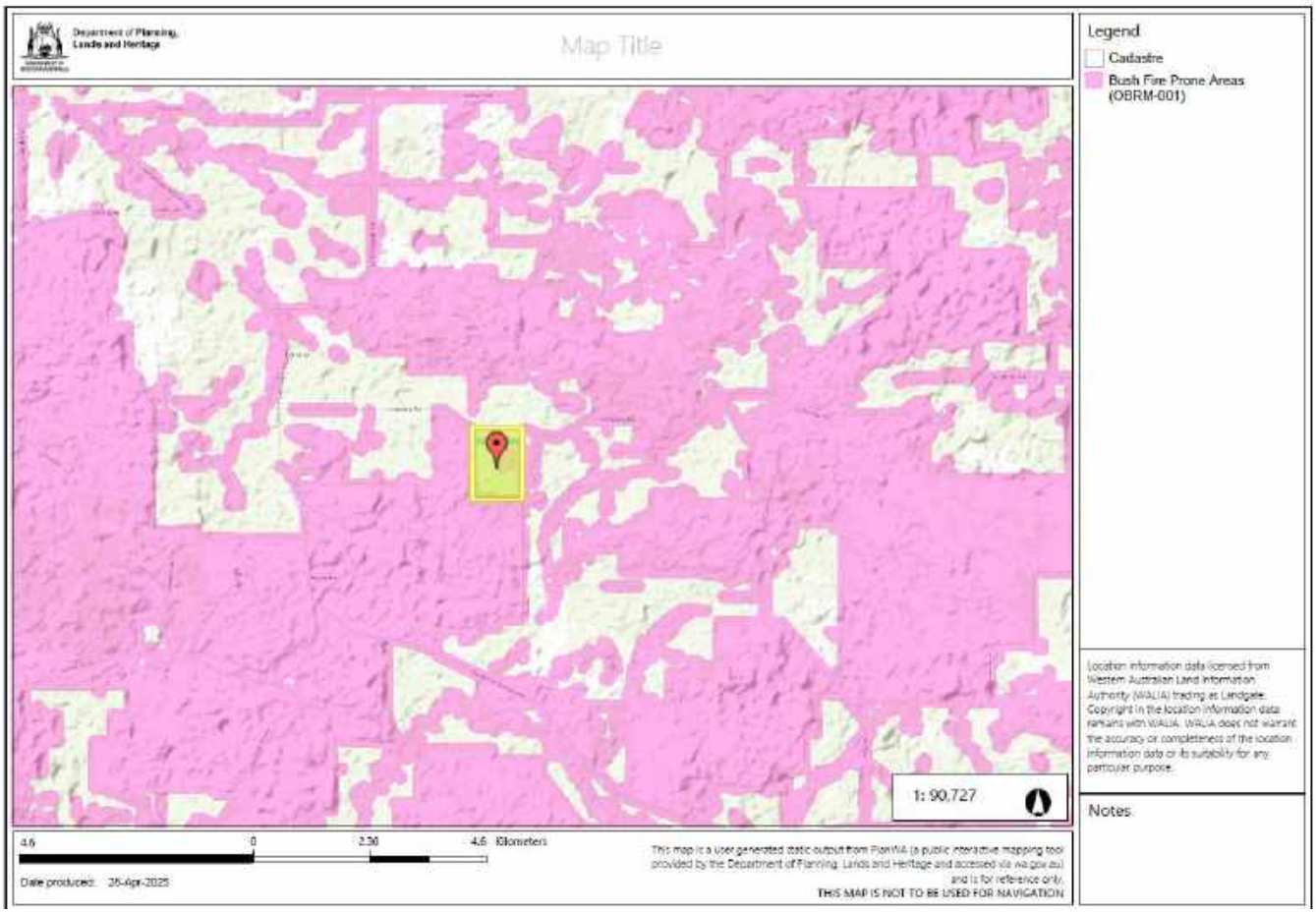


Figure 2. Bushfire Prone areas (Department Planning Lands and Heritage, WA, 2025).

3.3 Natural Resources

3.3.1 Surface waters

There are no watercourses on the piggery site (See **Figure 3**). The closest major watercourse is Fourteen Mile Brook which is located approx.3.8km to the south of the piggery complex. There is an unmapped drainage line/waterway over 1km to the south east of the premises. The subject land is not subject to flooding in a 1 in 100 year flood event (no flood overlays). It is also not located within a declared public drinking water source area, being well east of the Boddington Dam catchment area.

There are a number of freshwater dams on the property which supply water for the piggery. The main source of water is a large farm dam that is 50,000 cubic yards (approx. 38,000 m^3). The dam is located to the southeast of the property (Tucker, 2024).

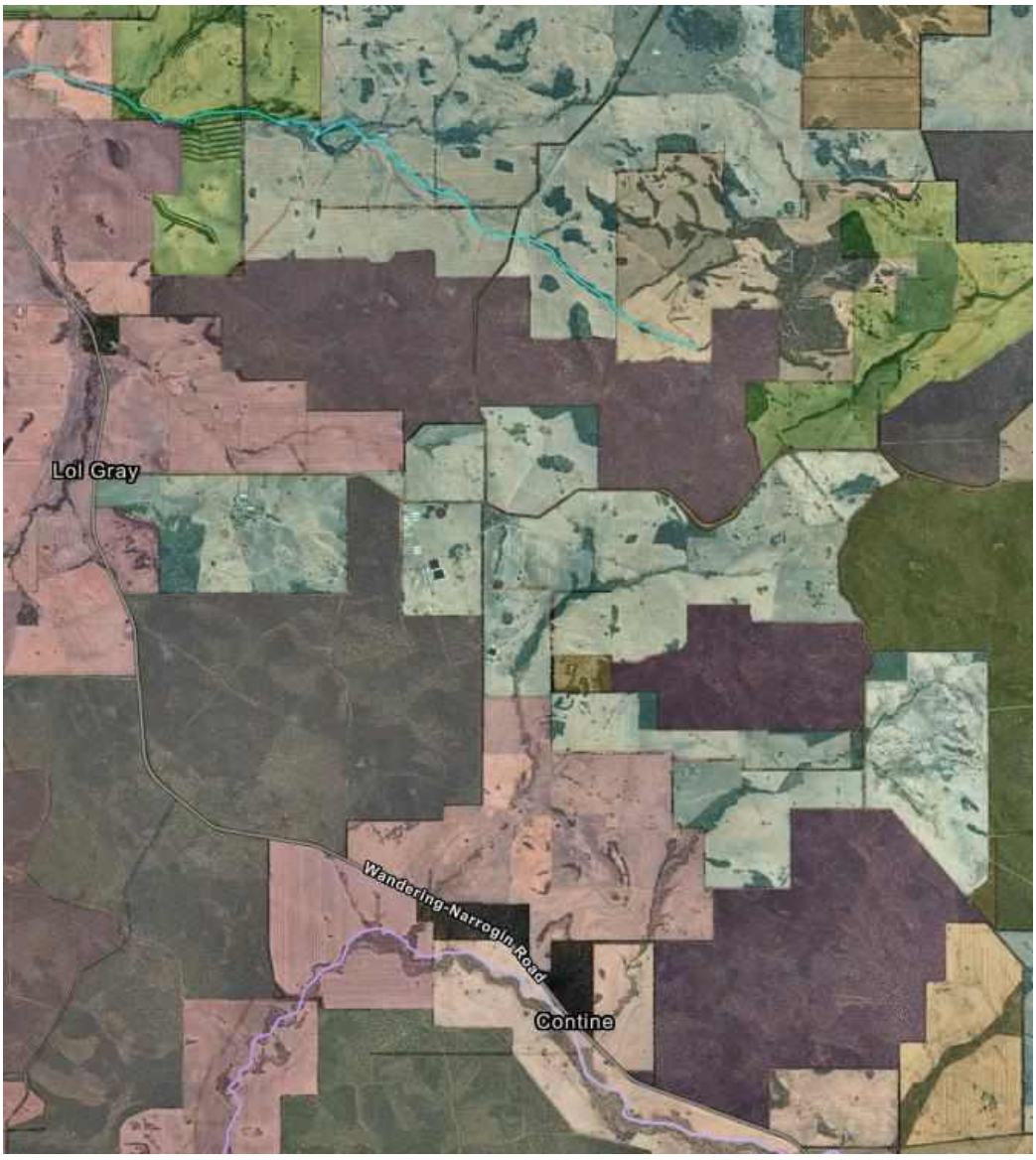


Figure 3. Mapped Watercourses (NRInfo 2025).

3.3.2 Groundwater

There are a couple of bores on the property (See **Figure 12** and **Figure 14**). Groundwater is also available for use in the piggery. Brackish water (2000-3000 ppm TDS) is accessed from depths of 20-60 m (Tucker 2014). Hillcroft Farm Piggery have a desalination unit and are able to use bore water in the piggery. The brine from the plant is redirected into the effluent system (evaporation ponds).

3.3.3 Topography

The subject site has gently undulating land (See **Figure 4**).

Figure 4. Topography (10m contours) (NRInfo, 2025).

3.3.4 Soils

There are two soil types on the subject site. The majority of the site is gravelly sand, duplex yellow soils and duricrust with the remainder being yellow /brown deep sandy duplexes and loams. Refer to **Figure 5**. The surrounding land is sandy or silty clay loam to medium clay. The area where the spent bedding/compost is stored has clay underlying the soil which offers some protection to the groundwater 20-60m below.

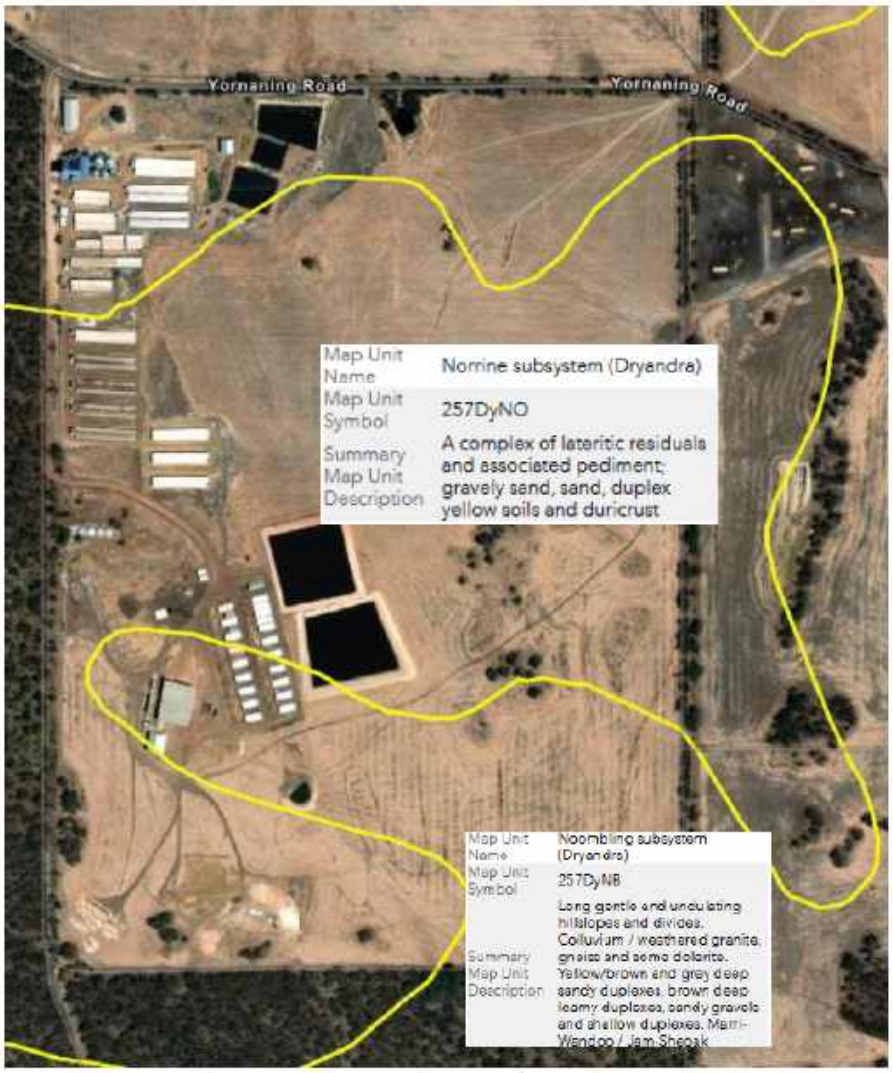


Figure 5. Soil types (NRInfo,2025).

3.3.5 Vegetation

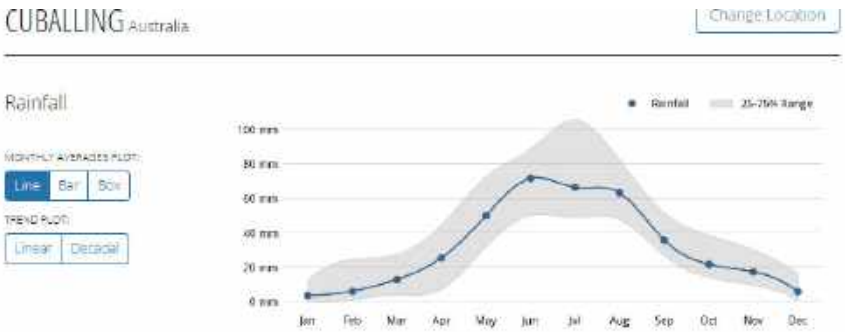
The piggery is surrounded by thick vegetation to the west and south. The site is largely devoid of vegetation with the exception of some scattered trees on the west and eastern boundaries and a stand of vegetation in the centre of the property.

3.3.6 Cultural Heritage

A search of the Aboriginal Cultural Heritage inquiry system did not find any registered or lodged culturally significant areas on or near the site.

3.3.7 Climate

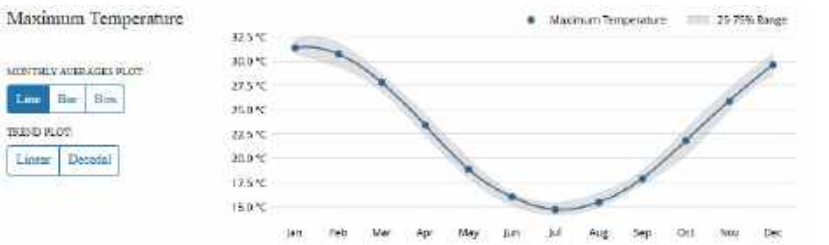
Data derived from ARM online indicates that the site has low rainfall with a mean of 459mm a year and a mean temperature of 22.8 degrees. (data 1960-2025).



Statistics

View Probabilities

units: mm	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean	15	16	19	28	55	75	80	65	41	27	21	11	459
Median	3	5	12	25	49	71	66	63	35	21	17	5	450
Standard Deviation	29	24	21	22	32	38	40	25	19	19	15	15	93
Lowest mth in record	0	0	0	0	0	9	19	9	10	0	0	0	272
Highest mth in Record	138	137	88	86	139	200	190	123	88	102	64	79	735
Lowest day in record	0	0	0	0	0	0	0	0	0	0	0	0	0
Highest day in Record	110	76	64	63	42	51	83	69	33	40	27	66	110
Rain days	1.6	1.7	2.5	3.6	6.7	9.1	9.9	8.8	7.1	4.3	3.3	1.5	59.7
Rain days above 15mm	0.2	0.3	0.4	0.5	1.0	1.3	1.2	0.9	0.4	0.4	0.3	0.2	7.0
Years in record	66	66	66	66	66	66	66	65	65	65	65	65	65



Statistics

View Probabilities

units: °C	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean	31.4	30.7	27.8	23.2	19.6	15.9	14.8	15.6	18.0	21.9	25.9	29.5	22.8
Median	31.4	30.7	27.8	23.4	18.9	16.0	14.7	15.5	17.9	21.8	25.0	29.6	22.8
Standard Deviation	1.4	1.6	1.4	1.6	1.3	1.1	0.8	1.0	1.3	1.8	1.8	1.6	0.8
Lowest mth in record	27.6	26.8	23.6	18.9	16.2	13.1	13.2	13.5	15.0	18.5	21.1	25.9	20.9
Highest mth in Record	34.4	34.0	31.0	26.5	22.4	18.5	16.3	17.9	21.4	27.1	29.8	34.2	24.6
Lowest day in record	18.4	14.6	12.9	12.0	9.5	8.3	7.7	6.9	9.2	9.0	9.8	14.7	6.9
Highest day in Record	45.5	45.2	40.2	36.3	32.5	23.7	22.7	26.2	32.0	36.7	40.0	42.5	45.5
Days above 25°	28.2	24.7	21.6	9.6	1.3	0.0	0.0	0.1	1.1	7.0	15.9	25.4	134.1
Days above 35°	7.5	5.3	2.3	0.1	0.0	0.0	0.0	0.0	0.0	0.1	1.2	4.4	20.9
Years in record	66	66	66	66	66	66	66	65	65	65	65	65	65

Based on the SILO Patched Point data between 1960 and 2025

Figure 6. Climate data (arm online, 2025).

Evaporation data was derived from the Bureau of Meteorology website for Narrogin Station (# 010614) which has operated from 1891 to present (See Table 2). The following evaporation data has been extrapolated from the mean daily evaporation (mm). The data shows that rainfall only exceeds evaporation from June to August each year.

Table 2. Mean evaporation for Narrogin, WA (BOM, 2025).

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean evaporation (mm)	270	218	183	105	71	45	47	59	81	130	177	251
Total annual	1637mm											

Pingelly is the closest station (#010626) located approx. 22.5km that has monthly climate statistics. The station has been operating from 1891 to present (See Figure 7). This station's data sourced from the Bureau of Meteorology website was used for wind direction. The dominant wind direction at 9 AM is from the south-east towards the north west. The wind direction at 3 PM is more scattered with westerlies the most common blowing towards the east.

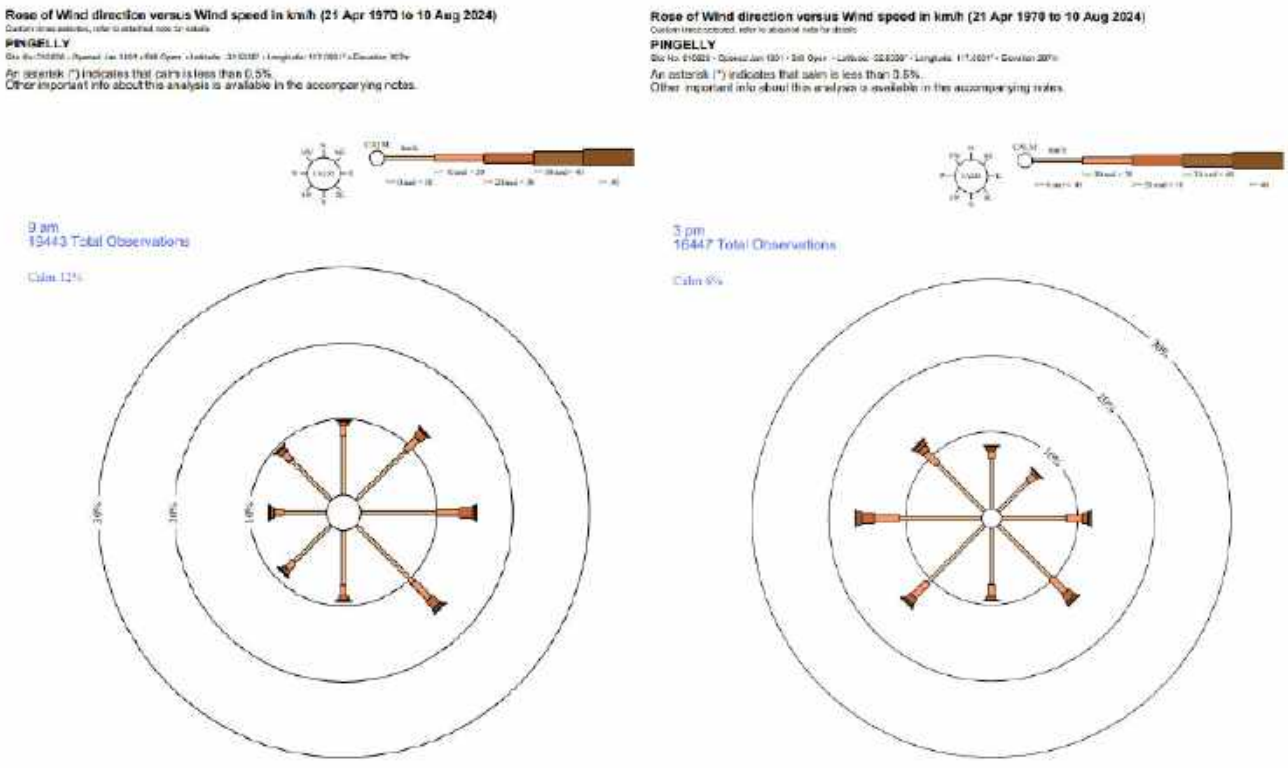


Figure 7. Windroses for Pingelly (BOM, 2025).

4 Existing Activities

4.1 Pig numbers and SPU

Hillcroft Farms piggery currently operates a 1300 sow farrow to finish operation which equates to approximately 16,170 pigs or 15,910 standard pig units[2]. A farrow-to-finish piggery includes the breeder, weaner and grower/finisher stages. The breeding unit of the piggery includes boars, gilts, gestating or dry sows, farrowing sows, lactating sows and sucker pigs. These pigs are housed in conventional indoor sheds. The sheds have concreted under-floor effluent pits or channels that collect manure, waste feed and wash water. The pits are drained (static pull plug) usually every 9-10 weeks to remove effluent from the sheds into a series of effluent ponds.

Pigs are typically weaned at 4 weeks of age into deep litter shelters until they are 12 weeks of age. The shelters are of hooped metal frames covered in waterproof fabric. Similarly, the bases of the shelters are impermeable concrete flooring overlain with straw, or similar loose material covers the floor, absorbing manure. The used bedding is removed and replaced when the batch of pigs is removed, or on a regular basis if needed. From 12 weeks of age the grower pigs are then moved back into the conventional shelters for finishing prior to be taken off farm for slaughter.

Spent bedding is stored/composted behind the shelters until cropping season in March -April each year. The spent bedding is composted prior to being spread on cropping land owned by the applicant to maximise the nutrients and organic matter as a fertiliser and soil conditioner. The total available land for spent bedding reuse is 3074ha.

Effluent from the conventional sheds is conveyed to a series of anaerobic ponds and evaporation ponds. The anaerobic ponds “treat” the effluent by removing in excess of 70% volatile solids leaving stabilised sludge in the bottom of the ponds which is periodically removed with a slurry tanker and spread over the cropping land. The remaining effluent is managed via evaporation.

Mortalities are buried in an earthen pit in which each layer is covered with soil to prevent vermin attraction. The pits are located at the southern end of the property away from the complex (biosecurity) and any sensitive areas.

[2] Standard pig unit (SPU) is a way of standardising pig numbers by equivalent manure output which influences the potential for environmental risk. A standard pig unit (SPU) is a unit for defining piggery capacity by manure production where the manure and waste feed produced by one SPU contains the amount of volatile solids (VS) equivalent to that typically produced by an average size grower pig (90 kg VS/yr). (NEGIP, 2025)

4.2 Current Infrastructure

Examples of the existing infrastructure at Hillcroft piggery is shown in **Figure 8**, **Figure 9**, **Figure 10**, and **Figure 11**. The existing site layout is shown in **Figure 12**. This figure also shows the current sheds to be demolished.

Figure 8. Piggery Shed.

Figure 9. Inside a shed with concrete slatted flooring.

Figure 10. Deep litter shelters- Pigs on straw.

Figure 11. Effluent pond with freeboard.

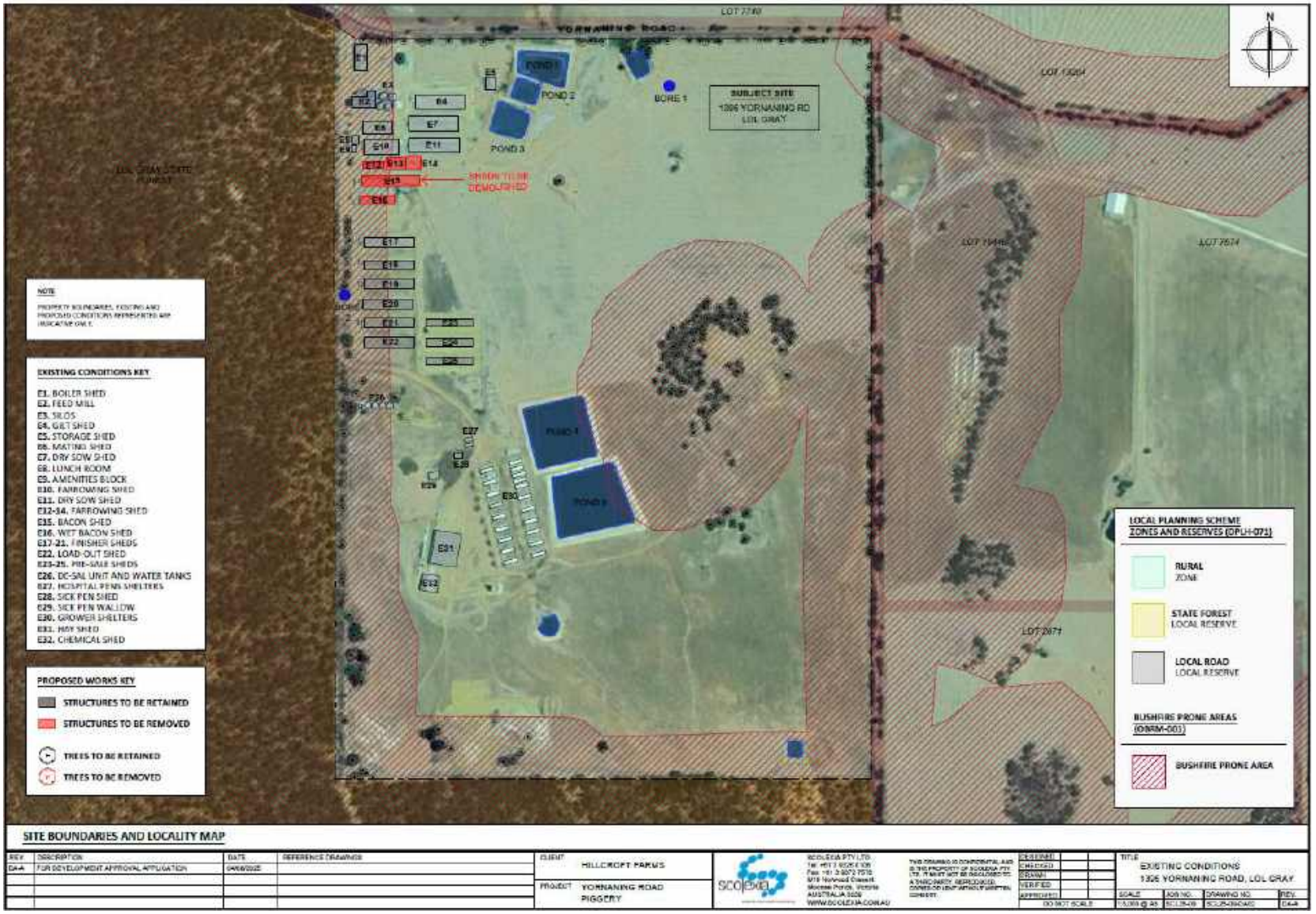


Figure 12. Site Map of current Piggery complex with sheds to be demolished.

4.3 Feed Mill

Feed is currently milled on site with the diet being predominately barley, triticale and lupins. The feed mill is located adjacent to the conventional sheds to the north of the site and has the capacity to produce 240T of feed per week (See **Figure 13**). Approximately 180T is used on the farm each week. The feed mill is currently licenced to produce up to 10,000T per year.

Figure 13. Feed Mill.

5 Proposed Activities/Development

The proposed activity is to increase the capacity of the piggery from the current 1400 sow farrow to finish operation to a 2500 sow farrow to finish operation. The expansion will be located within the current footprint of the piggery complex. The current operation houses the breeders, growers and finishers from 14 weeks of age in conventional indoor sheds with remaining weaners and growers raised in deep litter shelters. The proposed expansion will house the breeders, weaners and finishers in the conventional indoor sheds with the growers from 12-17weeks housed in the deep litter shelters.

To accommodate for the increase in production capacity and account for aging infrastructure, five old sheds will be demolished and replaced with nine new improved industry best practice sheds. Of the nine new sheds, four sheds will be constructed to house the increased number of animals on site. The new best practice sheds allow for improved climate-controlled conditions and industry animal welfare spacing requirement. The current effluent system storage and treatment capacity has been assessed, and an expansion of the effluent system is also proposed.

The feed mill on-site currently uses crops grown on other properties owned by Hillcroft Farms Pty Ltd to produce feed for the piggery. The feed mill is licenced to produce 10,000T per annum, however it has the manufacturing capabilities to increase production to accommodate for the increase in pig numbers on site. As such an increase in the manufacturing licence is being sought as part of the proposed expansion plans to 20,000T.

5.1 Pig numbers and SPU

The expansion will accommodate 32,460 animals or 33,225 SPU (See **Table 3**).

Table 3. Piggery Animal and SPU equivalents for the expansion (PigBal v4).

Pig class	Pigs accommodated in piggery			Shed type (waste management system)	Pig age			Pig live weight			SPU factor	No of SPUs
	Calculated values	Entered values	Adopted values		In	Out	Average	In	Out	Average	Live weight regression	Live weight regression
	(pigs stage^{-1})	(pigs stage^{-1})	(pigs stage^{-1})		(weeks)	(weeks)	(weeks)	(kg pig^{-1})	(kg pig^{-1})	(kg pig^{-1})	(SPU pig^{-1})	(SPU)
Gilts	283		283	Pull plug / Static pit	20.0	30.0	25.0	98.8	140.0	119.4	1.80	509
Boars	30		30	Pull plug / Static pit	20.0	176.4	98.2	98.8	300.0	199.4	1.60	48
Gestating sows	2,085		2,085	Pull plug / Static pit				140.0	215.0	177.5	1.60	3,336
Lactating sows	414		414	Pull plug / Static pit				215.0	140.0	177.5	2.50	1,034
Suckers	5,321		5,321	Pull plug / Static pit	0.0	3.7	1.9	1.4	7.0	4.2	0.10	542
Weaner	5,790		5,790	Pull plug / Static pit	3.7	8.0	5.9	7.0	22.0	14.5	0.41	2,368
Porker	5,355		5,355	Pull plug / Static pit	8.0	12.0	10.0	22.0	43.0	32.5	0.86	4,630
Grower	6,626		6,626	Deep litter	12.0	17.0	14.5	43.0	82.0	62.5	1.41	9,346
Finisher	6,555		6,555	Pull plug / Static pit	17.0	22.0	19.5	82.0	112.0	97.0	1.74	11,412
Unallocated	0		0		0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
Unallocated	0		0		0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
Totals:	32,460		32,460									33,225

5.2 Proposed Infrastructure Changes-Expansion

The proposed site layout and additional infrastructure is shown on **Figure 14**

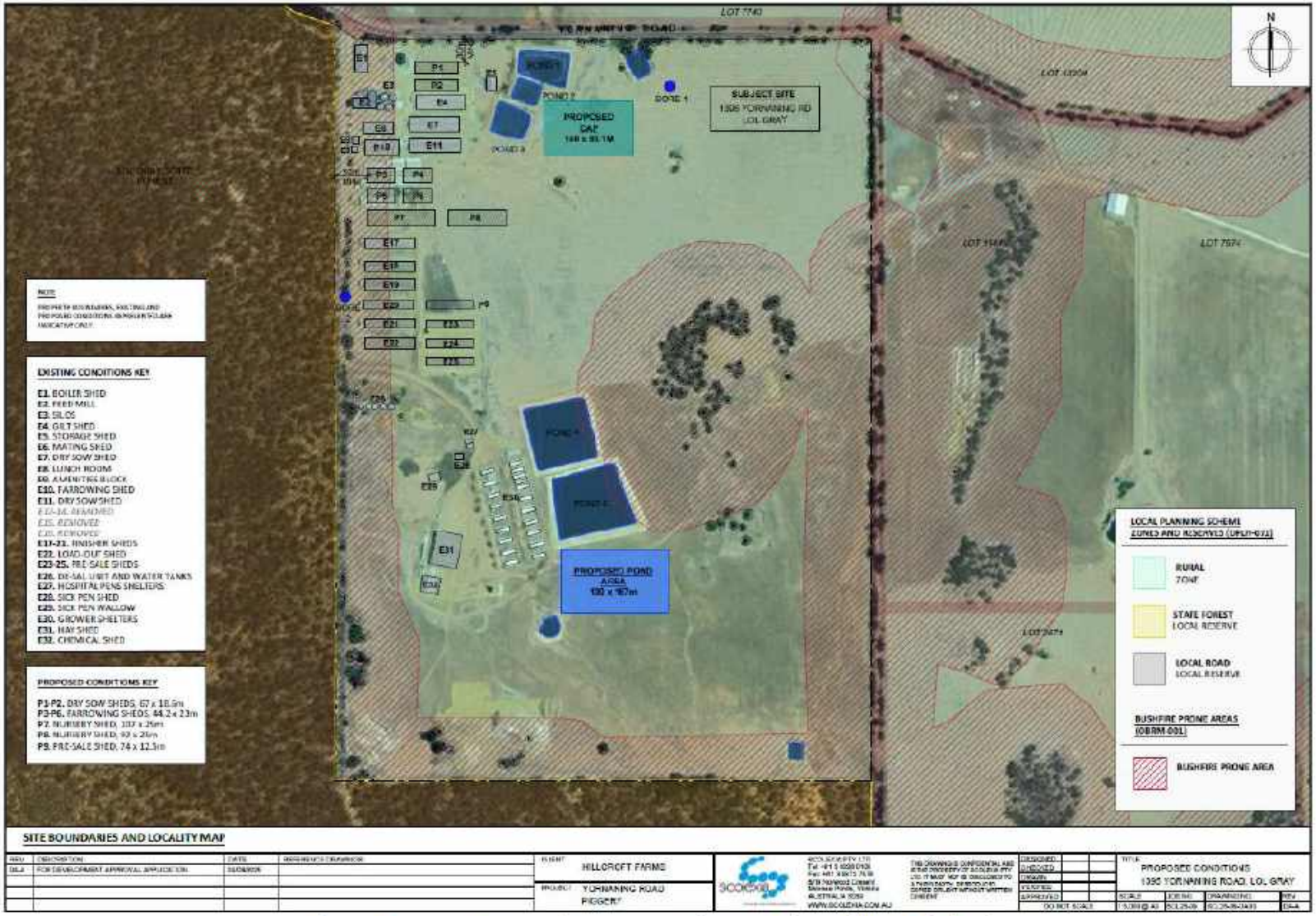


Figure 14. Proposed expansion showing the additional sheds.

5.3 Summary of key infrastructure changes

The main changes to the piggery are the demolition of old sheds which will be replaced by new modern improved sheds, four new sheds to accommodate the increase in capacity, along with an increase in capacity in the effluent system. There will be no changes to the other existing infrastructure on site. The separation and buffer distances outlined in section 6 will be measured from the same point of the complex as the expansion will be occurring within the footprint of the current site. Table 4 outlines the key infrastructure changes.

Table 4. Summary of key infrastructure changes.

	Existing	Proposed	Change
Subject Land	1395 Yornaning Rd, Lol Gray	1395 Yornaning Rd, Lol Gray Same footprint as current site	No – within footprint of current site
Land Use	Animal husbandry-Intensive	Animal husbandry-Intensive	No
DWER Permissions	Category 2: Intensive Piggery, 16,170 animals or 15,912 SPU Category 23: Animal Feed Manufacturing 10,000T	Category 2: Intensive Piggery, 32,460 animals or 33,225 SPU Category 23: Animal Feed Manufacturing 20,000T	Yes
Production Type	Farrow to Finish	Farrow to Finish	No
Pig Numbers	16,170	32,460	Yes
SPU's	15,912	33,225	Yes
Boiler/shed	1	1	No
Feed Mill	1	1 (increase manufacturing output-no infrastructure change)	No
Silos	4	4	No
Storage Shed	1	1	No
Lunch room	1	1	No
Amenities Block	1	1	No
Gilt Shed	1	1	No
Dry Sow Shed	2	2 retained 2 new sheds (67 x 18.6m)	Yes
Mating Shed	1	1	No
Farrowing Shed	4	3 farrowing sheds to be demolished 1 retained 4 new sheds (44 x 23m)	Yes
Nursery Sheds	0	2 new sheds (107 x 25m and 92 x 25)	Yes

Grower Shelters (Deep litter)	20	20	No
Bacon Shed	1	Bacon shed to be demolished	Yes
Wet Bacon Shed	1	Wet bacon shed to be demolished	Yes
Finisher Shed	5	5	No
Pre-Sale Sheds	3	3 retained 1 new shed (74 X12m)	Yes
Hospital Pens	2	2	No
Sick Pen Shed	1	1	No
Sick Pen Wallow	1	1	No
Hay Shed	1	1	No
Effluent Ponds	3 Anerobic ponds and 2 evaporation ponds	Additional 37ML Covered Anaerobic pond (CAP) 27ML evaporation pond.	Yes
Reuse area	3074ha	3074ha	No
Rainfed Dams	3	3	No
De- salinisation Unit	1	1	No
Water Tanks	5	5	No
Chemical Shed	1	1	No
Traffic Movements	24 cars plus 4 trucks	38 plus 8 trucks	Yes
Vegetation		No removal as in current footprint of piggery	No

5.4 Feed Mill

The feed mill on-site is currently licenced to produce 10,000T of feed per annum. To accommodate for the additional pig numbers on site an increase in the production capacity is being sought to 20,000T per annum.

There will be no changes to the current feed mill infrastructure on site. The current design and management of the mill as an enclosed system along with large separation distances will ensure no additional emissions from the system impact on the surrounding environment.

Having the feed grown and milled on farm contributes to the circular economy and cleaner production goals of the industry by reducing food miles, transport and associated embedded emissions.

5.5 Proposed Management

The siting, design, management, mitigation and contingencies for surface water, groundwater, odour, dust, noise, traffic and landscaping have been considered for the site in relation to housing and facilities, feed system, effluent system, spent bedding and carcass management.

The expansion will incorporate and integrate the current industry management practices (based on National Guidelines for Indoor Piggeries 2025) with the new infrastructure. The following section outlines the key areas of the piggery associated with potential resource usage and emission (including discharges) sources; along with the management and mitigation; demonstrating low risk of impacts.

5.5.1 Piggery housing

The majority of the piggery housing will be maintained, however five old sheds will be demolished and replaced with nine new improved industry best practice sheds. Of the nine new sheds, four sheds will be constructed to house the increased number of animals on site. The new best practice sheds allow for improved climate-controlled conditions and industry animal welfare spacing requirement for the farrowing sows. The expansion will be located within the current footprint of the piggery complex (See **Figure 14**).

The nine new sheds will be very similar in design to the existing indoor conventional sheds. The base of the sheds will contain static pits made of impermeable concrete in which slatted floors are overlain. The manure and effluent drop through the slatted floors into the pit which is flushed as part of the cleaning regime. This effluent and manure will be conveyed through fully enclosed underground piping to the primary pond system and storage/evaporation ponds.

The new sheds will have a similar feed and waterer system. The nursery and finisher sheds will have adlib feeders and the dry sows and farrowing sheds drop feeders.

The proposed expansion will house the breeders, weaners and finishers in the conventional indoor sheds with the growers from 12-17 weeks housed in the deep litter shelters. There are no changes to the existing deep litter shelters.

5.5.2 Water Usage and system

The main source of water is a large farm dam that is 50,000 cubic yards (approx. 38,000 m3). The dam is located to the southeast of the property. There are also a number of other small freshwater dams that can contribute to the water supply. Groundwater is also available for use in the piggery after being treated through the onsite desalination unit.

Water is used for drinking, cleaning and cooling. The existing and proposed sheds will use low water wastage drinkers such as nipple drinkers in the farrowing sheds, push nipples with catch bowls in the dry sow sheds and drinkomats in the finisher sheds. For cooling, fine misters or foggers will be used which utilise evaporation on the pig's skin, is low water use and prevents the bedding or flooring getting wet or contributing to the effluent stream.

The estimated water usage in **Table 5** has been calculated from the industry PigBal 4 which is the national industry standard tool for estimating piggery manure production that uses mass balances theory and diet digestibility data in its computations. (see section 5.5.4 for further information). The PigBal estimation is conservative. The cleaning water estimate in Pigbal is not reflective of the actual piggery water usage based on information provided by Hillcroft Farms. Information from the piggery suggests that the cleaning water usage is actually around 0.22ML a year (3,000L every 5 days or 600L/day) resulting in a total water usage on site of approximately 79ML (instead of 142ML from PigBal).

Table 5. Estimated water use from PigBal v4.

Clean water requirement	(ML. yr^{-1})	(L. day^{-1})
Drinking	59.88	164,067
Drinker waste	14.97	41,017
Cleaning	63.45	173,839
Cooling	3.66	10,032
Total:	**141.97**	**388,954**

5.5.3 Bedding Use

Deep litter shelters are used to accommodate grower pigs to from 12-14 weeks of age. The only waste product from these is spent bedding which contains manure, waste feed and any water spillages. (Tucker 2014). Bedding is added to the shelters before the entry of each new batch of grower pigs. Cereal straw grown on site is generally used as the bedding material in the deep litter shelters. The concrete base of the shelters is covered with a layer of straw and fresh straw is added as needed to maintain dry, low odour conditions. The spent bedding is removed at the end of each batch. Assuming straw usage of 0.5 kg/SPU/d and 9,346 SPU in the shelters, the total bedding usage will be around 1,705 t/yr.

5.5.4 Effluent and Manure (Solids) Management

Effluent generation

There are four effluent streams produced on site which include; liquid effluent, sludge, spent bedding and brine from the desalination plant. The generation, management and reuse of these streams is discussed in detail below.

The liquid effluent stream will be generated from the conventional indoor sheds which will house 23,879 SPU's out of the 33,225 on site. The remaining 9,346SPUs are housed within the deep litter shelters which produce spent bedding.

The PigBal 4 model (Skerman, 2018) was used to estimate the volume of effluent discharged to the primary anaerobic pond along with the manure total solids (TS) and volatile solids (VS) from the pig sheds.

PigBal 4 is the national industry standard tool for estimating piggery manure production that uses mass balances theory and diet digestibility data in its computations. PigBal 4 uses standard multipliers for the breeding stock and suckers, while using an in-built live weight regression formula to determine the multipliers for weaners, growers and finishers. This method used standard diets representative of typical industry diets. As well as estimating feed intake, diets, wastage and manure production, the model uses cleaning water use estimates based on typical effluent solids concentrations for different effluent management systems, pig drinking water estimates, pig cooling water estimates, and a range of solids separation (pre-treatment) options with typical solids and nutrient removal rates.

The model also estimated the mass of nitrogen, phosphorus and potassium in manure and effluent taking into account inputs (feed, pigs, and water) and outputs (pigs, mortalities and emissions of nitrogen to air (10% for conventional sheds).

PigBal estimates that approximately 106ML of effluent will be discharged to the primary pond per year (See **Table 6**). However this is conservative and significantly overestimates flush water used in the piggery. The amount of effluent is estimated to be more like 79ML a year.

Table 6. Estimated effluent discharged to the primary pond, PigBal v4.

Effluent discharged to primary anaerobic pond	Volume ($ML.\ yr^{-1}$)	Volume ($L.\ day^{-1}$)	TS ($kg.\ day^{-1}$)	VS ($kg.\ day^{-1}$)	N ($kg.\ day^{-1}$)	P ($kg.\ day^{-1}$)	K ($kg.\ day^{-1}$)
Flushing / hosing water	63.45	173,839	0	0	0	0	0
Manure + waste feed	31.87	87,305	8,725	7,213	718	184	177
Drinker waste water	10.85	29,734	0	0	0	0	0
Total:	**106.17**	**290,879**	**8,725**	**7,213**	**718**	**184**	**177**
			3.00%	2.48%	0.25%	0.06%	0.06%
Composite shed loss factors:			7%	9%	7%	0%	0%

Effluent management system

All wastewaters from the piggery including wash down water, leachate collection dam below chemical shed from shelters and wastewater from desalination plant are directed to the wastewater treatment system.

The treatment system comprises of three treatment ponds and two evaporation ponds. Wastewater is conveyed to the ponds via underground PVC pipes. The 3 primary ponds have been in place for many years. Although they have been compacted the extent of the level of compaction is unknown. However, the in-situ soil has a reasonable clay content (as previously tested for DWER) and self sealing from years of sludge deposition (Tucker, 2014). All of the evaporation ponds are clay-lined with compacted bases. Wastewater is transferred through the pond system via overflow pipes located 500mm below the top water level providing a 500mm freeboard (previous industry standard).

The ponds are desludged as required using a slurry tanker. The sludge is spread across the cropping country as a fertiliser and soil conditioner. The tanker allows the sludge to be spread thinly and evenly across large areas to facilitate nutrient distribution and minimise overloading.

Current Capacity on site

To determine the current on site effluent system capacity and required storage for the expansion the following methodology was undertaken. Pond capacities were estimated using surface area derived from near maps (See **Figure 15** and **Figure 16**) and depth data provided by Hillcroft farms. ie for the 3 ponds near the conventional sheds being 6m in depth and the two newer ponds near the deep litter shelters being 2.5m in depth. assumed that the 0.5m freeboard (previous industry standard) was included in the total depth (reflected in **Table 7**). Note: The following capacities are estimations only. This information was input into the WatBal model (see details below) to calculate individual pond volumes. An estimated 67ML is available on site for storage based on a 0.5m freeboard.

Table 7. Existing pond dimensions and estimated pond capacity.

Existing Ponds	Area Near maps	Area modelled	Dimensions (From near maps)	Depth (m)	Estimated capacity (Excluding freeboard)
Pond 1	4,988	5005	91 x 55m	5.5 plus 0.5 freeboard	14.4 ML
Pond 2	1,824	1,766	46 X 38.4	5.5 plus 0.5 freeboard	3.2 ML
Pond 3	3,861	3,832	67 x 57.2	5.5 plus 0.5 freeboard	10.3 ML
Pond 4	11,173	11,067	105 x 105.4	2 plus 0.5 freeboard	18.5 ML
Pond 5	12,033	12 059	118 x 102.2	2 plus 0.5 freeboard	20.4 ML
		TOTAL			66.8 ML

Figure 15. Near Maps showing the existing first three (primary) effluent ponds.

Figure 16. Near Maps showing the 2 effluent evaporation ponds.

Required Capacity

Production and operational management data were collected and used in the PigBal 4 model to estimate the total solids (TS) and volatile solids (VS) generated for the proposed piggery. The resulting TS and VS values were then input into the WatBal model to calculate the required treatment and storage volume for the system. The required capacity was compared to the current available capacity to assess the additional capacity requirements taking into account weather constraints and irrigation practices.

The WatBal model (Skerman and McClymont 2019) performs a daily water balance on piggery effluent treatment and storage systems. It includes provisions for modelling additions to the effluent stream from piggery manure, waste feed, fresh and recycled flushing and hosing water used for shed wash-down, any runoff from shed rooves or outdoor catchments, drinking water wastage, and rainfall falling onto pond surfaces. Effluent system extractions incorporated in the model include evaporation from pond surfaces, and use of recycled effluent for shed cleaning and application (irrigation) onto land growing crop and/or pasture.

The model uses historical daily climatic data which is downloaded from the SILO climate data website (https://www.longpaddock.qld.gov.au/silo/). The model accommodates analysis periods commencing from 1900 up to the day prior to the analysis. For Hillcroft farms 54 years of weather data from Narrogin WA was incorporated (1970-present). Note: If the assumptions entered into the models are to change in anyway, the sizings will need to be revised to reflect the changes. Due to the climate a large influence on the system is evaporation. As such surface areas were assessed to maximise the evaporation component.

The Watbal model only has the ability to model single effluent treatment/storage ponds and two ponds operating in series (primary anaerobic treatment pond + effluent storage pond). Modelling was carried out on a number of options. The system chosen by Hillcroft Farms is a covered anerobic pond (CAP) followed by additional evaporation storage (with no irrigation) to complement the current system. The CAP provides the option to offset GHG emissions and produce energy to reduce the reliance on offsite energy. The total required volumes considering surface area for evaporation are shown in **Figure 17**.

Covered Anaerobic Pond (CAP)

A covered anaerobic pond will require 37.3ML of treatment capacity (3 year desludging) followed by 86.2ML of storage based on evaporation. Maximising the use of the current storage and evaporation, this would require an additional 27.2ML if less than 1 in 10 yr spill frequency is maintained. APL, 2025 states “The design overtopping frequency must not exceed once every 10 years for ponds with irrigation of effluent, and once every 20 years for ponds relying only on evaporation for water disposal. However, the design overtopping frequency also depends on the sensitivity of the receiving environment”. As the site has deep groundwater and no watercourses the risk of environmental impacts is low therefore it is proposed that a no less than 1 in 10 yr spill frequency is maintained at all times. An desluding program (as required) will also assist in minimising spills. Note 0.5m freeboard was used for the first three ponds (existing) and 0.6m was modelled for the storage (proposed new). A freeboard on 1m is allowed for in the CAP to facilitate gas storage under the cover. The siting of the CAP has considered the location to the piggery sheds and potential ignition sources.

Points of Consideration for the Pond Capacity Model:

1. The loading rates for the CAP are assumed to be in the range of 0.298-0.4 kgVS/m^3. The CAP is larger than a traditional highly loaded pond due to lower loading rates and the lack of evaporation due to the cover.
2. All existing ponds in the facility are assumed to have a freeboard capacity of 0.5m. All models use this for the existing ponds. However, according to latest Industry standards (APL, 2025), all new ponds require a freeboard capacity of 0.6m. All new ponds to be installed have been modelled with this required 0.6m freeboard capacity.
3. All new additional storage ponds have been modelled based on evaporation, i.e. pond surface area. This methodology accounts for loss through evaporation, more suitable to the conditions at this piggery.
4. Desludging is assumed to be done every 3yrs for the CAP. Taking too much out of the CAP pond per year interferes with the pond operation. A longer desludging period is not recommended as it will likely result in difficulty in removing the material from the covered pond.

Note: The estimated total pond volume/capacity including the freeboard will need to be confirmed by a pond designer/engineer. The current pond calculations relies on maintaining an evaporative surface area. If the pond dimensions are to change from those outlined in the report, this would need to consider the implication for effluent management via evaporation.

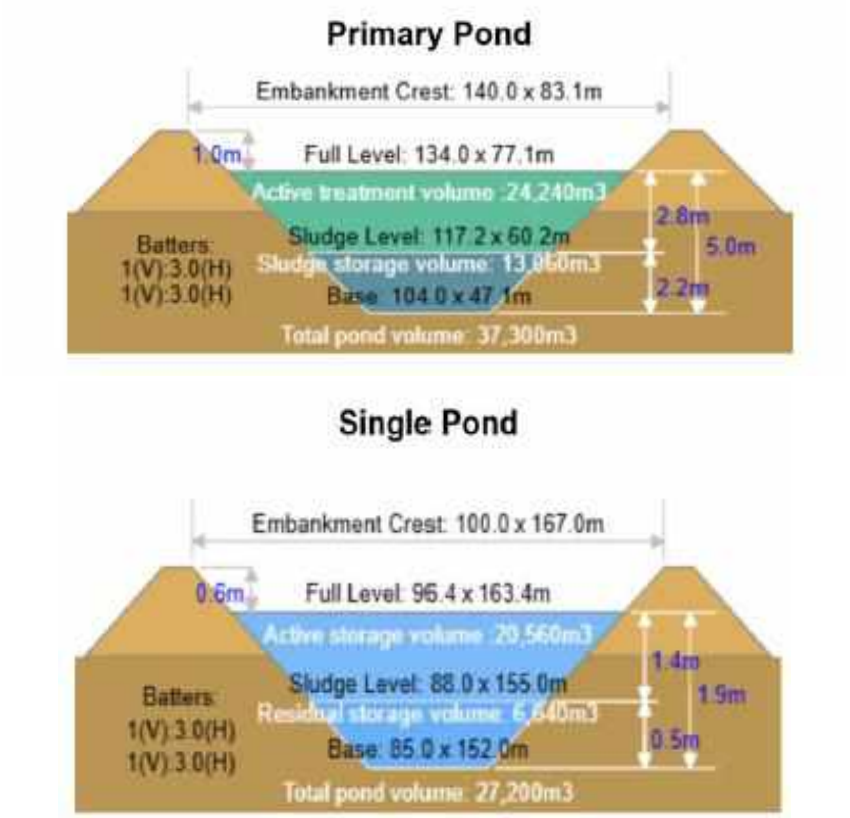


Figure 17. CAP and additional storage requirements.

Sludge reuse

The current system and the proposed system will rely on an anerobic treatment system to reduce volatile solids and stabilise the sludge (reduce odours). Following this system will be evaporation ponds with no effluent reuse. There is a desludging program (as required) which will remove sludge via a slurry tanker. A tanker can distribute sludge at low application rates over large areas in a controlled manner. Note sludge is recommended to be removed no more than once every 3 years to minimise impacts on pond operation.

It should be noted that the nutrient content of piggery sludge can be highly variable. It is recommended to test the sludge periodically prior to irrigation. Table 15.2 of the National Environmental Guidelines for Indoor Piggeries – Siting and Design (APL ,2025) provides indicative sludge properties.

- N – 2617mg/L
- P – 1696mg/L
- K – 7000mg/L * APL, 2015

Table 15.4 (APL 2025) provides data that estimates crop nutrient removal rates for wheat, barley straw, triticale, lupins. With the expected yields, the approximate nutrient removal rates are given in **Table 8**.

Table 8. Crop removal rates from APL, 2025

Crop	Crop Yield DM/t/ha	Normal nutrient removal range (kg/ha)		
	Average	N	P	K
Winter cereal Hay	7	140	21	112
Barley straw	7.5	53	2.1	135
Grain barley	3.5	70	6.25	16
Wheat straw	8	60	5	157
Wheat Grain	3.5	70	12	18
Grain triticale	2.25	47	7	11
Lupins	2	64	6	11

To determine the sustainable reuse area per year (one crop) required for 2ML of sludge the APL nutrient balance calculator was used. The inputs included the average nutrients in Sludge. Phosphorus which settles in the sludge is generally the limiting nutrient determining the reuse area requirements. However, potassium is limiting for a number of crops. Potassium is not an environmental nutrient of concern although excess K can have implications on soil structure and cation imbalances. The calculations assume a total removal of the nutrients generally resulting in deficits in the non limiting nutrients. Having some residual nutrients in the soil is preferable for plant/crop growth. **Table 9** shows the sustainable reuse areas based on different crop types. An alternative column is also shown that identifies the estimated area if K is causing limitations. That is the area based on P (primary nutrients of concern if they enter waterways and groundwater). Note there is deep groundwater and no waterways on the piggery site. If the material is to be spread on alternative land owned by Hillcroft the natural resource buffers outlined in section 6.2 will need to be observed.

Table 9. Sustainable reuse requirements for various crops generated from APL Nutrient Balance Calculator- Conventional and Deep Litter Piggeries (2ML Sludge, 1 crop).

	Sustainable reuse area*	Potential alternative area**
Winter cereal Hay	161ha (1mm)	P limited
Barley straw	646ha (1mm)	P limited
Grain barley	1000ha (1mm) *	P -323ha
Wheat straw	843ha (1mm)	P limited
Wheat Grain	700ha (1mm) *	P -212ha

**Potassium limited. ** Alternative areas taking into consideration the limitations of N and P which have potential environmental impacts if they enter groundwater and/or waterways.*

The table shows that there is sufficient land available to sustainably utilise the sludge generated by the piggery.

Note: the nutrient balances are indicative only, soil types, climate, microbial activity and variable crop yields all contribute to nutrient retention and uptake. It is recommended that sludge is tested periodically, soil tests are undertaken and un agronomist is engaged to interpret results to ensure sustainable agronomic rates are maintained to maximise soil health, crop yields and losses.

Solids generation

The solid waste generated from the deep litter sheds includes spent straw used for bedding, containing manure, urine, waste feed and any water spillages.

Deep litter shelters are used to accommodate grower pigs to from 12-14 weeks of age. The spent bedding is removed at the end of each batch. Assuming straw usage of 0.5 kg/SPU/d and 9346SPU, total bedding usage will be around 1,705 t/yr (1535T/DM/yr if 90% dry matter content).

Taking into account the TS, VS, N, P and K of the bedding and the effluent and manure deposition it is expected that the annual waste output from the deep litter shelters is depicted in **Table 10.**

Table 10. Estimated spent bedding outputs from deep litter sheds from PigBal v4.

	Annual waste output (t. yr^{-1})					
	TS	FS	VS	N	P	K
Deep litter added to sheds	1,553	102	1,451	11	1	37
Spent litter removed from deep litter sheds	2,341	292	1,975	83	25	60

Solids management

Spent bedding is removed from the deep litter shelters after each batch of pigs. The spent bedding is composted near the shelters on a hardstand consisting of compacted gravel with clay. The spent bedding is turned every week for 5-6 weeks to facilitate the composting process and spread on the land owned by Hillcroft farms as a soil conditioner and fertiliser. Any run-off from the hardstand (only likely after heavy rain) disperses through a paddock acting as a vegetative filter strip. Surface water from this area enters a farm dam. (Tucker, 2014). There are no sensitive natural resources such as vegetation or watercourses in the area of the stockpiled bedding.

Solids reuse

Once composted, the spent bedding is spread on land owned by Hillcroft farms in March-April of each year. Approximately 3074 ha is available in total. The areas spread are rotated to avoid nutrient overloading and integrate into the cropping regime. Buffers to any drainage lines are maintained as well as any sensitive vegetation. As there are large separation buffers

Application rates of about 5 t/ha (10 m^3/ha) are generally used on areas to grow oaten hay (7 t/ha), wheat (3 t/ha), canola (1.5 t/ha) or to graze sheep (8-9 DSE/ha) (Tucker, 2014).

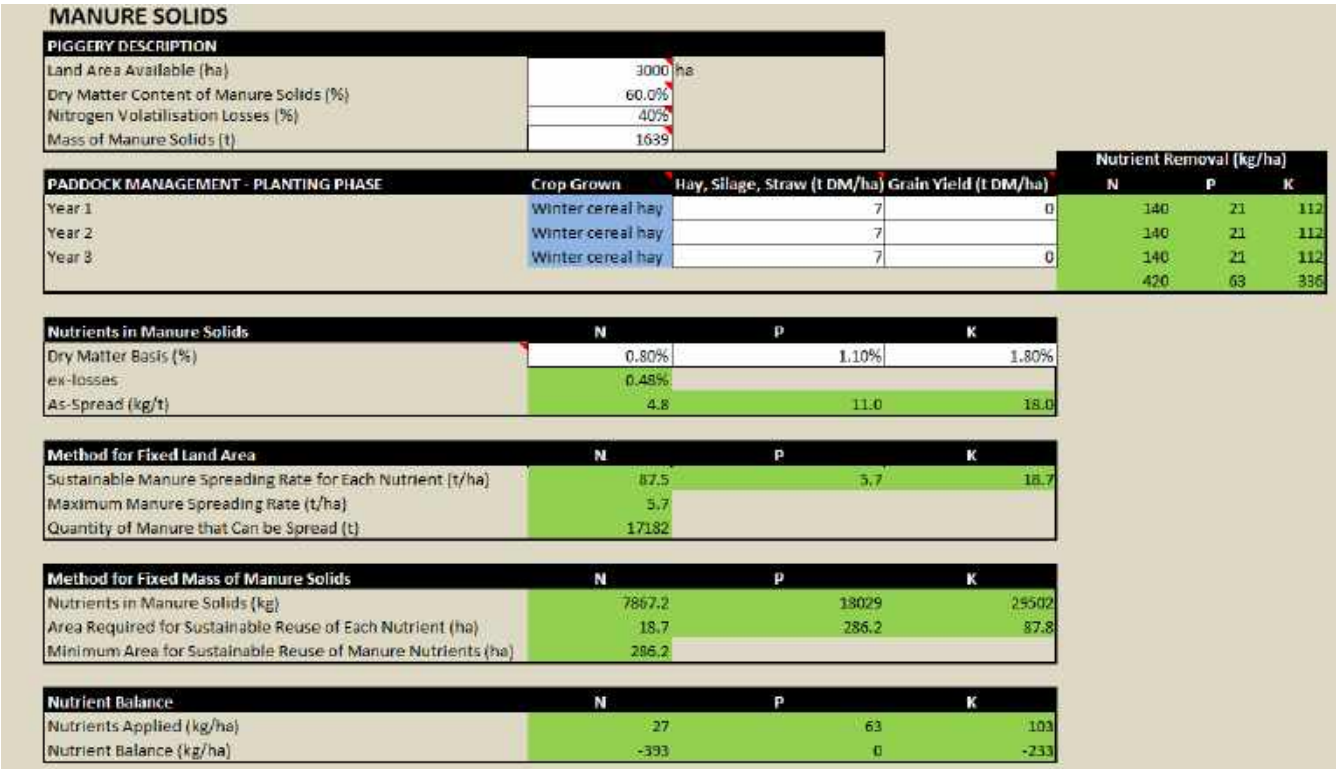
During stockpiling, moisture, dry matter and nitrogen will be lost from the spent bedding. On removal from the sheds the bedding likely has a moisture content of around 50-60%, although this could fall to around 30-40% after storage (Tucker, 2014). Losses of 50-60% of the initial volume could also be expected after stockpiling. (APL, 2015)

Assuming 30% of the TS could be lost, this would leave 1639 t DM or 2540 t of wet/as spread spent bedding.

Using 0.8%N, 1.1%P and 1.8%K from Table 14 in (APL, 2015) the composted spent bedding would contain around 8kg N/t, (4.8 kg N/t N losses) 11kg P/t and 18Kg K/t on dry matter basis.

If the material as spread contains 40% moisture the nutrients as spread would be 8kg N/t, 18kg kg P/t and 30kg k/t. At 5t ha/ this would equate to 40kg N per ha/yr, (assumes 25% loss), 90kg P per ha/yr and 150kg K per ha/yr.

For winter cereal hay an area of approximately 286ha is required for all of the spent bedding produced on site with 3 years of cropping to strip all of the added P and have deficit N and K (See **Figure 18**. As the piggery owner has 3074ha available for spreading there is sufficient land available for sustainable reuse.



MANURE SOLIDS

PIGGERY DESCRIPTION		
Land Area Available (ha)	3000	ha
Dry Matter Content of Manure Solids (%)	60.0%	
Nitrogen Volatilisation Losses (%)	40%	
Mass of Manure Solids (t)	1639	

PADDOCK MANAGEMENT - PLANTING PHASE	Crop Grown	Hay, Silage, Straw (t DM/ha)	Grain Yield (t DM/ha)	Nutrient Removal (kg/ha) N	P	K
Year 1	Winter cereal hay	7	0	140	21	112
Year 2	Winter cereal hay	7		140	21	112
Year 3	Winter cereal hay	7	0	140	21	112
				420	63	336

Nutrients in Manure Solids	N	P	K
Dry Matter Basis (%)	0.80%	1.10%	1.80%
ex-losses	0.48%		
As-Spread (kg/t)	4.8	11.0	18.0

Method for Fixed Land Area	N	P	K
Sustainable Manure Spreading Rate for Each Nutrient (t/ha)	87.5	5.7	18.7
Maximum Manure Spreading Rate (t/ha)	5.7		
Quantity of Manure that Can be Spread (t)	17182		

Method for Fixed Mass of Manure Solids	N	P	K
Nutrients in Manure Solids (kg)	7867.2	18029	29502
Area Required for Sustainable Reuse of Each Nutrient (ha)	18.7	286.2	87.8
Minimum Area for Sustainable Reuse of Manure Nutrients (ha)	286.2		

Nutrient Balance	N	P	K
Nutrients Applied (kg/ha)	27	63	103
Nutrient Balance (kg/ha)	-393	0	-233

Figure 18. APL Nutrient Balance Calculator- Conventional and Deep Litter Piggeries showing sustainable reuse areas.

From Tucker2014 it was deemed unfeasible to spread on land just used for grazing.

Note: the nutrient balances are indicative only, soil types, climate, microbial activity and variable crop yields all contribute to nutrient retention and uptake. It is recommended that composted spent bedding materials are tested periodically, soil tests are undertaken and un agronomist is engaged to interpret results to ensure sustainable agronomic rates are maintained to maximise soil health, crop yields and losses.

5.5.5 Mortalities Management

Day to day mortalities

Mortalities are buried in an earthen pit in which each layer is covered with soil to prevent vermin attraction. The pits are located at the southern end of the property away from the complex (biosecurity) and any sensitive areas. Groundwater is at depth on site (20m- 60m) and there are no waterways on the premise.

Mass mortalities

A mass mortality plan was developed for Hillcroft Farms Piggery as part of an APL project titled " Development of decision support tools for on-farm mass herd destruction, disposal, and decontamination (DDD) for the Australian Pig Industry in the event of an exotic disease outbreak – Stage 2" The plan determined suitable disposal locations across all of the land owned by Hillcroft farms taking into consideration buffers to neighbours, topography, separation to groundwater, distance to drainage lines and surface waters, distances to boundary buffers suitable soil types and other features such as vegetation (See **Figure 19** and **Table 11**). Various WA Government mapping information was taken into account to determine the most suitable potential disposal site. All of the sites (based on mapping) are located on the least steep areas of the farm, away from drainage lines, and on areas of soil type DyNB with greater than 30% clay content to assist impermeability requirements. Mapping also indicates all the areas have good excavation potential. Access may be an issue on those areas furthest from the farm. The following map identifies the potential mass disposal sites. A copy of the mass disposal plan and the associated maps can be provided on request.

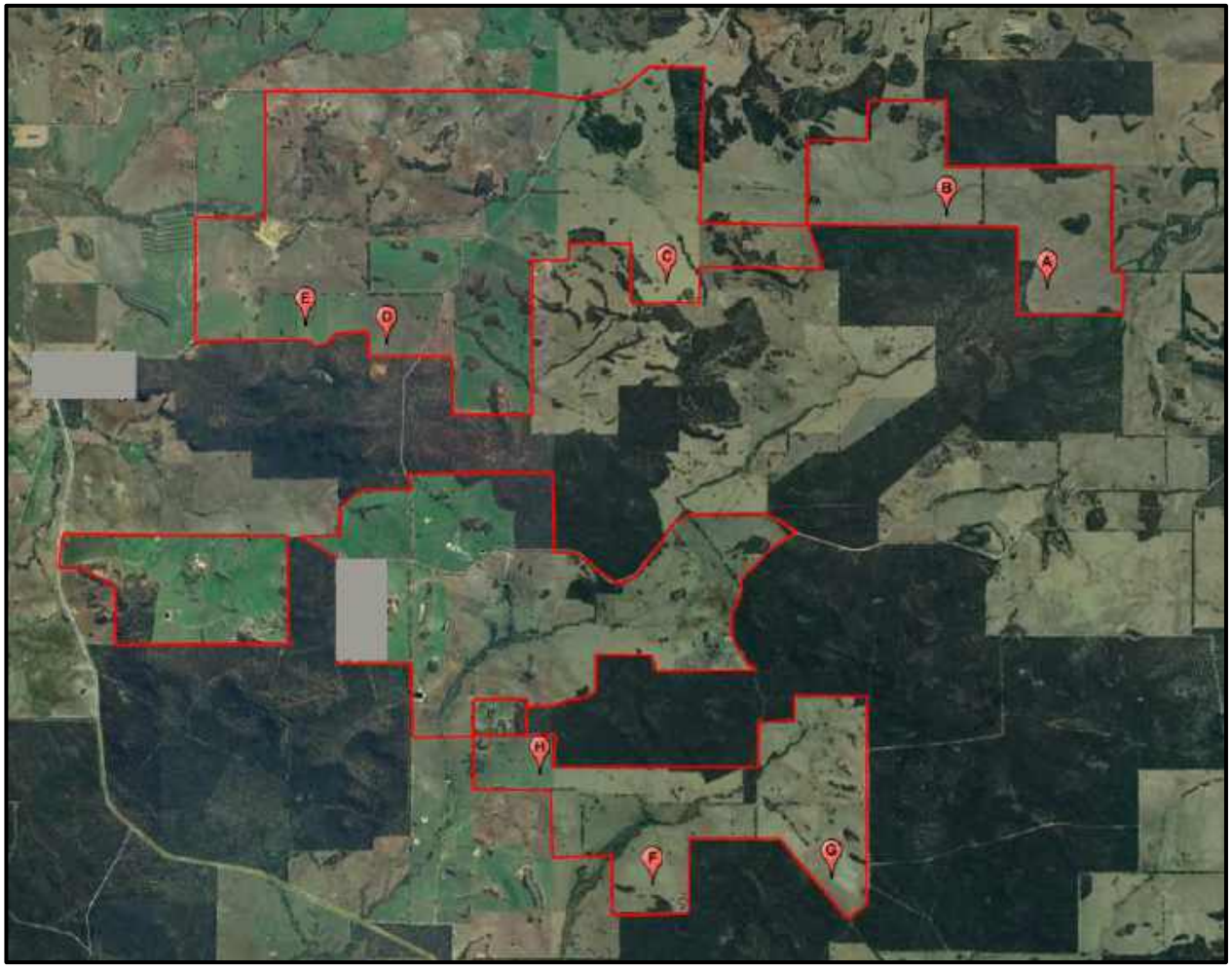


Figure 19. Identified Mass disposal locations.

Table 11. Mass disposal site buffer and separation distances.

Site	Creek (m)	Groundwater Depth* (m)	Road (m)	House (m)	Boundary
A	323 and 188 from drainage	Unknown	2400	2040 bush between	270
B	250	Unknown	3300	2070 (bush between)	110
C	370	Unknown	1900	2390 (bush between)	220
D	440	Unknown	520	3400	133
E	840	Unknown	1200	2700	145
F	615	Unknown	990 (track)	2400	330
G	1400	Unknown	470 (track)	3100 (bush between)	150
H	1050	Unknown	2300 (track)	1470	160

**Likely 20-60m bgl*

5.5.6 Stormwater Management

There are low risk of stormwater impacts from the property due to no surface waters being located on the premise. The premise is also located in an area of low rainfall of an average mean of 459mm a year which reduces the risk of stormwater risks.

The piggery housing (conventional and deep litter) and associated infrastructure has been designed and built above natural ground level to prevent the ingress and egress of stormwater entering the premise thus preventing potential stormwater contamination. The base of the sheds are impermeable concrete preventing moisture entry and containing all of the effluent, manure and spent bedding generated from the sheds. The effluent management collection and conveyance is designed to prevent potential contamination of effluent with stormwater and vice versa. All of the new proposed shedding will also be located above ground level with concrete underfloor effluent collection systems.

All effluent is conveyed from the sheds in impermeable PVC pipes to prevent contamination of stormwater and entry of additional stormwater into the ponds. The ponds have been constructed using a clay liner. Any new infrastructure will also be compacted to meet industry standards of 1x10-9ms-1. The pond capacity report and pond design in section 5.5.4 show that the ponds have and will have a design spill frequency of not more than once in ten years.

The compost area near the deep litter shelters is located on a compacted gravel and clay base. There should be minimal leachate generated from this area as the material absorbs moisture (needed for composting) minimising runoff. In the event of a high rainfall event (note low rainfall area), any run-off is directed towards a paddock which acts as a vegetative filter strip prior to entry into a farm dam on site. There are no drainage lines or surface waters located on the premise.

5.5.7 Chemical Storage and Handling

The site stores and uses potentially hazardous materials such as veterinary chemicals, disinfectants, and rodenticides. Only minimal amounts materials will be stored on site at any one time. All potentially hazardous materials are stored in well-constructed, clean and safe chemical storage and handling shed located to the rear of the property (E32 on property maps). The shed has impermeable concrete flooring. Facilities will be locked and only accessible by suitably trained staff.

5.5.8 Fire Protection

The premises has a generator, pump and firefighting equipment on site. Water will be pumped from the freshwater dams in case of emergency. The premise also has the local fire brigades' number on hand to expedite any emergency response.

There is an approximate 40m wide cleared buffer between the sheds on the western side, with the remainder of the infrastructure well separated from vegetation.

5.5.9 Roads and Traffic

The piggery is accessed by Yornaning West Road. It is a local network classified rd. with a hierarchy as a local distributor road. There is good visibility in both directions from the front entrance with approx. 500m and 850m to the west and east respectively of straight road prior to any bends in the road.

Internal roads are formed gravel that are periodically graded to maintain all weather access. There are significant areas available for onsite parking and multiple turning circles to ensure all vehicles can exit in a forward manner.

There will not be a significant increase in traffic generated from the expansion. Currently there are 2 trucks loading pigs out. This will increase to 4 (2 extra). There are also approximately 2 pocket trains bringing feed in. This will also increase to 4 a week (an increase in 2 movements).

There are currently1 2 staff working on Hillcroft Farms. With the expansion, an additional 7 staff will be employed, which increases small vehicle movements by 14 a day (includes both in and out).

5.5.10 Other Farm Wastes

General rubbish is deposited in a clay lined landfill on site. Scrap/surplus metal is stored in like material groups to the rear of the premise to minimise amenity, human health and environmental risks. It is recycled where possible and removed when required to a metal recycler.

6 Separation Distances

The natural resources and amenity of the site are protected by the siting, design and management of the piggery along with secondary measures such as separation distances (amenity) and buffers (natural resources).

6.1 Separation Distances – Amenity

The separation distance is the distances provided between a piggery complex and a sensitive receptor is an important secondary measure for reducing the risk of amenity impacts. Separation distances are measured as the shortest distance from the piggery complex to the nearest part of a building associated with the sensitive land use.

Odour has been identified as the principal community amenity concern in relation to piggery developments. Separation distances for odour generally provide larger distances than those required for dust and noise and are therefore deemed to provide sufficient protection from dust and noise impacts on sensitive areas. The Australian pig industry recognises the need to continually improve to meet rising community expectations and has developed a best available methodology for assessing potential odour risk based on industry research. The odour assessment as set out in the National Environmental Guidelines for Indoor Piggeries – Siting and Design, 2025 is used to establish whether odour generated by a piggery will have an unreasonable impact at off-site receptors. Odour nuisance *may* occur when the separation distances between a piggery and a receptor are less than those calculated using the methods set out in the guidelines. The methodology sets out a three tier assessment process:

- Level 1 uses a standard formula and is suitable for all piggeries. Level 1.5 is a variation incorporating a wind frequency reduction factor.
- Level 2 involves modelling using the most appropriate computer dispersion model, a meteorological data file representative of the site and adopted 'standard' emission rates.
- Level 3 involves modelling using the most appropriate computer dispersion model, 12 months of meteorological data measured on-site and non-standard odour emission rates or an odour concentration/odour intensity relationship.

A pass at any level is acceptable and means that no further assessment is required.

The simple odour risk assessment methods (Level 1 and Level 1.5) calculate more conservative (larger) separation distances than the level 2 and 3 process that uses site specific inputs.

The following **Figure 20**, **Figure 21**, and **Figure 22** outline the inputs used in the s-factor calculations. The division of potential odour sources between the indoor and deep litter shelters to generate the effluent treatment factor is shown in **Table 12**.

The calculated separation distance for the proposed expansion of the piggery are:

- 1334m to a legal dwelling
- 1739 to rural residential
- 3899m to a township

Note: the same surface roughness and terrain factor were used in the calculation due to the piggery being largely surrounded by bushland.

The nearest receptor is R6 and that is located 1.6km from the complex to the South East through scattered vegetation, a valley and up a hill. The site meets all of the Level 1 separation distance requirements for the legal dwelling, rural residential and townships (See **Figure 23**).

- Dryandra Lions woodland village is approx. 6km to the south west
- Cuballing is 13.5km the south east
- The nearest rural residential area is likely to be associated with Narrogin over 20km away.

Note: there are minimal calm periods (12% am and 6% pm) See **Figure 7**. Calm periods are more conducive to potential odour complaints as the plume may linger whereas unstable conditions promote odour dispersion.

Figure 20. S-Factor separation distance outputs from APL, 2025.

S1 = Piggery Design Factor			
Effluent Removal System			Factor Chosen
Conventional shed – static pit, pull plug or flushing system	1		1
Deep litter system, pigs on single batch of bedding ≤7 weeks	0.63		
Deep litter system, pigs on single batch of bedding > 7 weeks	1		
Effluent Treatment			Factor Chosen
Pond with >40% separation of volatile solids before pond	0.8		0.9
Pond with 25 – 40% separation of volatile solids before pond	0.9		
Pond with <25% separation of volatile solids before pond	1		
Permeable pond cover	0.63		
Impermeable pond cover	0.5		
Deep litter system – spent bedding stockpiled / composted on-site	0.63		
No manure treatment or storage on-site – effluent / bedding removed from site	0.5		
S1= Effluent Removal System Factor* Effluent Treatment Factor			**0.9**

Figure 21. S1 Piggery design factor inputs into S Factor calculations.

Table 12. Partitioning of SPU across the conventional and deep litter shelters to generate effluent treatment factor.

Efluent treatment				
	SPU	%	factor	
litter	9345	0.2813	0.63	0.2
Sheds	23880	0.7187	1	0.7
Total	33225			0.90

S2 = Sensitive use factor			Factor Chosen
Receptor type			11.5
Town	25		
Rural Residential	15		
Legal house	11.5		
Surface Roughness Factor			Factor Chosen
Limited ground cover, grass	1		0.6
Crops	1		
Undulating terrain	0.93		
Open grassland (grass, scattered trees	0.9		
Woodlands (low density forest)	0.7		
Open forest (canopy cover 30-70%)	0.6		
Forest with significant mid and lower st	0.5		
S2 Factor = Receptor Type Factor, S2R x Surface Roughness Features Factor, S2S			**6.9**
S4 - Terrain Factor			Factor chosen
Terrain description type	Downslope	Upslope	0.7
Narrow valley (>1% slope)	2	0.5	
Gently sloping (1-2% slope	1.2	1	
Flat (0-1% slope)	1	1	
Receptor downslope in different sub-catchment	1		
Sloping (>2% slope)	1.5	0.7	
Significant hills and valleys	0.7	0.7	

Figure 22. S2 Sensitive use factor inputs into S Factor calculations.

The piggery having significant separation between receptors, thick vegetation surrounding the majority of the site and between receptors and good management means that the risk of community amenity impacts from odour, dust, noise, flies/vermin, pathogens and visual is likely negligible.

Note: There have been no known complaints regarding Hillcroft farms' current operation.

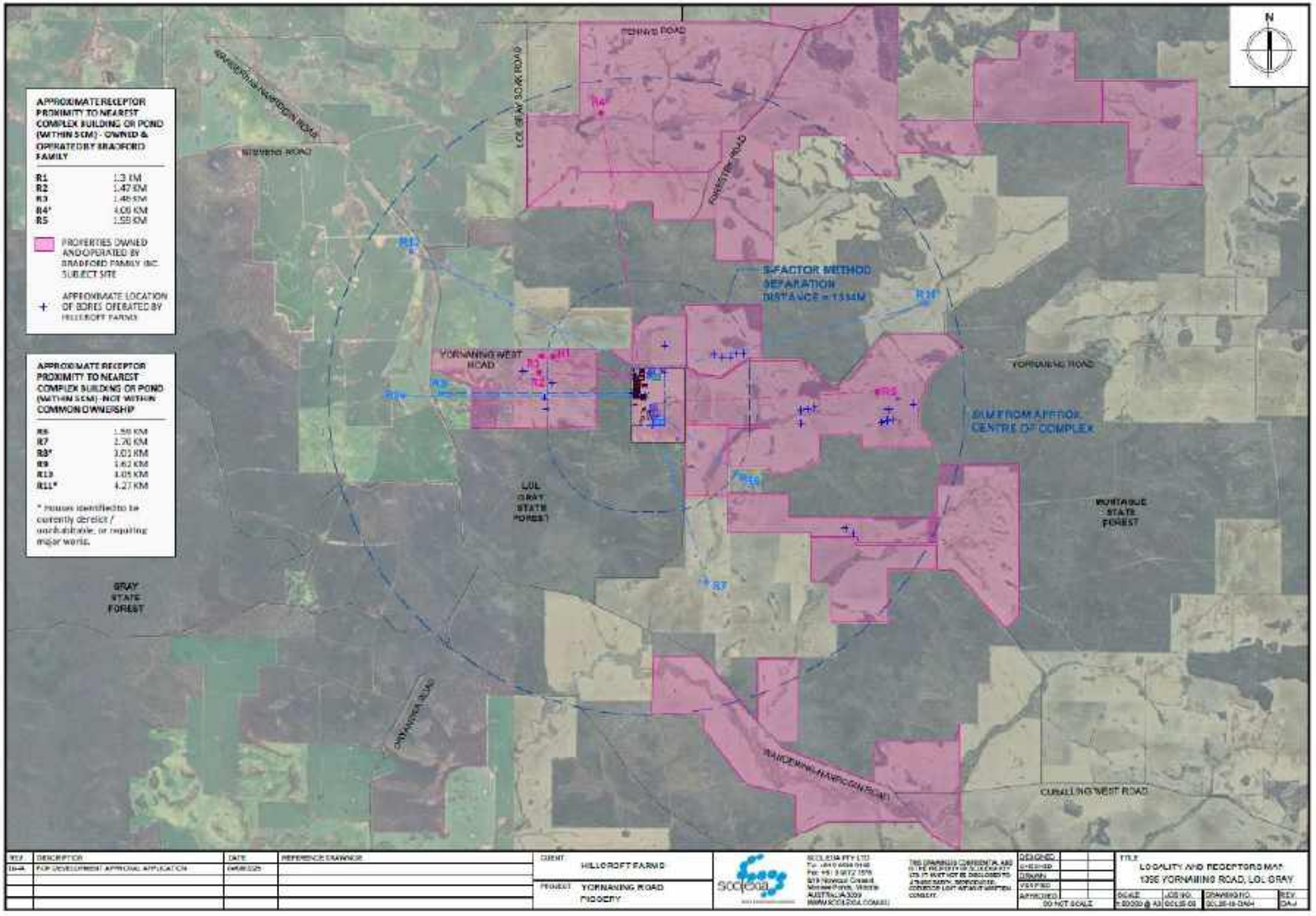


Figure 23. S factor separation distance and identified sensitive receptors.

6.2 Separation buffer-Natural Resources

A buffer distance is the space provided between the piggery complex or reuse areas and sensitive natural resources. (NEGIP, 2025). **Table 13** shows that there are adequate buffers provided to natural resources on site.

Table 13. Buffers to Natural Resources.

Natural Resource	Recommended Buffer/Siting	Proposed Buffer
Surface water	800m Potable water storage 100m watercourse, wetland lake Reuse areas 25m-100m (see (APL2025 pg. 38)	No waterways on site No waterways on site
Flood Risk	Above 1-100year flood line	Not located in a flood area
Groundwater	2m above highest seasonal water table	Estimated to be >20-60m bgl (APL, 2025 indicate depths of >20m low risk)
Native Vegetation	Protection from nutrients etc	>20m away and protected

7 Environmental Risk Assessment

An environmental risk assessment was carried out on Hillcroft Farm piggery that considers the current risk of the site and the risk posed from the proposed expansion. The purpose of the environmental risk assessment is to identify risks that the piggery may pose to the environment and then managing these to minimise the likelihood of harm. It will consider inter-related factors and how to minimise or mitigate all environmental risks through design, management or monitoring. The risk assessment provides opportunities to demonstrate that risk is being minimised, or ways to improve design or operation to further reduce risk.

Australian Pork Limited have recently released a risk assessment framework that considers the likelihood and consequence of an impact occurring from a piggery operation. The risk assessment undertaken for Hillcroft farms takes into account factors such as siting, location, planning controls, climate, soils, topography, groundwater, surface waters, design and management. The following sections outline the process (APL, 2025), key considerations and results of the risk assessment.

7.1 Process Overview

The risk identification process undertaken on Hillcroft piggery (See **Figure 24**) involved:

- identifying hazards
- considering the level of consequence if the hazard were to occur.
- considering the likelihood of occurrence.
- evaluating the risk level.
- identifying practical controls that could be used to reduce risk.
- re-evaluating the risk level with the new controls in place.

Figure 24. Risk assessment process, APL, 2025.

7.2 Hazards

Hazards are the ways in which the piggery may pose a risk to the environment or public health. For example, effluent might pose a hazard if it spills posing a risk of polluting a watercourse.
Common hazard categories could include the potential for risks from:

- effluent
- manure (including spent bedding/compost)
- mortalities
- odour
- dust
- noise
- pathogens
- chemicals
- wastes (rubbish and sharps).

7.3 Consequences

This involves considering the level of harm that could occur should the hazard eventuate. Each consequence (See **Figure 25**) should be rated as low, minor, moderate, major or severe. When deciding the rating, we considered the existing piggery and proposed expansion i.e., siting, design or management.

Low	No or minimal environmental or public health impact.
Minor	Low environmental impact or potential for public health impacts. Examples include: • effluent spill that does not leave the property boundary or enter a watercourse • nuisance resulting in an isolated community complaint.
Moderate	Medium level of harm to the environment or public health over an extended period of time. Examples include: • contained off-site environmental incident (e.g. effluent spill on road) • nuisance resulting in repeated community complaints from one incident.
Major	Serious harm to the environment or public health. An environmental impact that is severe and likely to impact beyond the immediate site and remain a problem in the medium term. Examples include: • significant effluent spill into a watercourse • nuisance resulting in ongoing community complaints.
Severe	Something that causes permanent or long term serious environmental harm, life threatening or long term-harm to public health. Examples include: • significant volumes of effluent regularly entering a Ramsar wetland or potable water supply • worker death resulting from untrained staff working in a confined space or hitting overhead power lines with machinery.

Figure 25. Consequence Ratings, APL, 2025.

7.4 Risk Likelihood

This step involves evaluating the likelihood of the hazard eventuating. The rating ranges from rarely to certain. (See **Figure 26**).

Likelihood rating	Similarity
Rare	Could happen but probably never will
Unlikely	Not likely to happen in normal circumstances
Possible	May happen at some time
Likely	Expected to happen at some time
Certain	Expected to happen regularly under normal circumstances

Figure 26. Liklihood rating, APL, 2025.

7.5 Risk Evaluation

The risk rating matrix provided in **Figure 27** was used to rate the risk by considering consequence and likelihood together, where consequence X likelihood = risk rating.

Likelihood	Consequences				
	Insignificant	Minor	Moderate	Major	Severe
Certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	High
Unlikely	Low	Low	Medium	Medium	High
Rare	Low	Low	Low	Medium	Medium

Figure 27. Risk Rating Matrix, APL, 2025.

The colour-coded output of the risk rating matrix identifies the overall level of risk. **Figure 27** can be used to guide the actions that follow:

- Low (green) – acceptable. The siting, design and management is acceptable. No corrective or preventative action is needed although further controls may be considered to further reduce risk if this can be done with little cost and effort.
- Medium (yellow) – at this risk level consider additional controls to reduce the risk to low.
- High (orange) – the risk is unacceptable. Risk will need to be mitigated through the implementation of appropriate corrective and / or preventative actions.
- Extreme (red) – the risk is totally unacceptable. Immediate corrective and / or preventative action must be implemented which could include ceasing some site activities.

7.5.1 Risk Interpretation

Risk Level	Action
Extreme	Implement corrective or preventative actions immediately to lower the risk to an acceptable level, which could include ceasing some site activities.
High	Implement controls as a priority to reduce the level of risk.
Medium	Additional controls should be considered and implemented to reduce the level of risk.
Low	No additional controls are needed although controls could be implemented to further minimise risk.

Figure 28. Risk action guide, APL, 2025

Identify Practical Controls

Where a risk needs to be addressed, consider the causes and use these to identify options to minimise the risk to the extent that is reasonably practicable considering effectiveness, feasibility and cost. This could be achieved by eliminating or reducing the hazard and/or consequence and/or the likelihood. Controls could involve changes to siting, design or management. For example, a risk to a watercourse could be reduced by relocating facilities or activities further away. A risk to groundwater from a manure storage area could be mitigated by constructing a bunded, impermeable pad for this activity. Odour nuisance could be mitigated by only irrigating effluent under conditions likely to promote good odour dispersion.

Re-Evaluate the Risk

This step involves re-assessing the risks using the risk matrix to determine if the new controls will eliminate or lower the risk to an acceptable level. If not, the process should be repeated.

7.6 Risk assessment Guidance

APL (2025) provides guidance to assist in the identification and assessment of common hazards that could occur at pig farms. It provides guidance on how identify sensitive land uses and natural resources that might be at greater risk from hazards. It provides a way to assess the vulnerability of the:

- Soils of reuse areas.
- Groundwater - quality and availability.
- Surface water - quality and availability.
- Community amenity.

The guidance (APL, 2025) also provides information, to assess the risk mitigation offered by the design and management of:

- Pig housing.
- The nutrient content of manure.
- The effluent collection system
- The manure solids separation system.
- The effluent management system.
- The manure storage/composting area.
- Carcass management.
- Design and management of reuse areas.
- Chemical storage and use.

This guidance has been used to determine the risk rating of a particular hazard on the vulnerability of natural resources and amenity as well as risk mitigation afforded by the design and management of systems/infrastructure at a premise. This process then highlights where/if improvements to siting, design and management may be needed to minimise risks to the environment.

Table 14 outlines the risk assessment undertaken for Hillcroft piggery for the current siting, design and management of the operation and after the proposed expansion.

Table 14. Risk assessment for Hillcroft Piggery.

Risk rating with current operation						Risk rating after proposed expansion			
Hazard	**Description of risk**	**Current controls**	**Likelihood**	**Consequence**	**Risk Rating**	**New Controls**	**Likelihood**	**Consequence**	**Risk Rating**
Piggery housing -Indoor conventional	Odour generation from effluent and manure and spilt feed. Noise from pig vocalisation	Piggery complex located >1.6km from nearest receptors and is surrounded by dense vegetation on two sides. Significant buffers provided by land in same ownership Sheds are periodically hosed down to remove manure and effluent and minimise odour. Static pits are monitored and emptied regularly to clean sheds. Regular shed inspections to identify spilt feed and manure build up. Cleaned as soon as practicable. Significant vegetation between the piggery sheds and neighbouring properties creating dispersion of potential odour and screening for any dust and noise. Ad lib feeders in most sheds reduce pig vocalisations as the pigs have access to feed at all times reducing pig noise and excitement at feeding times Areas of dust deposition including fans and cooling systems are regularly cleaned. Feed is transported in a fully enclosed truck which deposits feed directly into the into the feed system within the shed to minimise dust	Rare	Minor	Low	Piggery complex meets S-factor distances in NEGIP-SD (2025) New sheds to be constructed within the same footprint of the current piggery thus significant distances, buffers and vegetation maintained between complex and receptors. All additional new sheds will be managed as per current regime ie hosing, monitoring schedule and removal frequency.	Rare	Minor	Low

Piggery housing -Indoor conventional	Uncontrolled run-off from sheds entering surface waters and groundwater Sanitisation and veterinary chemical run-off to waterways and groundwater.	No waterways located on the piggery premise. Premise is above the 1:100yr flood. No flood overlays Groundwater depths of more than 20m below the sheds Sheds are built above the natural ground level to prevent in ingress of stormwater and egress of contaminated stormwater. All effluent collection systems under the piggery are impermeable concrete preventing groundwater contamination. Integrity of pits is monitored after emptying.	Unlikely	Minor	Low	Same siting design and management as current operation	Unlikely	Minor	Low
Piggery housing- Deep litter	Wet litter and spilt feed causing odour generation Noise from pig vocalisation Dust from bedding materials	Piggery complex located >1.6km from nearest receptors and is surrounded by dense vegetation on two sides. Significant buffers provided by land in same ownership Ad lib feeders reduce pig vocalisations as the pigs have access to feed at all times reducing pig noise and excitement at feeding times Weather conditions considered when adding and removing bedding to the shelters	Rare	Minor	Low	No change to deep litter system. Shelters managed as per current regime, monitoring, litter replacement and removal frequency.	Rare	Minor	Low
Piggery housing- Deep litter	Uncontrolled run-off from shelters entering surface waters and groundwater	No waterways located on the piggery premise. Premise is above the 1:100yr flood. No flood overlays Groundwater depths of more than 20m below the sheds. Deep litter shelters have impermeable concrete bases	Unlikely	Minor	Low	Shelters managed as per current regime	Unlikely	Minor	Low

		Sheds are built above the natural ground level to prevent in ingress of stormwater and egress of contaminated stormwater.							
Feed Mill	Dust generation from milling activities Noise from operation	Piggery complex located >1.6km from nearest receptors and is surrounded by dense vegetation on two sides. Significant buffers provided by land in same ownership. The feed mill is fully enclosed when operational to minimise noise and dust. All additives and feed products are stored within fully sealed silos. Feed transported to sheds in fully enclosed vehicles.	Possible	Low	Low	No change in feed mill design or management. Existing infrastructure can accommodate increase in proposed feed capacity Feed mill operation is fully enclosed.	Possible	Low	Low
Feed Mill	Feed additive storage facilities leaching wet ingredients into soil and groundwater	All additives and feed products are stored within fully sealed silos or IBCs on an earthen base. All used IBCs are temporarily located on a compacted earthen base prior to removal. Any spills will be cleaned up as soon as possible. No waterways on site and groundwater below 20m.	Unlikely	Minor	Low	No change in current controls. Same infrastructure utilised and managed.	Unlikely	Minor	Low
Feed Mill	Feed spills attracting pests and vermin	All products are stored within fully enclosed silos to prevent vermin access and attraction. Any spills are cleaned up as soon as possible.	Possible	Low	Low	No change in current controls.	Possible	Low	Low

Effluent - collection and conveyance	The effluent could enter the groundwater system. Effluent run-off into surface waters Effluent contamination of soils Effluent conveyance damage and spills Stormwater ingress into collection and conveyance impacting capacity	The effluent collection pits beneath the piggery sheds are constructed of impermeable concrete The sheds are monitored daily for effluent collection volumes and emptied regularly to prevent excessive build up. Pits are emptied in series on different days to minimise conveyance system overloading and overflow. Conveyance system to effluent ponds is fully enclosed underground PVC pipes to reduce the risk of traffic damage. Groundwater below 20m and no waterways on site. The effluent collection systems (channels, drains, pipes, sumps) have good structural integrity and are regularly inspected for damage. Uncontaminated stormwater and drainage from piggery sheds and the area around the shed is kept separate from the effluent stream. Underground effluent pipes regularly have effluent flushed through them to prevent blockages.	Unlikely	Minor	Low	New effluent system to be designed in accordance with the NEGIP-SD (2025) and NEGIP-M (2025) Collection and conveyance within same footprint as current complex. Same design and management as current operation. ie static pits Managed as per current regime ie hosing, monitoring schedule and removal frequency. Integration into upgraded effluent system	Unlikely	Minor	Low
Effluent - collection and conveyance	Odour generation from effluent and manure build up	The sheds are regularly cleaned to maintain clean lanes, pens and handling areas. Conveyance infrastructure to the ponds is fully enclosed underground.	Likely	Low	Medium	New infrastructure added to the routine conveyance inspection program,	Likely	Low	Medium

		Effluent is conveyed into the ponds within the bank structure and not at height which minimises odour aerosols. Piggery complex located >1.6km from nearest receptors and is surrounded by dense vegetation on two sides. Significant buffers provided by land in same ownership.							
Effluent treatment and storage	Overland flow/run-off to a watercourse	No watercourses on site. Effluent ponds designed in general accordance with APL (2018). Bases of all ponds have been constructed of compacted clay. Ponds banks are raised above natural ground levels preventing excess stormwater from entering and impacting capacity. All ponds have been designed with overflow piping at 500mm to maintain a freeboard at all times. Pond capacity reports demonstrates sufficient capacity in the system to avoid having an overtopping frequency of more than 1:10yr (industry standard) Pond levels are monitored weekly Desludging program based on sludge accumulation to maintain capacity within the system. A pump maintenance schedule is in place to regularly service equipment Stand by pump or spare parts are kept on site to expedite repairs.	Unlikely	Minor	Low	New effluent system to be designed in accordance with the NEGIP-SD (2025) and NEGIP-M (2025) ie less than 1:20 year spill frequency for evaporation. Storage areas within same footprint as current complex. Scheduled site inspection and audits are to continue weekly-monitoring of pond levels and review weather forecasts for intense rainfall events. Freeboard will be maintained in accordance with APL 2010-, 2025. Desludging program maintained to ensure ponds are functioning correctly and maintaining capacity.	Unlikely	Minor	Low

Effluent treatment and storage	Odour generation from poor treatment	Effluent ponds have been designed in accordance with APL National Environmental Guidelines and have sufficient treatment capacity (capacity report) to reduce volatile solids and produce a stabilised sludge which minimises odour. Piggery complex located >1.6km from nearest receptors and is surrounded by dense vegetation on two sides. Significant buffers provided by land in same ownership. No known odour complaints reported from the premises	Possible	Low	Low	Ponds managed as per current system Covered anaerobic pond will reduce odour and GHG emissions.	Possible	Low	Low
Effluent treatment and storage	Leachate generation and vertical infiltration to the groundwater system	Effluent ponds have been designed in accordance with APL National Environmental Guidelines. Site information indicates that the base of the effluent ponds were constructed with low permeability clay sourced from site and compacted. Depth to groundwater at the site is more than 20m below ground level. APL (2025) guidance indicates there is a low risk of impacts to the groundwater system at this depth. Desludging program based on sludge accumulation to maintain capacity within the system. The impermeable layer is maintained during desludging to prevent leakage to the groundwater system.	Rare	Moderate	Low	New effluent system to be designed in accordance with the NEGIP-SD (2025) and NEGIP-M (2025) ie impermeable bases to 1X 10^{-9} ms^{-1} New pond bases will be greater than 2m above the highest seasonal groundwater levels (>20m). Desludging program maintained to ensure ponds are functioning correctly and maintaining capacity.	Rare	Moderate	Low

Spent Bedding storage area/ composting pads	Overland flow to a watercourse	No waterways located on the piggery premise. Premise is above the 1:100yr flood. No flood overlays Spent bedding is composted on a ridge in an area of hard gravel with clay 0.5m below surface. Compost piles designed to prevent leachate run-off. Any run-off directed to a non-sensitive vegetative area within the paddock which drains into a dam.	Rare	Minor	Low	No change to deep litter system. Spent bedding managed as per current composting process.	Rare	Minor	Low
Spent bedding storage area/ and composting pads	Odour and dust from during handling	Piggery complex located >1.6km from nearest receptors and is surrounded by dense vegetation on two sides. Significant buffers provided by land in same ownership. Compost handling and turning is avoided if it is very dry or under windy conditions	Possible	low	Low	No change to deep litter system. Spent bedding managed as per current composting process.	Possible	Low	Low
Spent bedding storage area/ and composting pads	Vertical infiltration to the groundwater system	The hardstand is on a ridge in an area of hard gravel with clay 0.5m below surface to minimise vertical infiltration. Depth to groundwater is around 20 mbgl, and in accordance with APL (2025 in draft) there is a low risk of impacts to the groundwater system.	Unlikely	Moderate	Medium	No change to deep litter system. Spent bedding managed as per current composting process.	Unlikely	Moderate	Medium
Liquid and Solids reuse areas	Sludge and Spent bedding applied to land resulting in excessive nutrient loading to land.	Spent bedding is composted prior to application to land. Only small volumes of Sludge are applied to land using a tanker that controls application rates	Unlikely	Moderate	Medium	Continue to engage the services of an agronomist to provide advice on application rates to land and nutrient load in spent bedding	Unlikely	Moderate	Medium

		Approximately 3000ha is available for land application within piggery ownership. Nutrient budget indicates sufficient reuse land availability. An agronomist reviews soil quality data to manage nutrient levels across the reuse areas. Regular soil sampling in accordance with APL (2018) is undertaken to monitor the load of nutrients in the soil. Sludge and/or manure is spread evenly and at times (March to April) when active plant growth is expected. Evaporation exceeds rainfall.				Periodically test compost and sludge to assist in application rates.			
Sludge and Solids reuse areas	Runoff from high nutrient soils could impact surface water and groundwater systems.	Spent bedding is composted prior to application to land. Only small volumes of Sludge are applied to land using a tanker that controls application rates. Buffer distances are maintained from any waterways or drainage lines. Spreading only occurs when the soil is dry enough to absorb the water and when rain is not expected. (March-April). Evaporation exceeds rainfall. An agronomist reviews soil quality data annually to manage nutrient levels across the reuse areas. Regular soil sampling in accordance with APL (2018) is undertaken to monitor the load of nutrients in the soil.	Unlikely	Moderate	Medium	Continue to engage the services of an agronomist to provide advice on application rates to land and nutrient load in spent bedding/sludge. Periodically test compost to assist in application rates.	Unlikely	Moderate	Medium

		Sludge and/or manure is spread evenly and at times when active plant growth is expected to maximise uptake and minimise losses. Low levels of application to land on site. Low rainfall area minimises run-off.							
Farm machinery and equipment	Noise generation from machinery and equipment Dust from operation of machinery and equipment Spills from equipment and from maintenance activities	Piggery complex located >1.6km from nearest receptors and is surrounded by dense vegetation on two sides. Significant buffers provided by land in same ownership. Premise generally operates between 6am and 6pm. Weather is taken into consideration when undertaking activities which may produce excessive dust. Regularly inspections and maintenance vehicles and equipment use equipment in accordance with manufacturer's recommendations. All maintenance work carried out in an area with compacted/impermeable surface.	Possible	Low	Low	No change in farm machinery and equipment operation, management and maintenance	Possible	Low	Low
Vehicle movements	Noise from traffic movements Dust from traffic movements Light nuisance	Piggery complex located >1.6km from nearest receptors and is surrounded by dense vegetation on two sides. Significant buffers provided by land in same ownership Staff and delivery trucks maintain speeds on internal and external unsealed roads to prevent dust generation Road are maintained and graded as required to maintain standard and surface for all weather access	Possible	Low	Low	Additional vehicle movements from staff and delivery and transportation. Significant buffers provided by land in same ownership. Same controls as current operation.	Possible	Low	Low

		The deliveries and transportation generally occur between 6am and 6pm unless extenuating circumstances ie animal welfare							
Vermin and pests	Amenity impacts on sensitive receptors	Piggery complex located >1.6km from nearest receptors and is surrounded by dense vegetation on two sides. Significant buffers provided by land in same ownership Clean conditions maintained within and around sheds to avoid odour sources that may attract pests and vermin and feed sources. Mortalities are buried away from the complex and are immediately covered to prevent vermin attraction. Regular use of target specific, environmentally safe rodent baits are placed around the exterior walls and doors. Pest programs (Fly and insect etc) are implemented as required	Unlikely	Minor	Low	No change in controls	Unlikely	Minor	Low
Mortalities	Odour from carcasses Dust from burial activities Pest and vermin attraction Pathogen transfer	Mortalities are collected within 24hrs of discovery and placed in the burial pits. Carcasses are immediately covered to prevent vermin attraction. A Mass mortality plan has been developed for the site which Identifies a suitable location(s) on the site in the event of a mass disposal incident. Any mass disposal will occur as directed by vet or authorities.	Unlikely	Minor	Low	Existing practices for mortalities will continue.	Unlikely	Minor	Low
Mortalities	Leaching to groundwater Run-off to waterways Soil contamination	Mortality pits are located with a clay base and are well separated from groundwater. >20m likely. No watercourses on site	Unlikely	Moderate	Medium	Existing practices for mortalities will continue.	Unlikely	Moderate	Medium

De salination Plant	Noise from operation Wastewater entering groundwater and surface waters Soil contamination	Piggery complex located >1.6km from nearest receptors and is surrounded by dense vegetation on two sides. Significant buffers provided by land in same ownership Desalination plant and water tanks are fully enclosed and located towards the back of the property. Additional by-products from the plant are redirected to the evaporation pond.	Unlikely	Minor	Low	No change to the de salination plant operation. By product generation accounted for in new effluent system design.	Unlikely	Minor	Low
Pathogens	Livestock biosecurity Human health	Compost process reduces pathogens and destroys weed seeds in spent bedding. Land application is followed by a 21 day withholding period which allows for UV penetration and wind desiccation. Restricted Animal Management (RAM) requirements adhered to. Minimal hosing in sheds prevents aerosol releases.	Unlikely	Major	Medium	No change in controls	Unlikely	Major	Medium
Chemicals	Spills resulting in groundwater and surface water impacts Soil contamination Chemical drift Human health	Chemicals are stored in impermeable bunded shed. All Safety data sheets (SDS) for chemicals used on site are maintained in an accessible location. Located to the rear of the property. Facilities will be locked and only accessible by suitably trained staff. Spraying of chemicals takes into consideration weather conditions to avoid spray drift. Buffers are maintained to drainage lines, waterways and other sensitive areas.	Unlikely	Minor	Low	Current chemical storage and handling maintained.	Unlikely	Minor	Low

		Empty chemical/vaccine drums and containers are disposed in accordance with manufacturer's instructions. No hazardous materials disposed on site.							
General wastes	Land contamination Groundwater and surface water Odour generation Dust generation from disintegration Pest attraction	General wastes are disposed on an onsite clay based landfill. Materials immediately covered to prevent odour, dust and pest attraction. Scrap metal is stored towards the back of the property in like materials and is recycled or removed by a metal recycler.	Possible	Low	Low	Current practises to continue.	Possible	low	Low

7.1 Natural Resources and Amenity Risk Assessment Results

The risk assessment identifies that the majority of potential hazards on site are rated low or acceptable. That is the proposed siting, design and management of the expansion is acceptable. No corrective or preventative action is needed although further controls may be considered to further reduce risk if this can be done with little cost and effort. In the majority of cases the siting of the site, large separation distances, deep groundwater, no watercourses and design and management of the operation resulted in acceptable risk ratings.

There were five hazards that rated medium in both the current and proposed expansion. However, most of these generated the medium rating based on the consequence rather than the likelihood of the hazard occurring at the piggery. As a result, none of the medium rated hazards resulted in the need for practice change or additional controls.

- ***Effluent*** *-collection and conveyance* *Odour generation from effluent and manure build up*- it is likely that there may be odour generation within and in the immediate vicinity of the sheds due to the effluent collection system being located under the flooring, however the consequence is low as there is significant distance to the nearest receptor. No proposed change to siting, design or management required.
- ***Solids reuse areas*** *Sludge and spent bedding applied to land resulting in excessive nutrient loading to land.* It is unlikely that this would occur, however the consequence is moderate if it occurs over an extended period of time. The piggery owner owns significant land >3000ha. This land is cropped or grazed; thus it is unlikely that composted spent bedding (less nutrients than raw solids) would be applied to a small or same area for an extended period of time to generate excessive nutrient loadings. Applying liquid/sludge using a tanker allows for a controlled spreading rate across different and large areas. Continuing to spread over different areas, cropping and agronomic testing will ensure reduced risk. No change to current practices required.
- ***Solids reuse areas*** *Runoff from high nutrient soils could impact surface water and groundwater systems.* As above, it is unlikely that spent bedding or sludge application will occur near drainage lines or waterways or that excessive build up to generate run-off will occur. However, if it did occur there would be moderate impact over an extended period of time. The site, low rainfall and spreading practices (as above), mean that there is no change to current practices proposed.
- ***Mortalities*** *Leaching to groundwater, Run-off to waterways, Soil contamination.* It is unlikely that leaching will occur due to the pits being clay lined and the groundwater likely being at depth >20m from the base of the pits. However, the consequence is moderate over an extended period of time. Due to the siting, clay lining and deep groundwater, there is no proposed change to the current practices.
- ***Pathogens*** *Livestock biosecurity Human health*. It is unlikely that pathogens will cause any impacts due to the biosecurity practices implemented on site and the significant distances to sensitive receptors. However the consequence is major, thus resulting in the medium rating. Maintaining biosecurity practices, restricting visitors to the site and the large separation distances do not warrant changes to the siting , design or management of the operation.

7.1.1 Amenity Odour, Dust, Noise

All of the hazards identified relating to amenity issues resulted in a low rating due to the siting, design and management of the piggery. A key influence is that the piggery complex is located >1.6km from nearest receptors and is surrounded by dense vegetation on two sides. There are also significant buffers provided by land in the same ownership.

7.1.2 Surface waters

The majority of the hazards relating to surface waters were rated low risk. This is due to the siting, design and management of the piggery and the fact that there are no watercourses located on the piggery premises. Significant land >3000ha is in the same ownership as the piggery allowing for large reuse application areas. Spreading over a large area (avoiding nutrient overloading) and low rainfall also contribute to low risk of run-off. Buffers are maintained to drainage lines and any watercourses. The one risk rating (spreading composted spent bedding) related to surface waters that was medium was due to the consequence. Due to the practices mentioned above there is low risk of surface water impacts.

7.1.3 Groundwater

The majority of the hazards relating to ground waters were rated low risk. This is due to the siting, design and management of the piggery such as impermeable concrete bases, compacted earthen bases and clay lined ponds and pits. A key influence is that the piggery complex is located on an area in which the groundwater has been measured at 20-60m below ground level. Tucker, 2014 also noted that there is likely a clay layer below the soil offering a level of protection. The one risk rating (mortalities) related to groundwater that was medium was due to the consequence. Due the practices mentioned above there is low risk of surface water impacts.

7.1.4 Land/soil protection

The majority of the hazards relating to land/soil protection (nutrients) were rated low risk. This is due to the siting, design and management of the piggery. Where there is a concentration of manures, effluent and spent bedding, the associated infrastructure consists of fully enclosed piped conveyance systems, impermeable bases (concrete or compacted earth) and clay lined ponds and pits. Significant land >3000ha is in the same ownership as the piggery allowing for large reuse application areas. Spreading over a large area (avoiding nutrient overloading) and utilising machinery such as effluent /sludge tankers allowing low application rates contribute to low risk of nutrient overloading and soil structure issues.

8 Other Approvals

During the course of the application process, no other known approvals were identified other than the amendment to the council permit and DWER works approval. As the site is being constructed on the same footprint as the current piggery complex there are no tree removals or vegetation triggers or waterways on site.

9 Conclusion

Based on information provided by Hillcroft Farms, state-based mapping, and a detailed site-specific risk assessment, the proposed expansion of the Hillcroft Farms piggery presents minimal risk to the environment, human health, and community amenity. The low-risk profile is attributed to the site's location, best-practice management, and infrastructure design. Key factors contributing to this assessment include:

- The piggery is currently operated to industry best practice standards.
- The proposed new infrastructure will be located within the existing piggery footprint, avoiding site expansion into new areas.
- There are substantial separation distances to the nearest sensitive receptors, with dense vegetation buffers further enhancing protection.
- There are no waterways present on the site.
- Groundwater lies at a depth of 20 to 60 metres, with an underlying clay layer providing additional protection from potential leaching.
- All infrastructure handling effluent or manure is constructed on concrete or impermeable bases.
- The site has sufficient capacity to accommodate the effluent infrastructure required for the expansion.
- Extensive land is available for the beneficial reuse of nutrients through land application.
- Nutrient reuse supports soil health and reduces reliance on synthetic fertilisers.
- The potential installation of a covered anaerobic pond would further reduce greenhouse gas emissions.
- On-site feed milling, using crops grown with nutrients recycled from the piggery, supports circular economy principles and lowers transportation-related emissions.

----------End of Main Body----------

10Figures List

11Tables List

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