

WORKS APPROVAL AND LICENCE APPLICATION

“WONGAN HILLS” PIGGERY ENVIRONMENTAL MANAGEMENT PLAN

PREPARED FOR CRAIG MOSTYN FARMS PTY LTD

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Table of Contents

1	INTRODUCTION	1
1.1	BACKGROUND.....	1
1.2	LOCATION.....	1
1.3	OWNERSHIP	3
1.4	HISTORY OF THE SITE.....	3
2	PIGGERY DESCRIPTION	7
2.1	INTRODUCTION	7
2.2	INFRASTRUCTURE.....	7
2.3	CLEANING PROCESS.....	8
2.4	COMPOSTING AREA.....	9
2.5	MORTALITIES.....	10
2.6	TRANSPORT	10
3	EXISTING ENVIRONMENT.....	11
3.1	CLIMATIC CONDITIONS	11
3.2	TOPOGRAPHY AND SLOPES.....	12
3.3	GEOLOGY	14
3.4	SOILS	16
3.5	REMNANT VEGETATION.....	18
3.6	HYDROLOGY.....	21
3.7	HERITAGE	24
3.8	SURROUNDING LAND USES.....	26
3.9	SEPARATION DISTANCES	26
3.10	SPECIFIED ECOSYSTEMS	29
4	APL GUIDELINES – SITE SUITABILITY	30
4.1	INTRODUCTION	30
4.2	APL GUIDELINE REVIEW	30
5	APL RISK ASSESSMENT	34
5.1	INTRODUCTION	34
5.2	METHODOLOGY	34
5.3	VULNERABILITY RATING	34

5.4	DESIGN AND OPERATION RATINGS	38
5.5	ENVIRONMENTAL RISK ASSESSMENT	43
6	DWER RISK ASSESSMENT	45
6.1	INTRODUCTION	45
6.2	RISK ASSESSMENT.....	45
7	ENVIRONMENTAL MANAGEMENT	53
7.1	INTRODUCTION	53
7.2	WONGAN HILLS PIGGERY ENVIRONMENTAL MANAGEMENT PLAN	53
8	REFERENCES	1

Appendices

APPENDIX A – PLANS

1 Introduction

1.1 Background

Craig Mostyn Farms Pty Ltd operates a piggery located at Lot 1793 (2293) Yerecoin South East Road, Lake Ninan (“the site”). It comprises an eco-shelter “grower” operation known as the “Wongan Hills Piggery”.

The piggery is certified by the Australian Pork Industry Quality Assurance Program (APIQ) as an Indoor Piggery, “Gestation Stall Free Verification”. Certification allows producers to demonstrate that they meet legal requirements, industry standards and customer specifications for the raising of pigs.

The pig housing at the piggery is entirely comprises of eco-shelter (deep litter) sheds. This housing type is defined by the Australian Pork Limited (APL, 2018) as:

Typically accommodate pigs in shelters made up of hooped metal frames covered in a waterproof fabric, similar to the plastic greenhouses used in horticulture. However, skillion-roof sheds and converted conventional housing may also be used. The bases of the shelters are concrete or compacted earth. Straw, sawdust, rice hulls or similar loose material covers the floor, absorbing manure. The used bedding is generally removed and replaced when the batch of pigs is removed, or on a regular basis.

This purpose of the Environmental Management Plan is to provide an assessment of environmental risk and the environmental management of the piggery. It also accompanies a Licence application. It has been prepared in accordance with the *National Environmental Guidelines for Indoor Piggeries* (Australian Pork Limited, 2018).

1.2 Location

The piggery is located on Lot 1793 (2293) Yerecoin South East Road, Lake Ninan, located in the wheatbelt region, approximately 130km to the north-east of Perth. It is approximately 9.2 kilometres south-west of the Wongan Hills townsite. The local government area is the Shire of Wongan Ballidu. The total size of Lot 1793 is approximately 121 hectares.

The piggery operation (housing and compost area) is located at the far western extent of Lot 1793. The proposed Premise boundary (as shown on the “Premise Plan” in Appendix A) corresponds with the area leased by Craig Mostyn Farms.

A site context plan showing the locality and the surrounding environmental features is provided below.

Figure 1.1 Site Context Plan



1.3 Ownership

Ownership details are provided in the table below. Craig Mostyn Farms Pty Ltd lease a portion of the lot from the landowner for the piggery operations.

Table 1.1 – Ownership details

Lot Number	Plan number	Volume	Folio	Owner
1793	DP134345	2172	634	Myara Downs Pty Ltd

1.4 History of the site

Eco-shelters have been established on this property for a number of years.

Historic aerial photos have been provided below to provide an indication of the site history. Please note that being in a rural area, consistent and recent aerial photography is not available.

Figure 1.2 – Aerial Photo 2000



Source: Landgate

Figure 1.3 – Aerial Photo 2005



Source: Landgate

Figure 1.4 – Aerial Photo 2010



Source: Landgate

2 Piggery Description

2.1 Introduction

The Wongan Hills Piggery comprises the eco-shelter piggery operation. It is referred to as a “grower/finisher” piggery unit type which means that pigs arrive on the site at 3 weeks (after they are weaned) and they are kept in the piggery until approximately 24 weeks old (or until they make the required weight for market).

The piggery is located at the far western side of the lot, to the west of Yerecoin South East Road. The piggery comprises eco-shelter or deep litter shelters, associated infrastructure and composting area. The proposed Premise boundary (as shown on the “Premise Plan” in Appendix A) corresponds with the area leased by Craig Mostyn Farms.

2.2 Infrastructure

The buildings comprising the piggery are listed in Table 2.1 below. A majority of the eco-shelters have a concrete floor, however five do not have a concrete floor and have been constructed on the ground. Most of the eco-shelters have timber walls, but a few have concrete walls. All eco-shelters have a tarpaulin roof. The hospital shelter has timber and tin walls and a tin roof.

Table 2.1 – Piggery Structures

Structure	Quantity	Size	Cleaning regime	Average number of pigs	Age of pigs
Weaner Eco-shelters	6	22m x 12m	Cleaned every 8 weeks. Spent bedding is scraped out of the shelter and the shelter pressure washed with water.	400 pigs in each shelter	3-12 weeks
Grower Eco-shelters	16	25m x 10m	Cleaned every 8 weeks. Spent bedding is scraped out of the shelter and washed with water occasionally.	200 pigs in each shelter	12-16 weeks
Finisher eco-shelters	12	25m x 10m	Cleaned every 8 weeks. Spent bedding is scraped out of the shelter and washed with water occasionally.	200 in each shelter	16-24 weeks
Holding shed	1	25m x 10m	Used for temporarily holding pigs prior to transport.	Usually 240	Finishers
Hospital shelters	1	5m x 4m	Cleaned when needed.	Various	Weaner age pigs only.

The inside of the eco-shelter is set up with straw bales at one end (western end) to provide a place for pigs to sleep. The feeders and drinking water are provided at the other end of the shelter. Pigs generally defecate in the space between the straw and feeders. Drinking water is pumped into drinking facilities built into the wall of the eco-shelter.

Each eco-shelter has a 2m concrete 'apron' that extends from the eastern end of the shelter. The apron is used to stockpile spent bedding during cleaning.

Also located within this piggery is the office/administration building, a holding shed and composting area. The holding shed is used to temporarily hold pigs before being loaded onto a truck for market. Further information about the composting area is provided below. The feed silos are located closer to the site entrance, along the access road from Yerecoin South East Road.

Water for the piggery (including cleaning water and drinking water) is supplied by groundwater production bores located on the Myara Downs farm.

2.3 *Cleaning process*

The eco-shelters are cleaned every 8 weeks. The current process for cleaning is as follows:

1. Solid waste (straw and manure) is pushed and scraped to the eastern side of the eco-shelter and partially onto the concrete apron.
2. It is placed on the area between the eco-shelters temporarily.
3. Solid waste is picked up by a telehandler and taken to the compost area
4. A high pressure hose is used to wash the weaner eco-shelters and occasionally the grower and finisher shelters (if required). Water is drained to the outside of the shelter onto the ground.
5. Feeders are cleaned inside the shelters, there is no separate washdown area.

Waste removed from the eco-shelters is as follows:

- Approximately 30m³ waste from the weaner eco-shelters each time it is cleaned. One weaner eco-shelter is cleaned each week.
- Approximately 40m³ waste from the grower and finisher eco-shelters each time it is cleaned. One grower and one finisher eco-shelter is cleaned each week.

Volume of water used to clean the weaner and grower eco-shelters is as follows:

- 1800 litres to wash the weaner eco-shelters
- 1500 litres to wash the grower eco-shelters (if required)

This report provides recommendations relating to the cleaning and management of the eco-shelters and the compost area, with the aim of reducing emissions and discharges to the environment. It is recommended that eco-shelters are managed to prevent any water runoff from existing shelters and ensuring that spent bedding is transferred directly from the concrete pad to the composting area.

2.4 Composting area

The composting area is located directly to the west of the eco-shelters, with some composting to the south. It is approximately 300m x 130m in size (37,000m²). The soil on the site is sandy with some gravels and trace amounts of clay, however it is understood that the base of the composting area comprises compacted gravel. Spent bedding is composted in this area.

There are currently no earth bunds surrounding the composting area. The land slopes gently to the south. There was no evidence of surface water runoff from the composting windrows during a site inspection in January 2024 and upon a review of aerial photography. However, it is recommended in this report that an earthen bund is placed downslope of the composting area to contain water runoff from the composting area during rainfall events.

The spent bedding is placed into low stockpiles approximately 1.5m in width to 1.5m in height. The compost is stockpiled in windrows which are orientated in a north-south direction of approximately 100-150m in length. Compost windrows are regularly turned and processed for many months until it is in a composted state.

It should be noted that the aerial photography available from Landgate does not give a true indication of how the composting area is currently managed. A more recent image of the site from Google Earth is provided below which gives an indication of the composting windrows.



Source: Google Earth

2.5 Mortalities

Pig carcasses are picked up daily from the shelters and placed in a burial pit located on adjoining Lot 3267. This application includes a proposal to construct a concrete composting tunnel which will be used to compost mortalities. The composting tunnel will be located in the area adjoining the eco-shelters.

There are approximately 10 pig deaths per week (520 pigs per year).

2.6 Transport

Approximately 240 pigs are transported from the piggery each week and every four weeks there are two truckloads of 240 pigs, giving an average of 300 pigs each week.

3 Existing environment

3.1 Climatic conditions

Temperature

The site is located in the wheatbelt region of Western Australia, to the north-east of Perth. This area experiences cool, wet winters and hot, dry summers.

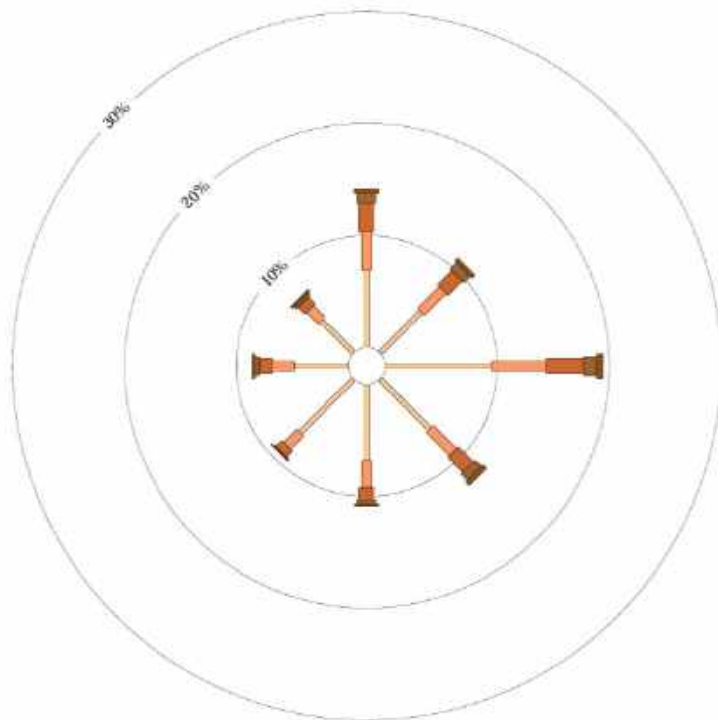
The closest weather station is located at Wongan Hills. It has recorded the mean maximum temperature as 34.7 degrees Celsius (recorded in January) and the mean minimum temperature as 6.6 degrees Celsius (recorded in July) (Bureau of Meteorology, 2024).

Rainfall

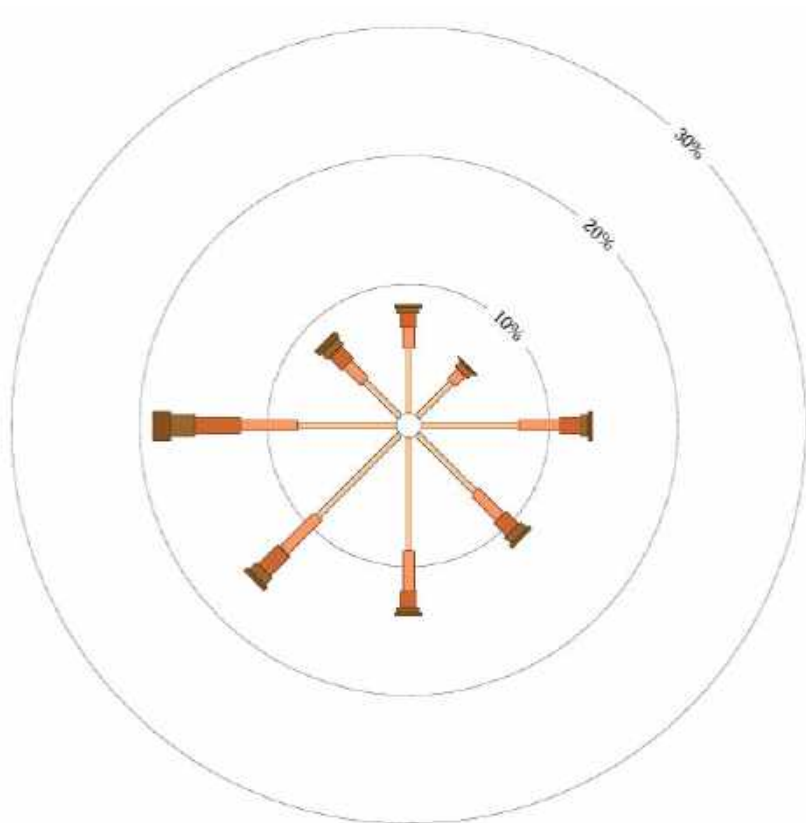
The closest weather station is located at Wongan Hills. The mean annual rainfall is 387mm with most rain falling during the months of May to August (Bureau of Meteorology, 2024).

Wind conditions

The annual wind rose for 9am is below. As can be seen from the wind rose, the prevailing wind in the morning is generally from the east. The prevailing wind in the morning is generally from the east throughout the year except in winter when it is from the north.



The annual wind rose below shows that the prevailing wind direction at 3pm is from the west. Most months of the year have prevailing winds from the west in the afternoon, particularly during winter and spring. Some months during summer and autumn have prevailing winds from the south-west, south and south-east.



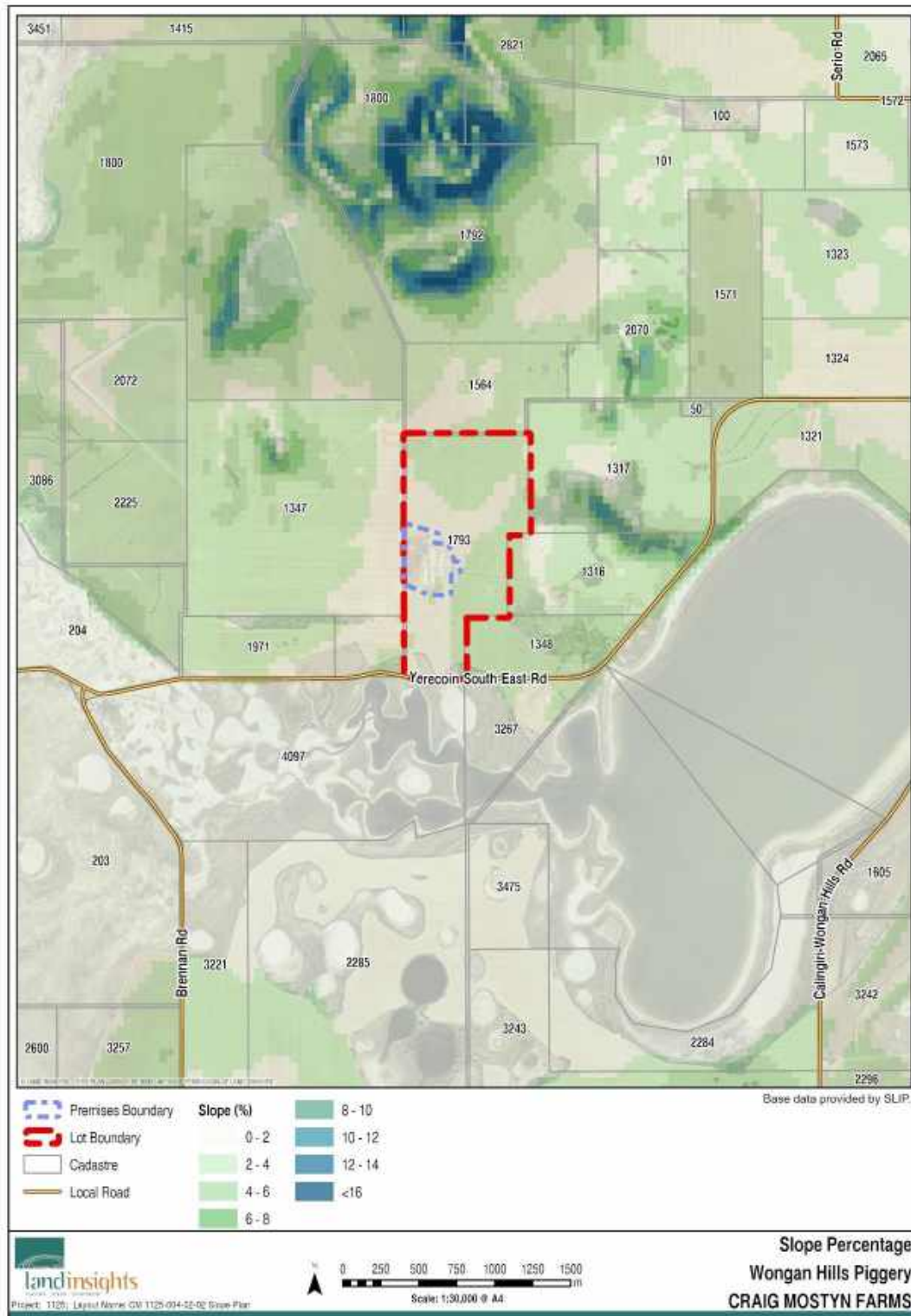
3.2 Topography and slopes

Lot 1793 gently slopes from north to south. The highest point is at the northern end of the lot at approximately 260m AHD (Australian Height Datum) to approximately 240m AHD at the southern point of the lot.

The slopes throughout the site are relatively gentle. Figure 3.1 below shows the slope across the lot and within the proposed Premise boundary. The Premise is located on land with a 0-2 degree slope.

The gentle slope of the site reduces the likelihood of water erosion and the movement of soil downslope.

Figure 3.1 – Slope



3.3 Geology

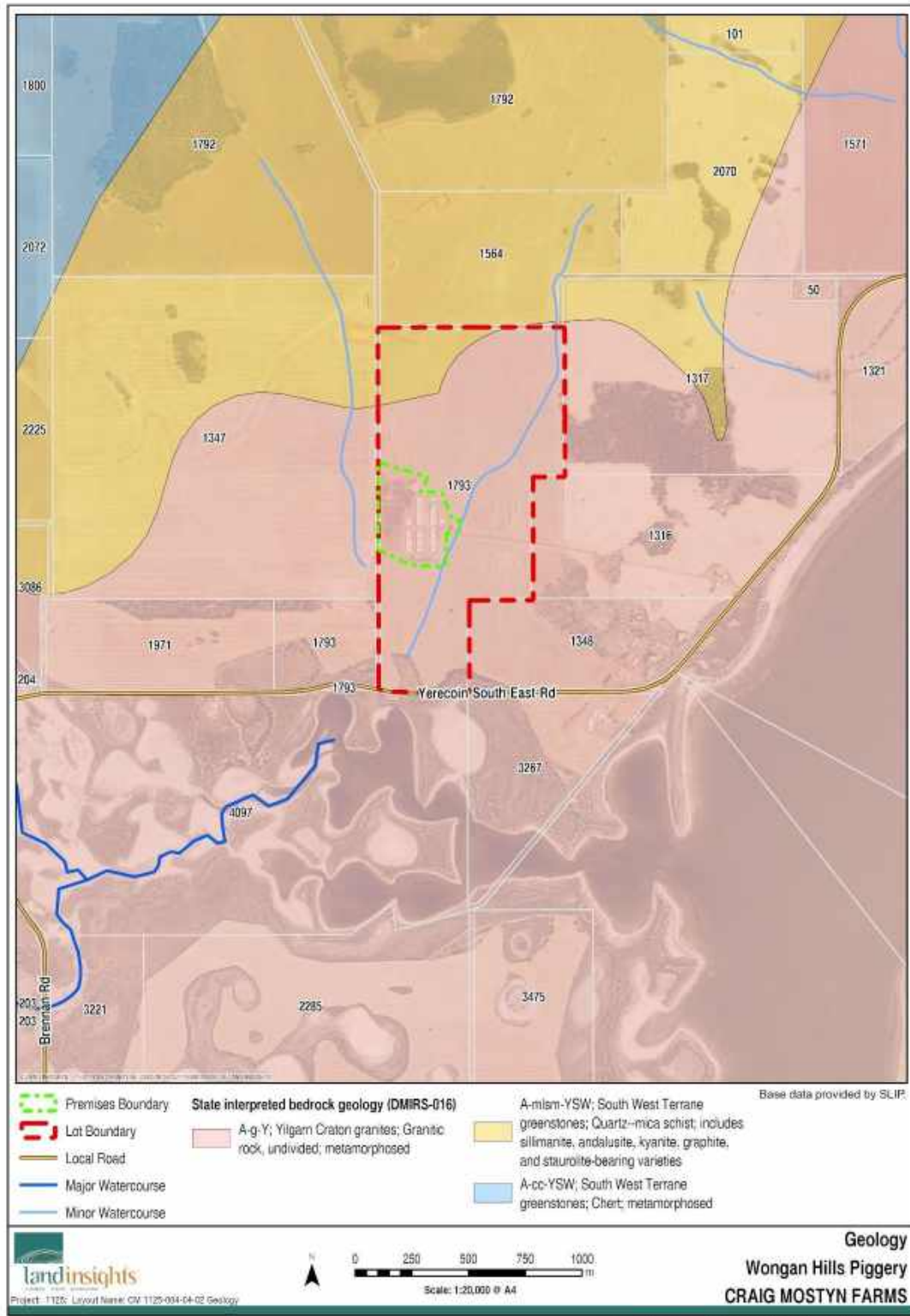
The site lies on the western edge of the Yilgarn Craton. DPIRD maps the geological formation across the site as “Undulating terrain with rock outcrop” and the geology as “colluvium over granitic rocks”.

The 1:2 500 000 and 1: 500 000 state interpreted bedrock geology by DMIRS maps the site within the “Yilgarn Craton granites” (symbol A-g-Y) which is described as “Granite rock, undivided and metamorphosed”.

The Regolith of WA – 500 metre grid mapped by DMIRS shows the piggery is located on “Lacustrine deposits; includes lakes, playas, and fringing dunes” on the southern side and “Slope deposits; includes colluvium and sheetwash” on the northern side. This description is reflective of the on site landscape which slopes to the south where it reaches the low lying wetlands.

DPIRD maps the geological formation across the site as “Undulating terrain with rock outcrop” and the geology as “colluvium over granitic rocks”.

Figure 3.2 – Geology



3.4 Soils

The soil-landscape units are mapped by DPIRD. The mapping indicates that the predominant soil-landscape unit across Lot 1793 is “Wongan Hills 1 subsystem” which is described below:

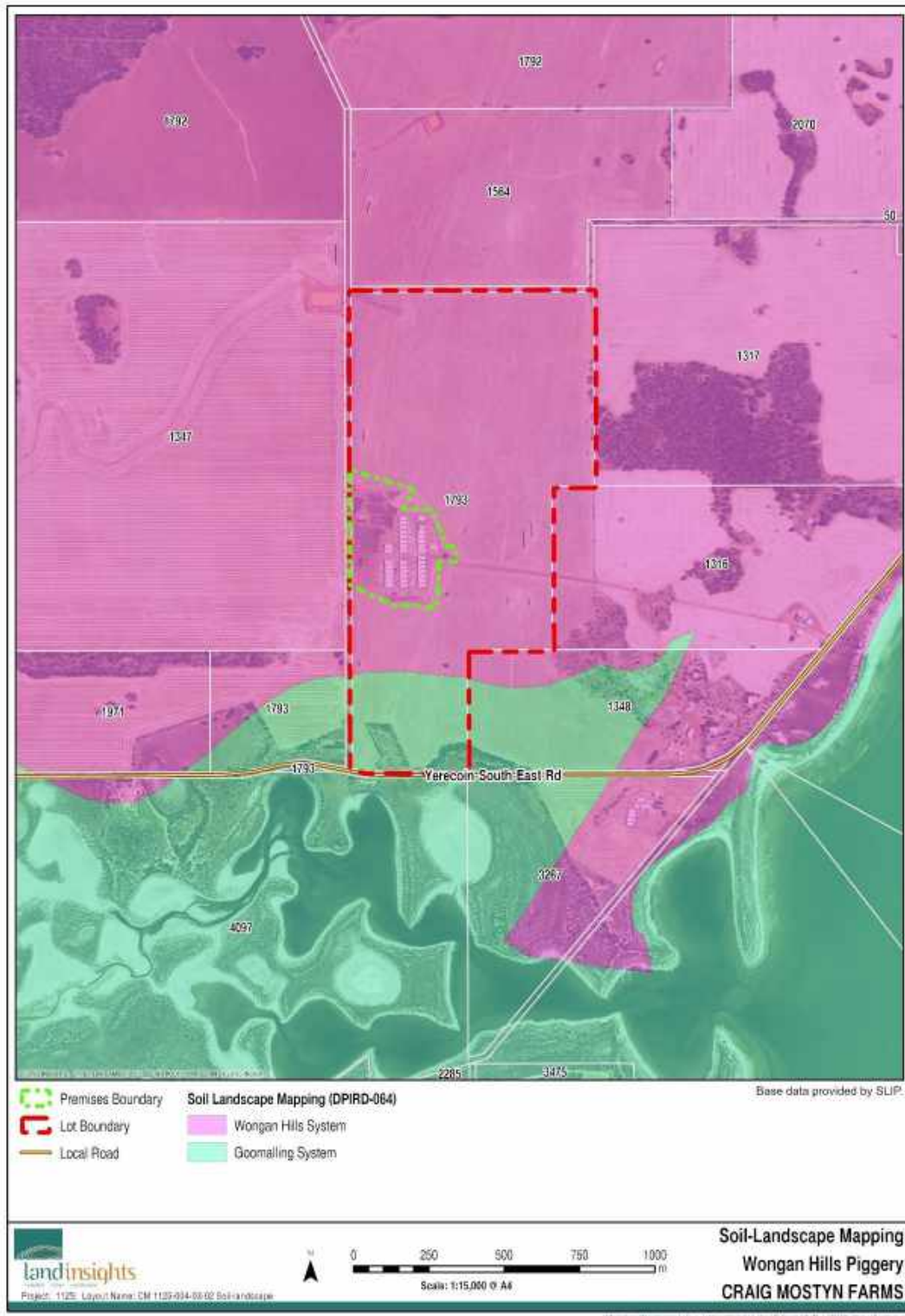
Wongan Hills 1 subsystem (256Wg_1) – “Grey brown shallow and deep loamy duplex, sandy and loamy earth and minor of shallow and deep sand”

The soil qualities mapped by DPIRD are described in the table below. The mapping categorises the soil qualities in terms of low, medium and high risk. The soil-landscape unit within the Premise has a low risk for most relevant soil qualities, with a medium risk of wind erosion due to the sandy nature of the soil.

Table 3.2 – Soil qualities

Symbol	Phosphorus export risk	Flood risk	Water erosion	Wind erosion	Waterlogging
Wongan Hills 1 subsystem	Low risk	Low risk	Low risk	Medium risk	Low risk

Figure 3.3 – Soil-landscape units



3.5 Remnant vegetation

Lot 1793 and the surrounding area has been historically cleared to facilitate agricultural uses, and is still largely void of native vegetation. There are no areas of native vegetation within or directly adjoining the Premise. The closest vegetation is approximately 400m to the south of the proposed Premise boundary, associated with the watercourse and wetland system. While these areas are downslope of the piggery, it is considered that there will be a low risk of impact with the implementation of the recommendations from this report. Another area of remnant vegetation is located approximately 550m to the east of the piggery. This vegetation is located upslope of the piggery.

The pre-European vegetation is mapped as “Guangan – 1024” system association by the Department of Primary Industries and Regional Development (DPIRD) database. The structure is described as “thicket” and the flora is described as “Wattle, Casuarina and Teatree (Acacia-Allocasuarina-Melaleuca alliance”.

There are no Environmentally Sensitive Areas mapped on Premise or the Lot. There are also no Clearing Instruments (proposals, approved areas, conditions) and no Offsets mapped within or surrounding the Premise.

There are no proposals to clear native vegetation as part of the Licence application.

Conservation significant species and communities

No Threatened Ecological Communities (TECs) have been mapped on the site by the Department of Biodiversity, Conservation and Attractions (DBCA).

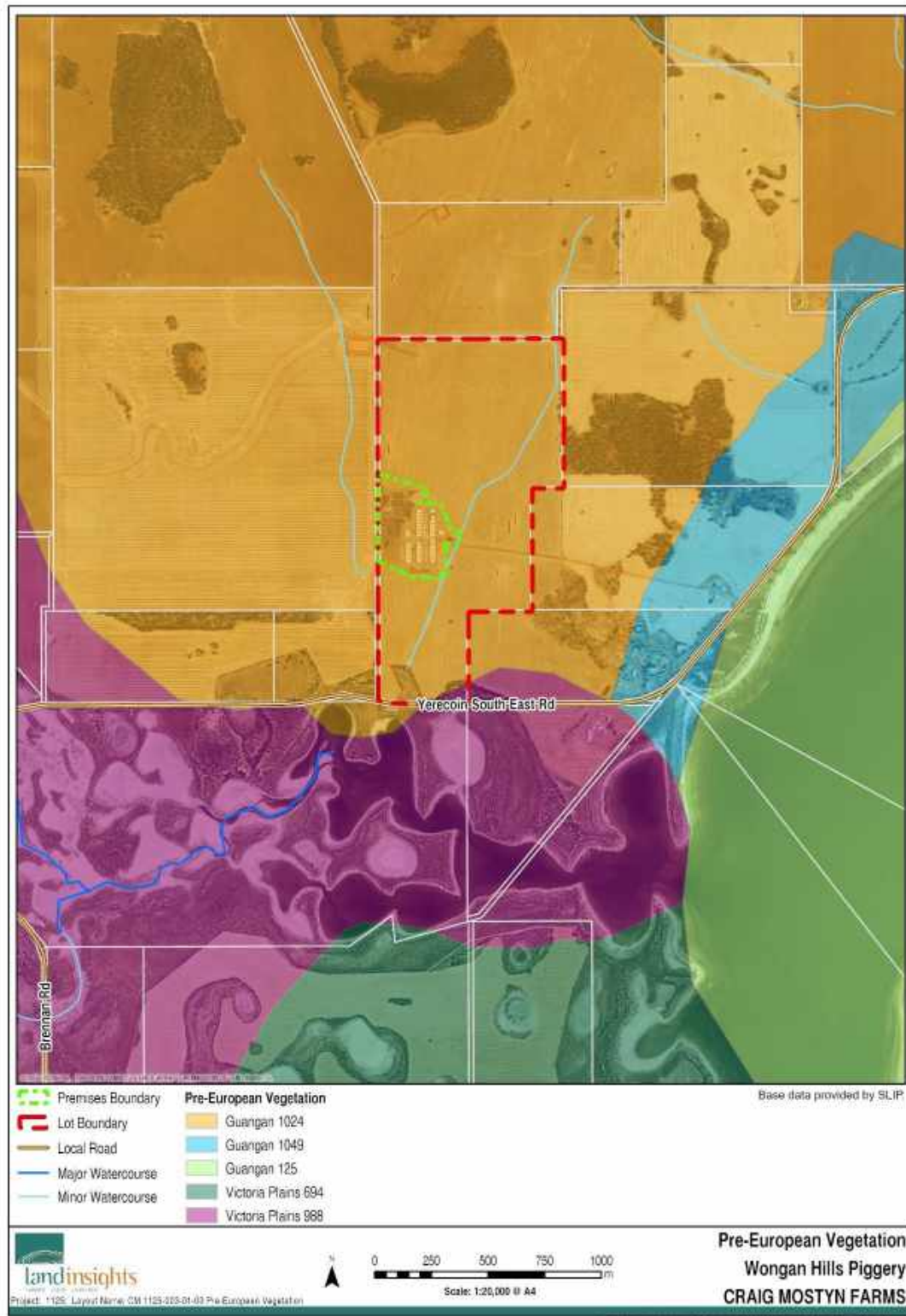
No Threatened or Priority flora or fauna are mapped by DBCA as occurring on the site. A number of occurrences of Threatened Flora (Threatened and Priority 3) have been mapped to the north and south-west of the site. One occurrence of Threatened Fauna is mapped as occurring in Lake Ninan to the south-east of the site. The database does not specify the species, but it lists it as a mammal and the conservation status is “vulnerable”.

As there are no proposals to clear native vegetation, there will be no direct impact to conservation significant species or communities.

Figure 3.4 – Remnant Vegetation



Figure 3.5 – Pre-European Vegetation Communities



3.6 Hydrology

Regional hydrology

Hydrology data mapped by the Department of Water and Environmental Regulation (DWER) is as follows:

- Surface Water Area – *Avon River System* (Proclaimed)
- Surface Water Subarea – *North Mortlock Avon System* (Proclaimed)
- Groundwater Area – *Karri* (Unproclaimed)
- Groundwater Subarea – *Karri* (Unproclaimed)
- Hydrographic Catchment Division – *South-west*
- Hydrographic Catchment Name – *Swan Avon – Mortlock*
- Hydrographic SubCatchment Name – *North Mortlock Avon System*
- Hydrographic Basin Name – *Avon*
- Hydrological Zone Name – *Northern Zone of Rejuvenated Drainage*
- Surface Water Management Area – *Avon River System*
- Surface Water Management Subarea – *North Mortlock Avon System*

The hydrological zone is *Northern Zone of Rejuvenated Drainage*. It extends from Beverley at the northern end to the Gordon River at the southern end. It is described by DPIRD as having a basement of granitoid rock at the western edge of the Yilgarn Craton. It is a predominantly erosional landscape with uplands mainly comprised of lateritic gravel.

There are no Public Drinking Water Source Areas and no Proclaimed Groundwater Areas in the region. The proposed Premise is located in a Proclaimed Surface Water Area (“Avon River System”) under the *Rights in Water and Irrigation Act 1914* (RIWI Act).

Local Surface Hydrology

The proposed Premise lies within the surface water catchment area for the North Mortlock River, which is a tributary of the Avon River. This catchment area is one of the many systems responsible for feeding saline water into the Avon River (Water and Rivers Commission, 2003).

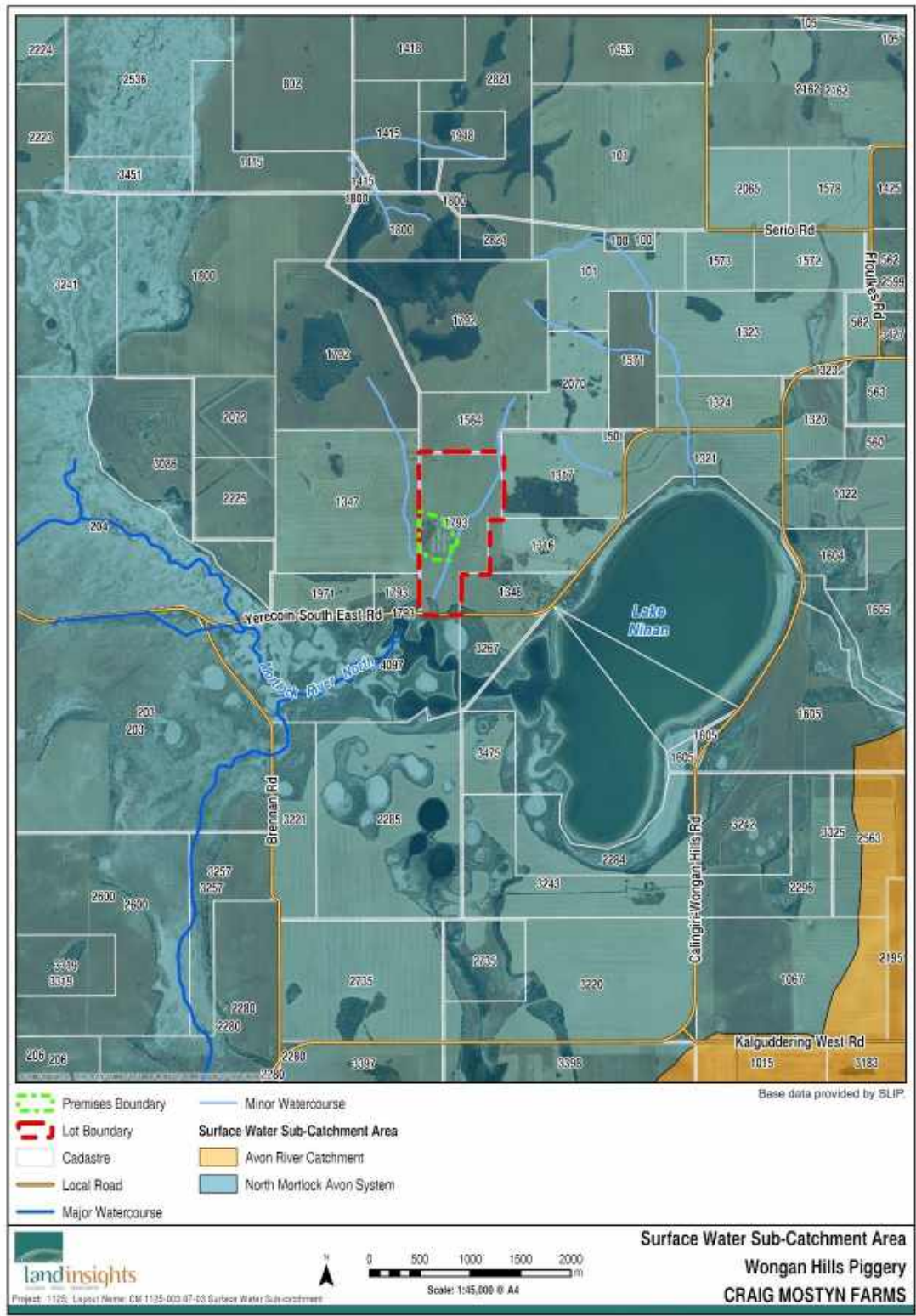
Lake Ninan has been impacted by historic land uses relating to agriculture in the area, one of the main impacts being increased salinity and nutrient levels. The lake is located at the southern end of the North Mortlock River surface water catchment area. Water in the lake can be up to six times saltier than the sea and fish and bird species numbers have been reduced as a result (Pendragon Environmental Solutions, 2018).

The North Mortlock River runs along the southern boundary of the lot. It is approximately 670 metres to the south of the piggery. Lake Ninan is approximately 1,200 metres to the south-east of the piggery.

Figure 3.6 – Surface Water Features



Figure 3.7 – Surface Water Sub-catchment Areas



Hydrogeology

The 1:250,000 Hydrogeology Map Series shows that the aquifer beneath the proposed Premise and surrounding areas is a 'surficial aquifer – porous media and un-consolidated'. Groundwater in the superficial aquifer is partially confined, and as a result, is partially under pressure.

There are local groundwater systems such as saprolite and perched sandplain aquifers in the area. Groundwater is located at approximately 237m AHD which is approximately 10m below ground level (the piggery is at approximately 248m and 252m AHD). Groundwater has been determined to be approximately 10-14 metres below ground level. No areas of perched watertable or waterlogged areas are known to be located within or adjacent to the piggery. A number of production bores are located on the Myara Downs farm, which supply water to the piggery. These are located at a depth of approximately 20 metres below ground level.

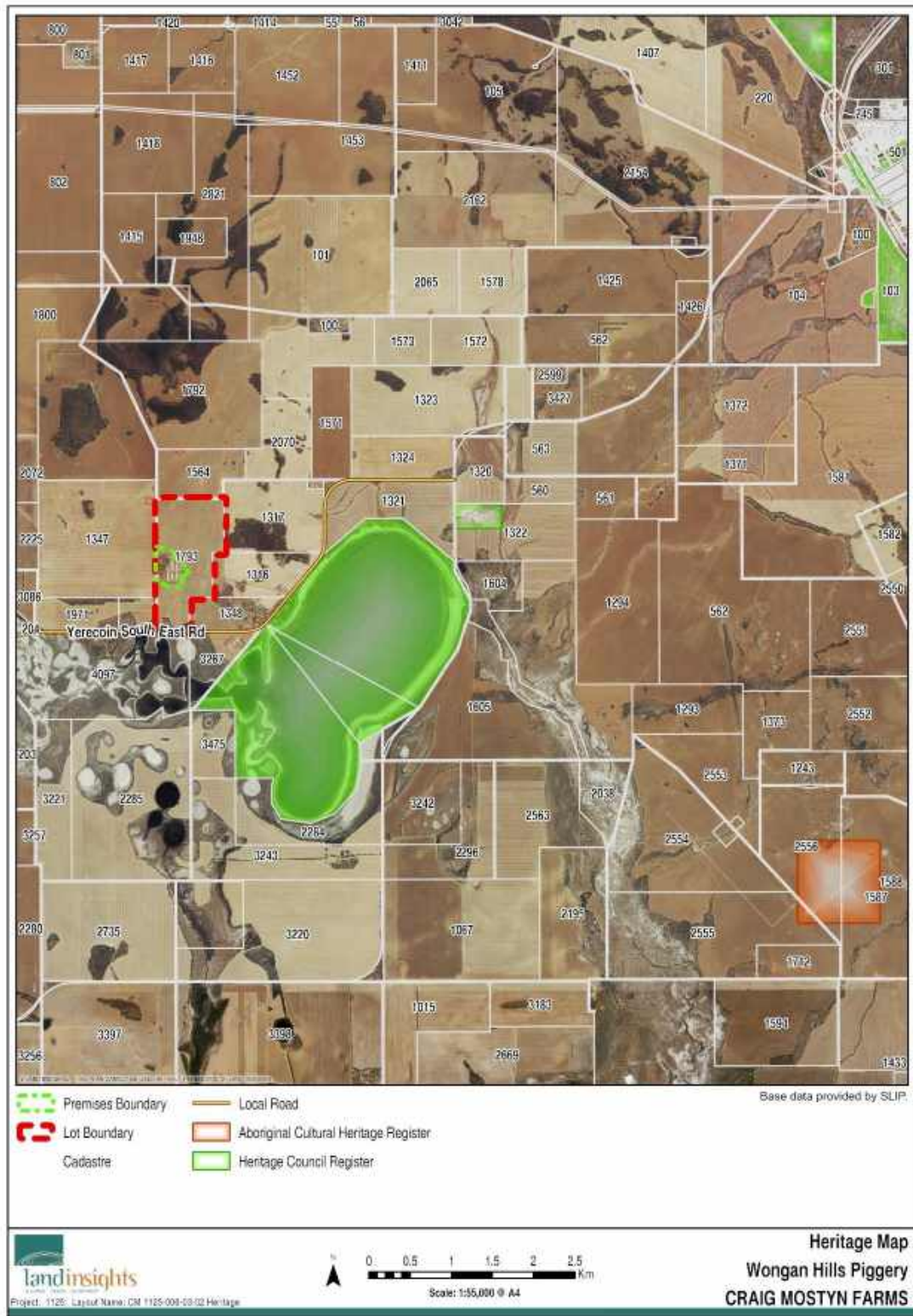
No registered groundwater bores are located at the proposed Premise. The site is not located within a Proclaimed Groundwater Area under the RIWI Act.

3.7 Heritage

There are no Aboriginal Heritage Sites mapped by DPLH within the proposed Premise or within 5 kilometres of the Premise (including Registered Heritage Sites and Other Heritage Sites). The closest mapped heritage site is "Wongan Hills Craigs Farm" (ID 5945) located 7 kilometres to the south-east of the Premise.

Lake Ninan is mapped as a Local Heritage Site in the Shire of Wongan-Ballinu Municipal Inventory as a category 5 site. It is described as "an historic site without built features" and "has associations with a way of life no longer practised, and with different eras of development." The heritage site is approximately 1,200m from the piggery.

Figure 3.8 – Heritage



3.8 Surrounding land uses

The surrounding land uses are other rural land uses such as broadacre cropping and animal husbandry. There are no residential or rural-residential areas in close proximity to the proposed Premise. The closest sensitive receptors are rural dwellings. The wetland and waterway system of the North Morlock River and Lake Ninan adjoining the lot to the south and south-east.

The closest town is Wongan Hills, located approximately 9.2km to the north-east of the piggery.

3.9 Separation distances

The piggeries are both well separated from the nearest occupied residences (sensitive land uses). They are listed in the table below.

Table 3.3 – Separation distances to sensitive residences

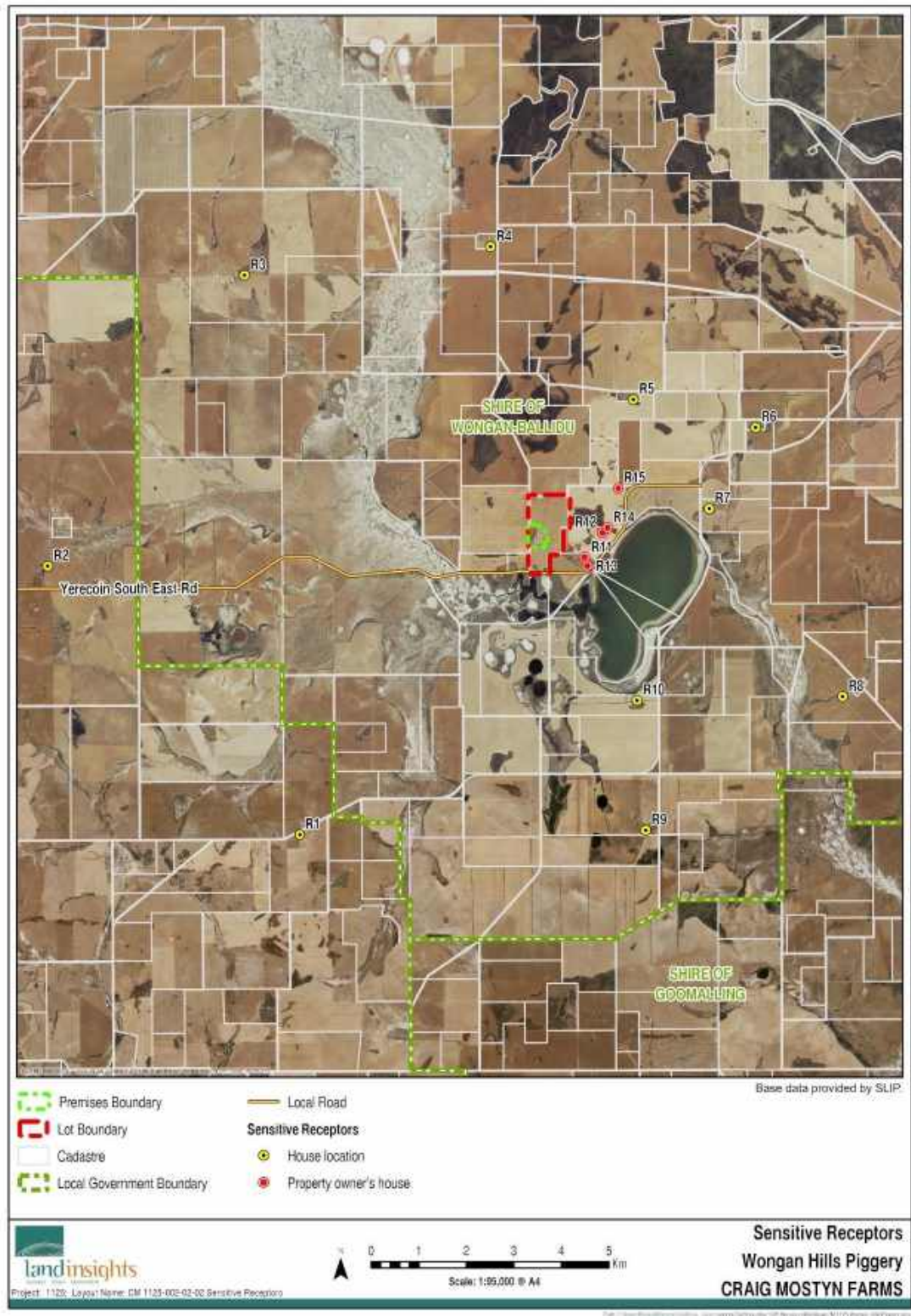
Residence	Distance to the Piggery/Proposed Premise
R1 – Dwelling to the south-west	7,700 metres
R2 – Dwelling to the west	10,200 metres
R3 – Dwelling to the north-west	8,000 metres
R4 – Dwelling to the north	6,000 metres
R5 – Dwelling to the north	3,400 metres
R6 – Dwelling to the north-east	5,000 metres
R7 – Dwelling to the east	3,500 metres
R8 – Dwelling to the south-east	7,000 metres
R9 – Dwelling to the south	6,300 metres
R10 – Dwelling to the south-east	3,800 metres
R 11 and R13 – Dwellings to the south-east, owned by the landowner and resided in by piggery staff.	930 metres
R12 and R14 – Dwelling to the east, owned by the landowner	1,200 metres

Residence	Distance to the Piggery/Proposed Premise
R15 – Dwelling to the north-east, owned by the landowner	1,800 metres

The *National Environmental Guidelines for Indoor Piggeries* (APL, 2018) does not provide specific separation distances for indoor or intensive piggery operations.

Further guidance is provided in *EPA Guidance Statement No. 3 – Separation Distances Between Industrial and Sensitive Land Uses* (EPA, 2005). The recommended separation distance for “Piggery – Intensive” for an operation with over 5000 pigs is 5,000 metres. The only dwellings (which is not owned by the property owner) which are less than 5,000m from the piggery are R5 and R7 (at 3,400m and 3,500m respectively). The remainder of the surrounding properties are over 5,000m from the piggery.

Figure 3.9 – Surrounding Sensitive Receptors



3.10 Specified Ecosystems

“Specified ecosystems” are defined by DWER (2016) as “areas of high conservation value and special significance that may be impacted as a result of activities at or Emissions and Discharges from the Premises”. The distances from the site to relevant specified ecosystems (as set out in DWER’s “Guideline: Environmental Siting”) are set out in the table below. A Siting and Location Plan is at Appendix A.

Table 3.3 – Specified Ecosystems Relevant to the Site

SPECIFIED ECOSYSTEM	DISTANCE TO PREMISE
Department Managed Lands and Waters	Lake Ninan Nature Reserve – 600m south of the piggery.
Threatened Ecological Communities	The closest TEC is approximately 800 metres to the east of the piggery (400m east of the premise), a most likely vegetation associated with the Lake Ninan Nature Reserve.
Threatened Flora	Threatened species and priority flora species mapped within 5km of the premise, primarily to the north, associated with Rogers Nature Reserve and Elphin Nature Reserve. The closest Threatened Flora is approximately 2km to the north of the piggery (1,200m from the premises).
Threatened Fauna	Threatened and priority fauna species are mapped within 5km of the premise. The closest is classified as “Vulnerable” and is located in Lake Ninan approximately 600m to the south-east of the piggery.
Public Drinking Water Source Areas	14km to the north-west of the piggery/premise.
Hydrography WA	North Mortlock River – 600m to the south of the piggery and adjoining the southern boundary of the Premises. Lake Ninan – 1,200m to the south-east of the piggery and 800m to the south-east of the Premises. Lake Hinds – 14.5km to the north of the piggery.

4 APL Guidelines – Site Suitability

4.1 Introduction

The suitability of a site/property for a piggery operation is discussed in the *National Environmental Guidelines for Indoor Piggeries* (Australian Pork Limited, 2018) which provides guidance on the environmental and amenity factors that can influence site suitability. The site suitability and potential environmental issues outlined in the Guidelines are discussed in this chapter.

4.2 APL Guideline Review

The site suitability applicable to a deep litter/eco-shelter piggery as set out in the *National Environmental Guidelines for Indoor Piggeries* (Australian Pork Limited, 2018) is reviewed in Table 4.2 below. It is important to note that the Guidelines largely focus on conventional indoor pig accommodation, however some aspects of the Guidelines can apply to eco-shelter/deep litter operations where relevant.

Table 4.2 – Peter Valley Piggery Issue and Risk Review

Category	Description (based on APL, 2018)	Comment
Odour	Odour nuisance is a very complex issue. Careful site selection is imperative in minimising the likelihood of odour nuisance, supported by good design and management. An odour assessment can determine if nearby receptors are likely to be protected. Providing suitable separation distances is crucial.	Odour is not considered an issue on this site given the significant separation distances to the nearest residences and the size and operation of the piggery. Only two residences are located under 5,000m from the piggery (R5 and R7 to the east and north-east). The piggery is an eco-shelter operation and does not have wastewater treatment ponds which removes a potential odour source from the operation. No complaints have been received for the piggery. It is therefore considered that an odour assessment is not necessary for this operation.
Dust	Nuisance from dust can be minimised through good siting, design and management. Traffic movements along unsealed roads and spreading of dry manure has the potential to generate dust. Choosing routes with either sealed roads, or good separation to houses, lowers the risk of dust impacts. Selecting manure reuse areas that are well separated from	Dust is not considered an issue on this site as separation distances to the nearest residences are considered adequate to provide protection against the effects of dust. Spent bedding produced from the eco-shelters is composted in an area adjacent to the eco-shelters. There are no 'reuse areas' as defined by the APL Guidelines (defined as "land used to

Category	Description (based on APL, 2018)	Comment
	receptors also reduces the risk of nuisance from dust. Burning of mortalities and rubbish, which creates smoke, is discouraged.	spread piggery effluent or manure”) as the spent bedding is composted.
Noise	Noise is generated by the piggery itself, equipment used on other parts of the farm (e.g. pumps) and vehicles relates to the piggery. On-farm noise sources should be well separated from sensitive land uses to minimise the likelihood of nuisance for nearby receptors. Careful selection of traffic routes and property entry points, and suitable scheduling of traffic movements will reduce the risk of nuisance traffic noise.	Noise is not considered an issue on this site as separation distances to the nearest residences are considered adequate to provide protection against the effects of noise.
Vermin	The Guidelines state that intensive piggeries may attract flies, rodents and predators. There is a need to manage vermin to not only prevent amenity impacts, but also to control disease within the piggery and minimise piglet losses.	Vermin and pests controlled as required by animal husbandry and welfare requirements.
Visual impacts	Vegetative screening between the piggery and a neighbour or a road can mask the visual reminder of piggery. Vegetation around the operation can significantly improve the visual appeal of a piggery, and vegetation belts can help in dispersing odour, noise and dust.	This piggery is setback over 1km from the road and is also shielded by the natural topography of the land in between the road and the piggery.
Road safety and maintenance	Roads used by the piggery should be of suitable standard and site access appropriate. The impact on road users will depend on the number of traffic movements, visibility at entry/exit points, road conditions etc.	The site has been used for piggery operations for many years. Traffic movements and impact on the roads is outside the scope of this management plan and can be considered by local government if necessary.
Surface water	Water is typically needed at a piggery for drinking, cleaning, fire control, dust control and dilution of effluent for irrigation. It is important that enough water of suitable quality is available at the piggery. Potential new water sources should be analysed to confirm the supply is fit for purpose. Good piggery siting, design and management practices will effectively protect surface water quality. This is important since the entry of manure	Adequate water supply is already used at the piggery and has been used for many years. Water is used to clean the shelters as needed (i.e. not every time they are cleaned but on occasion). There is adequate separation between the piggery and the nearest surface water features.

Category	Description (based on APL, 2018)	Comment
	nutrients, organic matter and sediment into surface waters may cause a number of environmental problems. Piggery complexes should be sited above the 1 in 100 year flood line.	
Groundwater	Groundwater vulnerability depends on the depth to groundwater, soil type, geology, water quality and other factors. Sites with light soils and shallow groundwater pose a high risk for groundwater contamination and effluent and manure need careful management to prevent nutrient leaching into groundwater. Ideally, effluent and manure reuse areas should be located on land where groundwater is deep, stored within confined aquifers or well protected by a clay layer.	Groundwater is located at approximately 237m AHD which is approximately 10m below ground level (the piggery is at approximately 248m and 252m AHD). No areas of perched watertable or waterlogged areas are located within or adjacent to the piggery. As a result, it is not considered that nutrient leaching to the groundwater is a significant risk at this site.
Soils	The soils should be considered in terms of its suitability for building pads, effluent treatment systems, manure storage, carcass composting pads or burial pits and reuse areas. Clays and clayey sands and gravels best suit earthen pads for deep litter piggeries, effluent ponds, manure storage sites and carcass burial pits, since these soils can be compacted to provide a low permeability base.	The only components at the piggery is eco-shelters and a composting area. Soil types are sand with gravel over sand with clay. While the APL Guidelines recommend that clay soils can be compacted to provide a low permeability base, the standards for waste containment infrastructure (such as the shelters and composting area) are set out in DWER's "Guideline: Better Practice Organics Recycling" which sets out the benchmark controls for storage of organic matter. The soils under the composting area are understood to be compacted gravel.
Flora and fauna	Native vegetation, including trees, shrubs, herbs and grasses, and the habitats it provides, can be environmentally sensitive. Clearing native vegetation is controlled through the <i>Environmental Protection (Clearing of Native Vegetation) Regulations 2004</i>.	The eco-shelters and associated facilities are already established and no clearing of native vegetation is proposed.
Available land area	Ideally, a property should be large enough to contain the piggery complex and any required areas for manure and effluent reuse (if being kept on site). Available land	The spent bedding will be composted within the premises. Following this, the material will not be considered "waste" or "manure reuse" and can be spread off site.

Category	Description (based on APL, 2018)	Comment
	area should also consider separation distances to sensitive land uses.	
Climate	Temperature can affect shed heating and cooling requirements. Rainfall patterns affect water availability for piggeries relying on surface waters. Odour dispersion is heavily dependent on wind speed and direction patterns as well as other factors.	Climate is discussed in Chapter 3.1 above, including temperature, rainfall and wind conditions. Odour is discussed above.
Topography	An ideal site for an indoor piggery is relatively flat. Topographical barriers can help reduce odour, dust, noise and amenity impacts.	Topography is discussed in Chapter 3.2 above. There are no steep slopes and the Premise is relatively flat with a gentle slope as recommended by the Guidelines. The eco-shelters are located on gently sloping ground.
Heritage	Items, sites or places of Aboriginal or European cultural significance must be considered when selecting a piggery site.	No Aboriginal Cultural Sites have been identified within or directly surrounding the Premise. Lake Ninan is listed in the Shire's local heritage municipality as a local heritage site.

5 APL Risk Assessment

5.1 Introduction

The risk assessment for the eco-shelters was undertaken using the *National Environmental Guidelines for Indoor Piggeries* (Australian Pork Limited, 2013) and the *Australian Pork Limited Conventional Piggeries Environmental Management Plan* template. It provides an 'environmental risk identification tool' which "considers both the vulnerability of the surrounding community, surface water, groundwater and soils, and the major activities undertaken at piggeries to identify potential risk areas".

It should be noted that the factors and risk ratings suggested by the APL Guidelines are a "starting point for completing the first step in the risk assessment process by helping to identify the risks". The Guidelines also recommend "discretion should be used when evaluating the site vulnerability" and that each individual farm should be assessed on its merits. This approach is used in the below assessment where factors or ratings which do not apply to the Wongan Hills piggery are amended as appropriate.

The outcome of the risk assessment is described below, as well as a discussion on the considerations for future management. It should be noted that the 'risk rating' is applied to the assessment where relevant to an eco-shelter operation (some are only relevant to a conventional indoor piggery operation).

5.2 Methodology

The methodology used for the risk assessment is as follows:

- Review requirements of the *National Environmental Guidelines for Indoor Piggeries* (Australian Pork Limited, 2013) and the *Australian Pork Industry Quality Assurance Program Standards Manual* (APIQ, 2017)
- Comprehensive site visit of the piggery by a qualified Environmental Scientist from Land Insights
- Desktop review of background information and data relating to the site (climate, contours, water features, flora and fauna etc.)
- Discussion with the piggery operators and collaboration to complete the risk assessment.

5.3 Vulnerability Rating

The vulnerability of environmental features of the site is discussed below. Environmental features required to be considered by the APL includes soils, groundwater, surface water and community amenity. The vulnerability of each of these features was given a rating between 1 to 4 in accordance with the below definitions. The vulnerability ratings are as follows:

- A rating of 1 is 'low vulnerability'
- A rating of 2 is 'somewhat vulnerable'

- A rating of 3 is 'vulnerable'
- A rating of 4 is 'very vulnerable'.

Soils in reuse areas

Although the spent bedding is composted and there are no 'reuse areas' as defined by the APL Guidelines (defined as "land used to spread piggery effluent or manure"), soils within the Premises are considered below. DWER has confirmed that once the spent bedding (manure and straw) is composted in accordance with Australian Standards (AS4454), it is no longer considered manure or waste and can be spread or taken off-site for use (most likely as a soil improver). Although the soils on the Premises will not be reuse areas in accordance with the APL definition, the vulnerability has nevertheless been considered below to provide a comprehensive review of the environmental characteristics on site.

Table 5.1 – Vulnerability Rating: Soils

Rating	Assessment
Rating 2 – Somewhat vulnerable	Soils on the site are not prone to waterlogging, slopes are favourable (2-4%) and the site is not located within potentially waterlogged areas. The only criteria which gives the site a somewhat vulnerable rating is due to the sandy nature of the soil (which also contains some gravels and clays).

Although soils are sandy with some gravel and clay, the nature of the soil is not considered to pose a significant environmental risk as the spent bedding is placed onto a compacted gravel base. All spent bedding is processed (composted) on site prior to being taken off the Premise.

Therefore, the overall vulnerability of the soils in reuse areas is considered to be low.

Considerations

There are no specific recommendations relating to the mitigation of impact to soil.

Groundwater

Assessment of vulnerability of groundwater is considered in the APL Guidelines in the context of impact of groundwater from spreading effluent and manure. However, as the spent bedding produced from the piggery is composted on site the main consideration is risk to groundwater from the operation of the eco-shelters. The vulnerability rating is below.

Table 5.2 – Vulnerability Rating: Groundwater

Rating	Assessment
Rating 2 – Somewhat vulnerable	This rating is as a result of the depth to groundwater being approximately 10 metres below the surface and because of the likely clay layer confining the aquifer.

Groundwater is located at approximately 237m AHD which is approximately 10m below ground level (the piggery is at approximately 248m and 252m AHD). No areas of perched watertable or waterlogged areas are located within or adjacent to the piggery.

Taking the above into consideration, the vulnerability of groundwater is considered to be somewhat vulnerable.

Considerations

Specific recommendations relating to the mitigation of impact to groundwater is as follows:

- Establish monitoring bores at strategic locations around the Premise with the purpose of monitoring water quality for signs of elevated nutrient levels.

Surface Water

The APL Guidelines recommend that surface water vulnerability can be managed with appropriate separation distances to water features and containment of contaminated water within appropriate wastewater management systems. The Guidelines largely focus on conventional indoor systems, however the criteria also apply to eco-shelter systems.

Table 5.3 – Eco-shelter Piggery Vulnerability Rating: Surface Water

Rating	Assessment
Rating 1 – Low vulnerability	All criteria relating to potential impact to surface water were considered to be low risk including the following: • Separation distances to the nearest watercourse exceeds 200m • There are no major water supplies within 800m • There are no concerns regarding surface water supply or quality.

Rating	Assessment
	The piggery is located above floodlines.

There is adequate separation distance from the piggery operation from the nearest major watercourses (approximately 1,200 from Lake Ninan and approximately 600m from the North Mortlock River). There is a minor drainage line running through the property. The eco-shelters are approximately 65-70 metres from the drainage line. The piggery is also above the floodline and there are no concerns regarding surface water quality and supply. There was no evidence of surface water runoff from the composting windrows during a site inspection in January 2024 and upon a review of aerial photography.

The vulnerability to surface water is considered to be low.

Considerations

Specific recommendations relating to mitigation of impact to surface water are as follows:

- Maintenance of existing separation distances to the minor drainage line on the Premises.
- Implement measures to stop drainage of water from the eco-shelters to the surrounding environment.
- Ensure that washdown water is captured by the spent bedding.
- Ensure that no water runoff leaves the eco-shelters.

Community amenity

The APL Guidelines considers impacts on community amenity in the context of a conventional piggery which have different pig housing and waste management system to an eco-shelter operation (including wastewater ponds and onsite composting). The below assessment has been undertaken on the basis that the piggery only has eco-shelters and a composting area.

Table 5.4 – Eco-shelter Piggery Vulnerability Rating: Community amenity

Rating	Comment
Rating 1 – Low vulnerability	The rating for community amenity is low vulnerability as the piggery meets the following criteria: • There have been no complaints in the last 5 years at least. • Surrounding land is rural in nature. • The piggery is well concealed from roads. • Vehicle movements are only during the day. • There is a complaints system in place.

Rating	Comment
	Separation distances are adequate for a majority of surrounding sensitive residences.

The recommended separation distance in *EPA Guidance Statement No. 3 – Separation Distances Between Industrial and Sensitive Land Uses* (EPA, 2005) for an intensive piggery operation with greater than 5,000 pigs is 5,000 metres. The only dwellings (which are not owned by the property owner) which are less than 5,000m from the piggery are R5 and R7 (at 3,400m and 3,500m respectively). The remainder of the surrounding properties are over 5,000m from the piggery.

The risk to community amenity is considered to be low.

Considerations

Specific recommendations relating to the mitigation of impact to community amenity are as follows:

- Maintain the complaints management system
- Train staff in the complaints management system.

5.4 Design and operation ratings

The APL Guidelines provides a template for the consideration of the likelihood of risks to the environment from the design and operation of a piggery. It should be noted that the Guidelines are largely focussed on conventional indoor piggeries, therefore the below assessment only considers factors which relate to an eco-shelter operation. Considerations include pig housing, manure storage, and mortalities management. Each of these considerations were given a rating between 1 to 4 in accordance with the APL Guideline. The ratings are determined as follows:

- A rating of 1 is 'minimises the likelihood of risks to the environment'
- A rating of 2 is 'limits the likelihood of risks to the environment'
- A rating of 3 is 'offers some protection against risks to the environment'
- A rating of 4 is 'does not provide much protection against risks to the environment'.

Pig Housing

The APL Guidelines provide advice on how pig housing can be designed and operated to reduce risk to the environment, including eco-shelters. The risk rating based on the criteria set out in the Guidelines for eco-shelters is provided below.

Table 5.5 – Operation Rating: Pig Housing

Rating	Assessment
Rating 3 – some protection against risks to the environment	A majority of the criteria for Pig Housing received a rating of 1 including the following: • Orientation of the sheds is east-west • The floor of a majority of the eco-shelters is concrete (except for 5) • The walls of a majority are concrete, except for a number which have timber walls. • The feeding system minimises feed waste • Stocking densities meet the requirement of the Model Code of Practice for the Welfare of Animals Pigs. • Sheds are well ventilated. There is some risk as a result of the design of the eco-shelters due to the following: • Outflow from sheds is currently not controlled. Although not all sheds are washed with water at each clean out, the weaner sheds are pressure-washed and the other sheds are washed occasionally. Most of the water is absorbed by the spent bedding and removed from the shelter, however any potential outflow is currently not controlled. • Some eco-shelters do not have a concrete base and unknown permeability, and a number have timber walls instead of concrete, resulting in less control of water outflow.

Pig housing referred to in this risk assessment is addressed in Chapter 8 of the Guidelines for Indoor Piggeries (APL, 2018). The potential emissions and discharges to the environment are leachate from the manure and wastewater from cleaning eco-shelters, and odour, dust and noise from the keeping of pigs. Environmental management and controls to reduce the potential emissions are addressed in Table 7.1 below.

Although a majority of the criteria for pig housing and design have been met, there are some elements of the pig housing design and management which increase the environmental risk. This is because five of the eco-shelters do not have a concrete base and a number have timber walls, which allow water runoff to leave the shelter.

Considerations

It is considered that there are some improvements that can be made to pig housing to mitigate risk to the environment. Specific recommendations relating to pig housing are as follows:

- Ensure that eco-shelters with timber walls are properly bunded to prevent water runoff leaving the shelters (such as through the construction of a concrete curb around the base of the floor) or changed to concrete walls.
- Implement measures to manage drainage of water from the eco-shelters to the surrounding environment.
- Ensure that washdown water is contained within the eco-shelters and captured in the spent bedding prior to removal.
- Ensure that no water runoff leaves the eco-shelters.

Effluent collection system

There is no effluent collection system for an eco-shelter/deep litter operation.

Solids separation system

There is no solids separation system for an eco-shelter/deep litter operation.

Effluent treatment system

There is no effluent treatment system for an eco-shelter/deep litter operation.

Manure storage

The APL Guidelines provide recommendations for the storage and handling of manure, including spent bedding produced at an eco-shelter piggery. The risk rating based on the criteria set out in the Guidelines is provided below.

Table 5.9 – Operation Rating: Manure Storage

Rating	Assessment
Rating 3 – some protection against risks to the environment	Spent bedding is stored and composted directly to the west of the eco-shelters. Criteria which received a good rating are: • The depth to the watertable exceeds 2 metres at all times • Manure stockpiles are managed to maintain low odour. • Composting stockpiles are maintained and managed to reduce the potential for odour generation. It is understood that the base of the composting area is comprised of compacted gravel which can have low permeability. The composting area is not bunded and drainage is not currently contained. Runoff follows the natural topography of the site which is gently sloping which lowers the risk of runoff and erosion.

Manure storage referred to in this risk assessment is addressed in Chapter 11 of the Guidelines for Indoor Piggeries (APL, 2018). The potential emissions and discharges to the environment are leachate from the manure, and odour, dust and noise from manure storage. Environmental management and controls to reduce the potential emissions are addressed in Table 7.1 below.

Spent bedding from the eco-shelters is initially taken out of the shelter and stored in the space between the eco-shelters and then is taken to the composting area. The base of the composting area is understood to be comprised of compacted gravel. Depth to groundwater is greater than 2 metres.

Considerations

It is considered that there are some improvements that can be made to manure storage (composting area) to mitigate risk to the environment. Specific recommendations relating to manure storage are as follows:

- Ensure the composting area is bunded to prevent water runoff from leaving the area.
- Ensure water runoff from the composting area is captured in a drainage basin.
- Ensure the composting process meets the Australian Standards AS4454-2003.

Manure nutrients

Consideration of manure nutrients is not necessary as the spent bedding is composted on the premises prior to being removed.

Reuse areas

There are no reuse areas on the Premises as defined by the APL Guidelines as the spent bedding is composted on the Premises and following composting, it is taken off the Premise.

Mortalities management

The APL Guidelines provide advice on the environmental risks for mortalities and best practice management. The risk rating based on the criteria set out in the Guidelines is provided below.

Table 5.10 – Operation Rating: Mortalities Management

Rating	Assessment
Rating 3 – some protection against risks to the environment	The eco-shelters have a rating of 3 for mortalities management. This means that mortality management practices are considered to have some risk to the environment. The following elements result in the best rating of 1 and are considered low risk to the environment: • Dead pigs are always removed from eco-shelters daily. • Mortalities management always occurs within 24 hours of death. • There is at least 2m separation to groundwater. The below elements are considered to have some risk to the environment and could be improved: • Mortality management is currently burial. • Runoff from the burial area is not currently controlled with bunding and the permeability of the base is unconfirmed.

Mortalities management referred to in this risk assessment is addressed in Chapter 13 of the Guidelines for Indoor Piggeries (APL, 2018). The potential emissions and discharges to the environment are leachate and odour from dead pigs. Environmental management and controls to reduce the potential emissions are addressed in Table 7.1 below.

Considerations

As above for manure management, it is considered that there are some improvements that can be made to mortality management to mitigate risk to the environment. This application includes a proposal to construct a concrete composting tunnel to allow for mortalities to be composted within a controlled area instead of burial.

Specific recommendations relating to mortality management is as follows:

- Construct a concrete composting tunnel for mortality management.
- Ensure there is no water runoff from the composting tunnel.
- Ensure the composting process meets the Australian Standards AS4454.

Chemical use and storage

Table 5.11 – Operation Rating: Chemical Use and Storage

Rating	Assessment
Rating 1 – low likelihood of risks	There is a low likelihood of risks due to chemical use and storage as all chemicals are stored and used according to the manufacturer's instructions and staff are trained in correct handling.

Chemical storage referred to in this risk assessment is addressed in Chapter 18 of the Guidelines for Indoor Piggeries (APL, 2018). There is a low likelihood of risk to the environment from chemical use and storage.

Considerations

No improvements are recommended for chemical use and storage.

Managing GHG emissions

There are no considerations of greenhouse gas (GHG) emissions as required by the template (as there are no conventional sheds, ponds etc).

5.5 Environmental risk assessment

The below environmental risk assessment is a summary of the above ratings. It is based off the table in the APL Guidelines template for environmental management. The vulnerability ratings for soils, groundwater, surface water and community amenity are combined with the ratings for piggery operation which provide an overall risk rating score.

The APL recommends that overall scores from 1-4 are low risk, ratings from 5-11 are medium risk that might trigger investigation or action (if there are legitimate concerns) and ratings from 12-16 are high risk and trigger further investigation or action.

Table 5.12 – Overall Risk Assessment

		VULNERABILITY RATINGS (1-4)			
		Soils of reuse areas	Groundwater	Surface Water	Community Amenity
DESIGN AND OPERATION RISK RATINGS (1-4)		2	2	1	1
Pig housing	3	6	6	3	3
Manure storage	3	6	6	3	3
Mortalities management	3	6	6	3	3
Chemical use and storage	1	2	2	1	1

As can be seen from the table above, a majority of the risk assessment received a low risk rating score. This means that, according to the APL Guidelines, the piggery operation has an overall low risk to the environment and is largely managed to lower the likelihood of risks. The pig housing, manure storage and mortalities management result in a medium rating for potential risks to surface water and groundwater. This is largely due to risk of wastewater and leachate entering surface and groundwater.

An additional risk assessment in accordance with DWER’s “Guideline: Risk Assessments” (2017) is provided in the chapter below.

6 DWER Risk Assessment

6.1 Introduction

This chapter presents the risk assessment undertaken in accordance with the DWER's "Guideline: Risk Assessments" (2017). The assessment incorporates the results from the Site Suitability Assessment in Chapter 4 and the APL Risk Assessment in Chapter 5. The purpose of the risk assessment presented in this chapter is to determine the consequence, likelihood and risk of emissions to the environment from the piggery using the DWER's risk assessment guidelines. It also includes comment and consideration of the risk assessment from the APL Guidelines. This is so that the link between the two guidelines (DWER Guidelines and the APL Guidelines) can be understood.

The potential emissions considered are as follows:

- Wastewater and leachate from eco-shelters
- Noise from eco-shelters
- Odour from eco-shelters
- Dust from eco-shelters
- Wastewater and leachate from composting area
- Odour from compost area.

6.2 Risk Assessment

The criteria used to determine the likelihood and consequence are shown in Tables 6.1 and 6.2 respectively and the risk matrix is defined in Table 6.3 below. The tables are based on the criteria in the DWER's *Guidance Statement: Risk Assessments* (2017). The results of the risk assessment are presented in Table 6.4 below.

As can be seen from the table, all risks of emissions are considered to be low except for the risk of wastewater and leachate emissions from the spent bedding area/mortalities area. This means that the risk for these factors is acceptable subject to some controls. These controls are addressed in Chapter 7.

Table 6.1 – Likelihood Criteria

Almost certain	Likely	Possible	Unlikely	Rare
The risk event is expected to occur in most circumstances.	The risk event will probably occur in most circumstances.	The risk event could occur at some time.	The risk event will probably not occur in most circumstances.	The risk event may only occur in exceptional circumstances.

Source: DWER (2017)

Table 6.2 – Consequence Criteria

Criteria	Consequence				
	Slight	Minor	Moderate	Major	Severe
Environment	On-site impact: minimal (No discernible adverse impact).	- On-site impacts: low level (discernible effect on the environment but no adverse impact) - Off-site impacts local scale: minimal - Off-site impacts wider scale: not detectable - Minor number of individuals of species may be affected locally.	- On-site impacts: mid level (Minor adverse affect to the environment) - Off-site impacts local scale: low level - Off-site impacts wider scale: minimal - Moderate loss of individuals of species locally.	- On-site impacts: high level (moderate impact to the environment) - Off-site impacts local scale: mid level - Off-site impacts wider scale: low level - Short term impact to an area of high conservation value or special significance[^] - Moderate damage to ecosystem function and major loss of individuals of species locally.	- On-site impacts: catastrophic (significant impact to the environment) - Off-site impacts local scale: high level or above - Off-site impacts wider scale: mid level or above - Mid to long term or permanent impact to an area of high conservation value or special significance[^] - Significant long-term damage/loss of ecosystem function and loss of individuals of species locally.
Public Health and Amenity	Local scale: minimal to amenity.	Local scale impacts: low level impact to amenity.	- Adverse health effects: low level or occasional medical treatment - Local scale impacts: mid level impact to amenity.	- Adverse health effects: mid level or frequent medical treatment - Local scale impacts: high level impact to amenity.	- Loss of life - Adverse health effects: high level or ongoing medical treatment - Local scale impacts: permanent loss of amenity.

[^] Determination of areas of high conservation value or special significance should be informed by the Guidance Statement:

Environmental Siting.

*'onsite' means within the Lot boundary.

Source: DWER (2017)

Table 6.3 – Risk Matrix Criteria

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

Source: DWER (2017)

Table 6.4 – Risk Assessment for the Eco-shelters and Compost Area

Element	Potential Emissions	Potential Receptors	Potential Pathway	Potential Impacts	APL Guideline Risk Assessment Outcome	Consequence	Likelihood	Risk without additional management	Likelihood with additional management	Residual Risk
Eco-shelters – Solid and liquid wastes.	Wastewater and leachate. Runoff from eco-shelters	Watercourses	Overland flow Seepage of wastewater and leachate through soil. Transport through groundwater.	Introduction of nutrients to surface waters.	Groundwater vulnerability is ‘moderate’ due to the depth of groundwater being approximately 10 metres. Surface water vulnerability is ‘Low’. The APL assessment concluded that there is a moderate risk to groundwater and surface water from management of eco-shelters.	Based on key receptors and the on-site management of waste, it is determined that leachate from eco-shelters could cause minor on-site impacts to groundwater and surface water quality and soils. The consequence is considered to be Minor .	Based on the current on-site management of eco-shelter waste, the likelihood of wastewater and leachate impacts to the beneficial use of groundwater and surface water will probably not occur in most circumstances. Therefore, the likelihood is Unlikely .	Risk of wastewater and leachate from the eco-shelters is Medium.	With the implementation of additional management as recommended by this EMP the likelihood is considered to be Rare .	The residual risk is considered to be Low.
		Wetlands	Overland flow. Seepage of wastewater and leachate through soil. Transport through groundwater.	Introduction of nutrients to surface waters. Note that there are no wetlands in close proximity to the Premise.	Groundwater vulnerability is ‘moderate’ due to the depth of groundwater being approximately 10 metres. Surface water vulnerability is ‘Low’. The APL assessment concluded that there is a moderate risk to groundwater and surface water from management of eco-shelters.					

Element	Potential Emissions	Potential Receptors	Potential Pathway	Potential Impacts	APL Guideline Risk Assessment Outcome	Consequence	Likelihood	Risk without additional management	Likelihood with additional management	Residual Risk
		Premises and adjoining land	Overland flow Seepage of wastewater and leachate through soil	Introduction of nutrients to soil.	Groundwater vulnerability is 'moderate' due to the depth of groundwater being approximately 10 metres. Surface water vulnerability is 'Low'. The APL assessment concluded that there is a moderate risk to groundwater and surface water from management of eco-shelters.					
Eco-shelters – Housing and transport of pigs.	Noise	Rural dwellings (nearest is 3,400m and 3,500m to the north and east)	Air (windborne).	Amenity impacts.	Community amenity vulnerability is 'Low'. Odour, dust and noise management limits likelihood of risks.	Noise impacts are considered to have minimal impact to amenity on a local scale. Therefore, the consequence is considered to be Slight .	Noise impacts will probably only occur in exceptional circumstances. Therefore, the likelihood is Rare .	The current risk of noise impact is Low .	Additional noise mitigation is not considered necessary.	The residual risk remains Low .
	Odour	Rural dwellings (nearest is 3,400m and 3,500m to the north and east).	Air (windborne).	Amenity impacts.	Community amenity vulnerability is 'Low'. Odour, dust and noise management limits likelihood of risks.	Odour impacts have the potential to cause low-level off-site impacts. Therefore, the consequence is considered to be Slight .	The likelihood of odour impacts will probably not occur in most circumstances. Therefore, the likelihood is Unlikely .	Risk of odour impact from eco-shelters is Low .	Additional odour mitigation is not considered necessary.	The residual risk is Low .

Element	Potential Emissions	Potential Receptors	Potential Pathway	Potential Impacts	APL Guideline Risk Assessment Outcome	Consequence	Likelihood	Risk without additional management	Likelihood with additional management	Residual Risk
	Dust	Rural dwellings (nearest is 3,400m and 3,500m to the north and east).	Air (windborne).	Amenity impacts.	Community amenity vulnerability is 'Low'. Odour, dust and noise management limits likelihood of risks.	Dust impacts have the potential to cause low-level off-site impacts. Therefore, the consequence is considered to be Slight .	The likelihood of dust impacts will probably not occur in most circumstances. Therefore, the likelihood is Unlikely .	Risk of dust impact from the compost area is Low.	Additional dust mitigation is not considered necessary.	The residual risk is Low.
Compost area	Wastewater and leachate	Watercourses	Overland flow Seepage of wastewater and leachate through soil Transport through groundwater	Introduction of nutrients to surface waters.	Groundwater vulnerability is 'moderate' due to the depth of groundwater being approximately 10 metres. Surface water vulnerability is 'Low'. The APL assessment concluded that there is a moderate risk to groundwater and surface water from the compost area.	Based on key receptors and the on-site management of waste, it is determined that leachate from the compost area could cause minor on-site impacts to groundwater and surface water	Based on the current on-site management of the compost area, the likelihood of wastewater and leachate impacts to the beneficial use of groundwater and surface	Risk of wastewater and leachate from the compost area is Medium.	With the implementation of additional management as recommended by this EMP the likelihood is considered to be Rare .	The residual risk is considered to be Low.

Element	Potential Emissions	Potential Receptors	Potential Pathway	Potential Impacts	APL Guideline Risk Assessment Outcome	Consequence	Likelihood	Risk without additional management	Likelihood with additional management	Residual Risk
		Wetlands	Overland flow Seepage of wastewater and leachate through soil Transport through groundwater	Introduction of nutrients to surface waters. Note that there are no wetlands in close proximity to the Premise.	Groundwater vulnerability is 'moderate' due to the depth of groundwater being approximately 10 metres. Surface water vulnerability is 'Low'. The APL assessment concluded that there is a moderate risk to groundwater and surface water from the compost area.	quality and soils. The consequence is considered to be Minor .	water will probably not occur in most circumstances. Therefore, the likelihood is Unlikely .			
		Premises and adjoining land	Overland flow Seepage of wastewater and leachate through soil	Introduction of nutrients to soil.	Groundwater vulnerability is 'moderate' due to the depth of groundwater being approximately 10 metres. Surface water vulnerability is 'Low'. The APL assessment concluded that there is a moderate risk to groundwater and surface water from the compost area.					

Element	Potential Emissions	Potential Receptors	Potential Pathway	Potential Impacts	APL Guideline Risk Assessment Outcome	Consequence	Likelihood	Risk without additional management	Likelihood with additional management	Residual Risk
	Odour	Rural dwellings (nearest is 3,400m and 3,500m to the north and east).	Air (windborne).	Amenity impacts.	Community amenity vulnerability is 'Low'. Odour, dust and noise management limits likelihood of risks.	Odour impacts have the potential to cause low-level off-site impacts. Therefore, the consequence is considered to be Slight .	The likelihood of odour impacts will probably not occur in most circumstances. Therefore, the likelihood is Unlikely .	Risk of odour impact from the compost area is Low.	Additional odour mitigation is not considered necessary.	The residual risk is Low.

7 Environmental Management

7.1 Introduction

This chapter presents the environmental management actions recommended for the Wongan Hills Piggery. It includes actions which are currently used, as well as new actions recommended to be implemented to reduce environmental risks to 'low'. The environmental management actions are presented in Table 7.1 below.

The actions are based on the recommendations provided in the APL Guidelines and best practice for management of a piggery. A reference to the section of the APL Guidelines is provided against each potential emission/impact to demonstrate compliance with the industry standards.

The potential emissions/impacts in Table 7.1, Column 1 and the residual risk in Column 2 are based on those determined in the risk assessment in Table 6.4 above. The potential emission/impact is further broken down into the potential "source of impact" and management actions are set out for each one of these. This provides a thorough consideration of each potential environmental risk and the actions to mitigate impact.

7.2 Wongan Hills Piggery Environmental Management Plan

The Wongan Hills Piggery Environmental Management Plan is provided below.

Table 7.1 – Wongan Hills Piggery Management Plan

POTENTIAL IMPACT	RESIDUAL RISK	POTENTIAL SOURCE OF IMPACT	MANAGEMENT ACTION/CONTROL	APL GUIDELINE REFERENCE
Leachate	Low	Pig Housing – Keeping pigs in eco-shelters and cleaning eco-shelters Wastewater from eco-shelters	1) Ensure that all eco-shelters meet the permeability criteria in “Better Practice Organics Recycling” (DWER, 2022). 2) Replace the base of eco-shelters which do not currently have a concrete base with a concrete base or demonstrate with a geotechnical assessment that the base meets the permeability criteria in “Better Practice Organics Recycling” (DWER, 2022). This can be undertaken progressively, ensuring that all non-concrete bases are replaced within 2 years. 3) Ensure that the walls/bunding around eco-shelters are constructed with material which meets the permeability criteria (such as concrete curbs or concrete walls). 4) Replace, bund or repair the walls of the eco-shelters that have timber walls to ensure that there is no outflow of liquid or wastewater from the shelter. This can be undertaken progressively, ensuring that all walls are repaired within 2 years. 5) Ensure that feeding systems minimise waste through regular maintenance and by replacing units where required. 6) Ensure inflow of drinking water is well controlled to minimise waste and to prevent water outflow. 7) Implement controls to manage wastewater washdown from cleaning eco-shelters. All water should be absorbed by the spent bedding before being transferred to the composting area. 8) Ensure that spent bedding cleaned from each eco-shelter is kept on the concrete base and picked up on the same day after completion of cleaning activities and transferred to the composting area (rather than temporarily being stored anywhere outside of the eco-shelters). 9) Maintain existing separation distance to the minor drainage line on the Premises.	Pig Housing – Chapter 8 of the Guidelines

POTENTIAL IMPACT	RESIDUAL RISK	POTENTIAL SOURCE OF IMPACT	MANAGEMENT ACTION/CONTROL	APL GUIDELINE REFERENCE
		Manure storage – Compost area for spent bedding Mortalities Management – Composting tunnel for dead pigs	10) Ensure the compost area is bunded to retain all wastewater within the compost area. 11) Wastewater should be directed to a basin where it can be evaporated. 12) Windrows are to be approximately 1.5 metres high (maximum height 3m) and 2-3m wide at the base. Sufficient space should be provided in between windrows for machinery movements. 13) Ensure composting windrows are maintained at the correct height and width and are turned and managed as required by Australian Standards AS4454. 14) Ensure that carcasses are removed from eco-shelters daily. 15) Construct a concrete composting tunnel for mortality management. 16) Ensure there is no water runoff from the composting tunnel. 17) Daily, place carcasses onto the compost tunnel and immediately cover with 300mm of spent bedding. 18) Establish groundwater monitoring bores on the Premises with the intention of testing for groundwater nutrients, total dissolved solids, pH and metals.	Manure Storage – Chapter 11 of the Guidelines Mortalities Management – Chapter 13 of the Guidelines
Odour	Low	Pig housing – Pigs kept in eco-shelters	19) Eco-shelters are orientated east-west to reduce need for mechanical heating or cooling. 20) Stocking densities meet the APIQ requirements. 21) Ventilation is good because of the orientation of sheds. Adequate ventilation helps to control the air temperature and humidity, removes excess heat and moisture and maintains oxygen levels. 22) Maintain the complaints system and address any complaints received. 23) Train staff in how to adequately address community complaints. 24) Ensure that pig numbers do not exceed the numbers approved on the Licence.	Pig Housing – Chapter 8 of the Guidelines Community Amenity Vulnerability – Addressed in Chapter 5 of the Guidelines

POTENTIAL IMPACT	RESIDUAL RISK	POTENTIAL SOURCE OF IMPACT	MANAGEMENT ACTION/CONTROL	APL GUIDELINE REFERENCE
		Compost area –spent bedding from eco-shelters and mortalities	23) Maintain the complaints system and address any complaints received. 24) Train staff in how to adequately address community complaints. 25) Ensure composting windrows are maintained at the correct height and width and are turned and managed as required by Australian Standards AS4454/2003.	Manure Storage – Chapter 11 of the Guidelines Mortalities Management – Chapter 13 of the Guidelines
Noise	Low	Keeping of pigs in eco-shelters and associated farm vehicles and machinery on site.	26) Maintain the complaints system and address any complaints received. 27) Train staff in how to adequately address community complaints. 28) Vehicles and machinery only operate during daylight hours. 29) Stocking densities meet the APIQ requirements.	Pig Housing – Chapter 8 of the Guidelines Community Amenity Vulnerability – Addressed in Chapter 5 of the Guidelines
Dust	Low	Keeping of pigs in eco-shelters and associated farm vehicles and machinery on site.	30) Stocking densities meet the APIQ requirements. 31) Pigs are kept within a shelter with a roof and side walls, minimising the potential for dust generation. 32) Vehicles and machinery generally only operate during daylight hours unless required on animal welfare grounds due to hot weather. 33) Maintain the complaints system and address any complaints received. 34) Train staff in how to adequately address community complaints.	Pig Housing – Chapter 8 of the Guidelines Community Amenity Vulnerability – Addressed in Chapter 5 of the Guidelines

8 References

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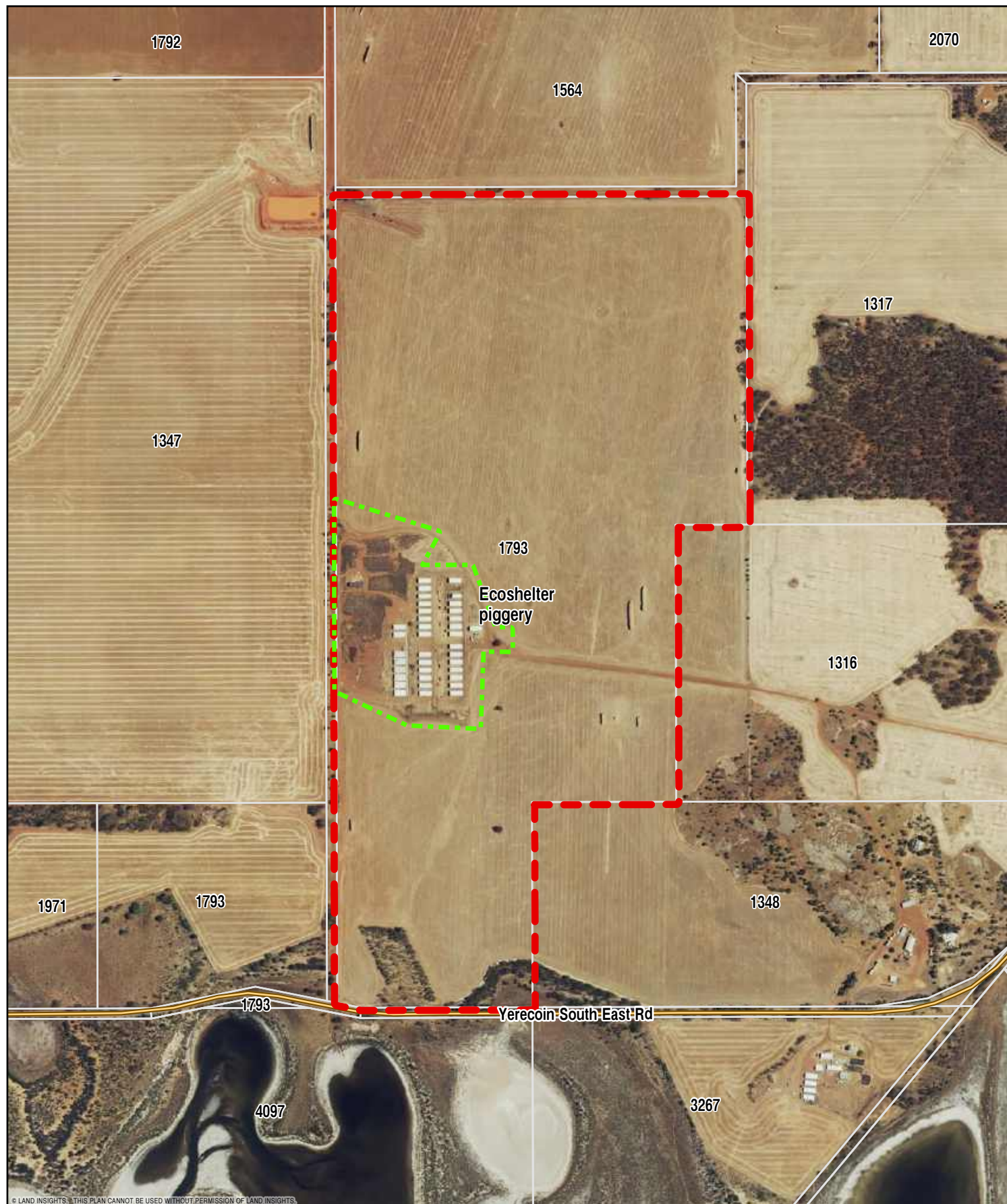
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APPENDIX A

Plans

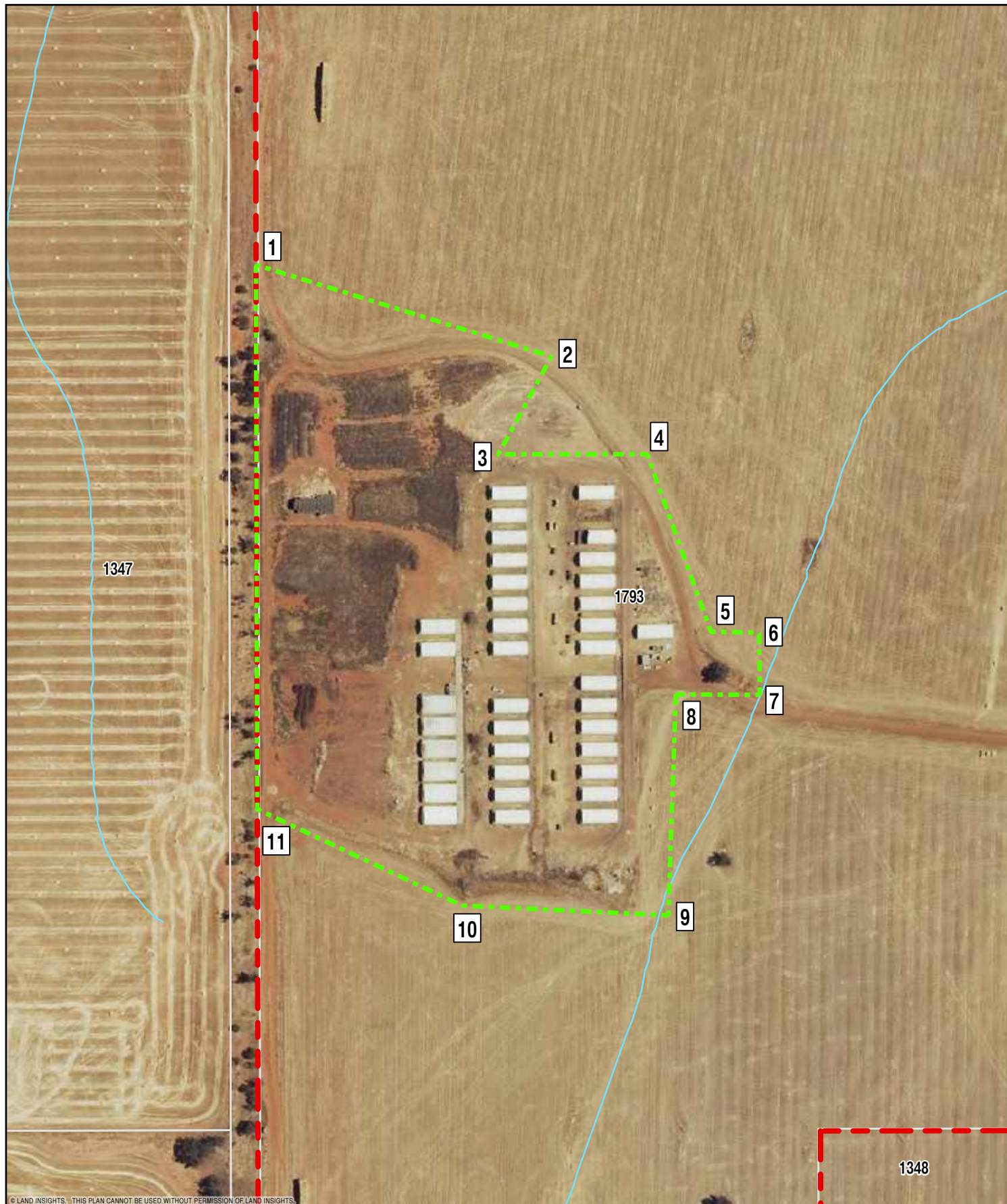


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Base data provided by SLIP.

- Premises Boundary
- Lot Boundary
- Cadastre
- Local Road

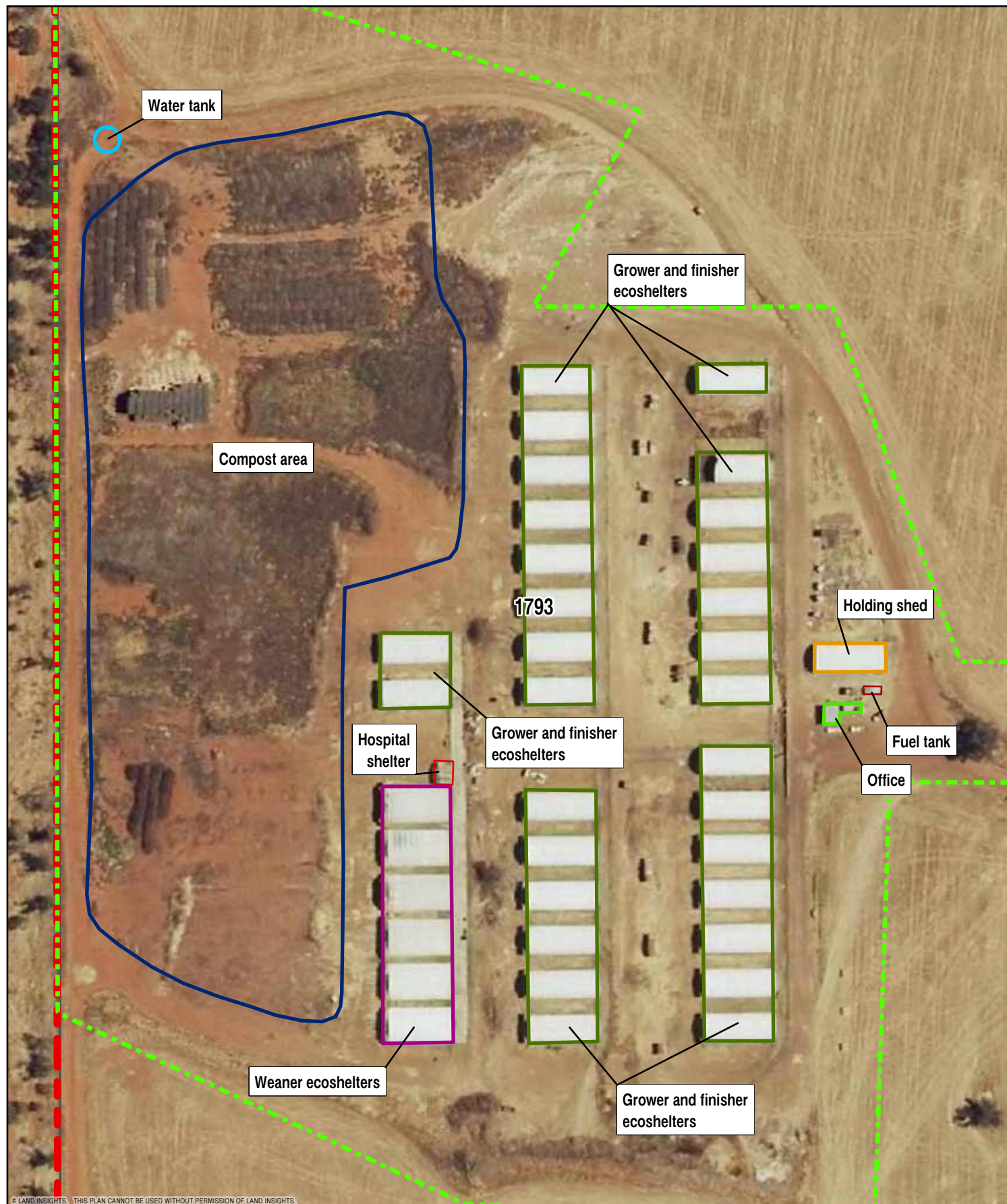




Base data provided by SLIP.

- Premises Boundary
- Lot Boundary
- Cadastre
- Minor Watercourse





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- | | | |
|-------------------|---------------------------------|--------------------|
| Premises Boundary | Fuel tank | Office |
| Lot Boundary | Grower and Finisher ecoshelters | Water tank |
| Cadastre | Holding shed | Weaner ecoshelters |
| Compost area | Hospital shelter | |

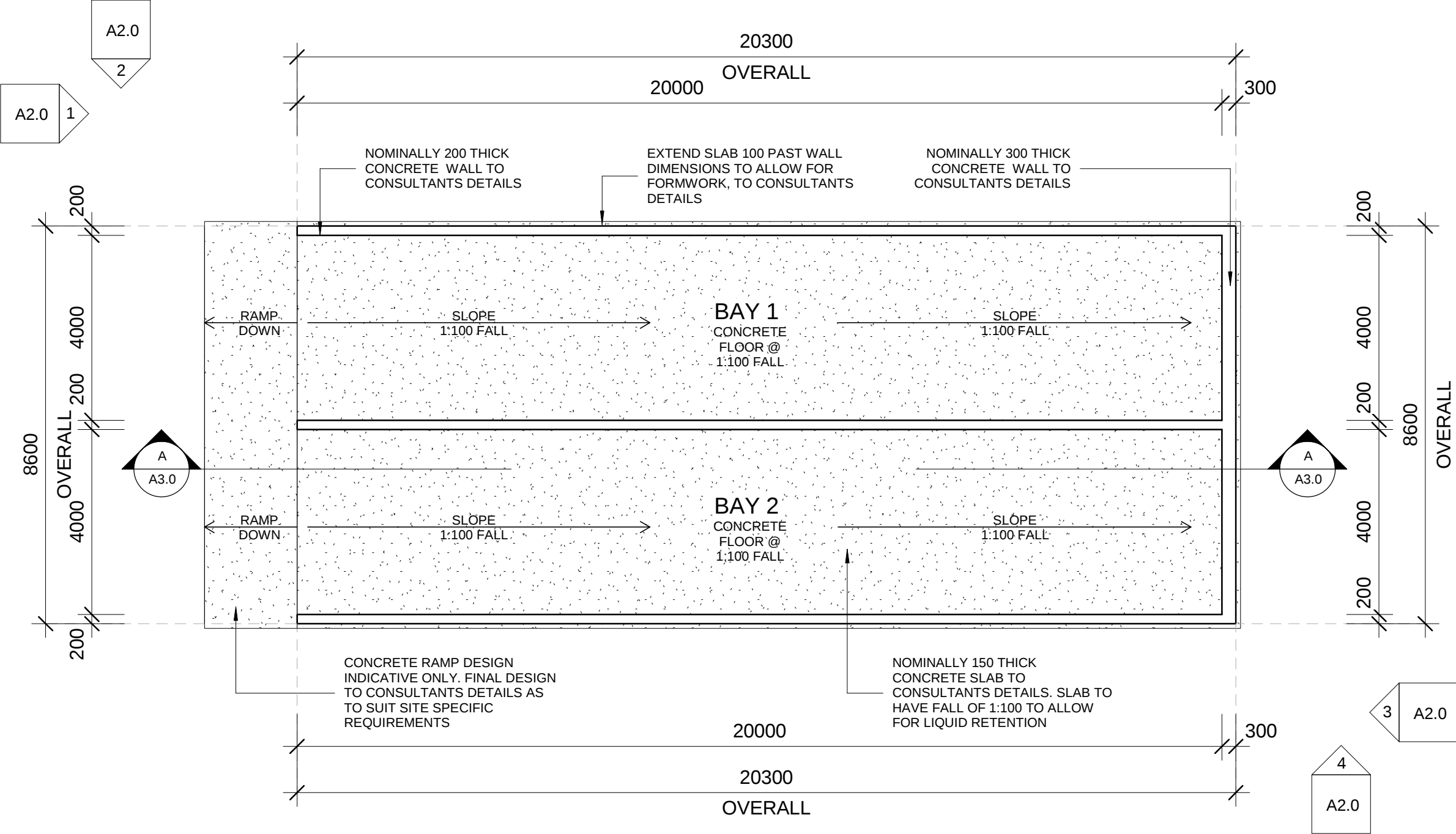


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MATERIAL NOTES

- CONCRETE NOTE:**
ALL CONCRETE TO BE 32Mpa STRUCTURAL
GRADE, AS PER CONSULTANTS
SPECIFICATION
- REINFORCING NOTE:**
SL62 REINFORCING MESH TO ALL WALLS &
FLOOR SLAB, AS PER CONSULTANTS
SPECIFICATION
- STARTER BAR NOTE:**
STARTER BARS TO BE DRILLED INTO FLOOR
TO SUPPORT WALLS – 16mm x 1.0mtr D BAR @
600mm CENTRES, AS PER CONSULTANTS
SPECIFICATION
- WATERPROOFING NOTE:**
NOMINALLY XYPEX 5000C & KUNISEAL
WATERPROOFING AGENTS, TO BE
CONFIRMED BETWEEN CLIENT AND
CONSULTANT



GROUND FLOOR PLAN

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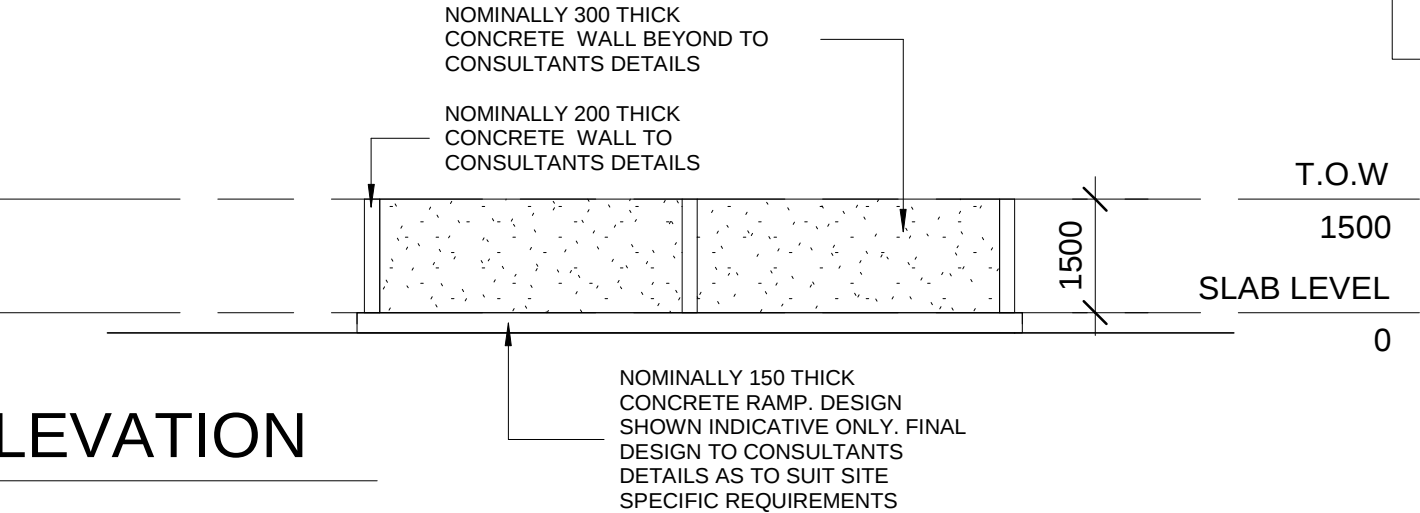
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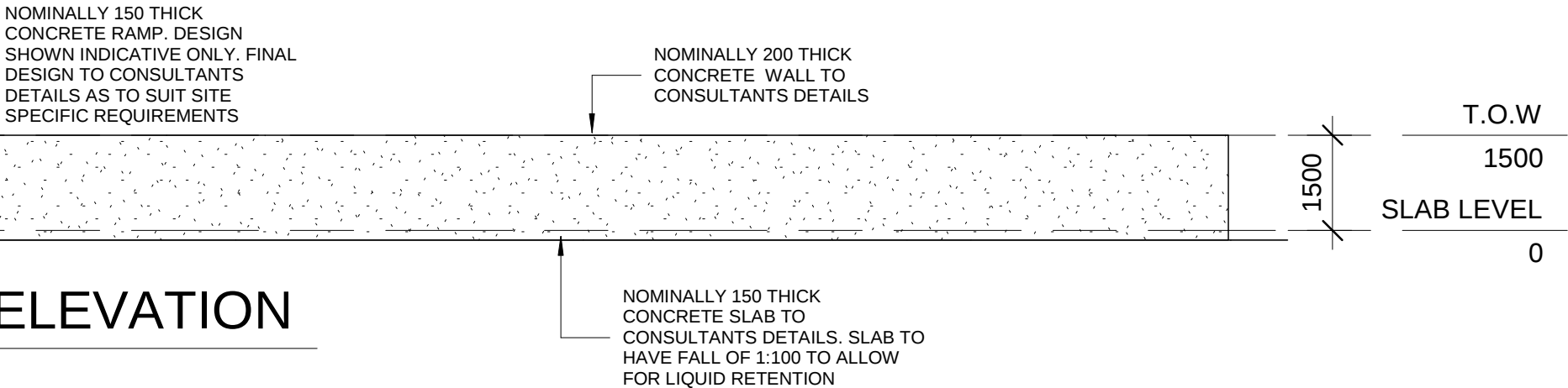
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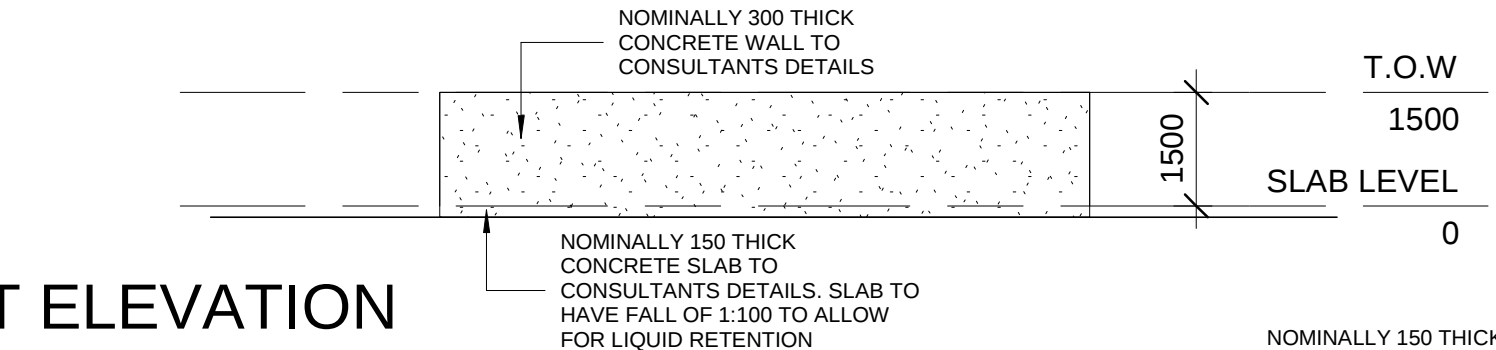
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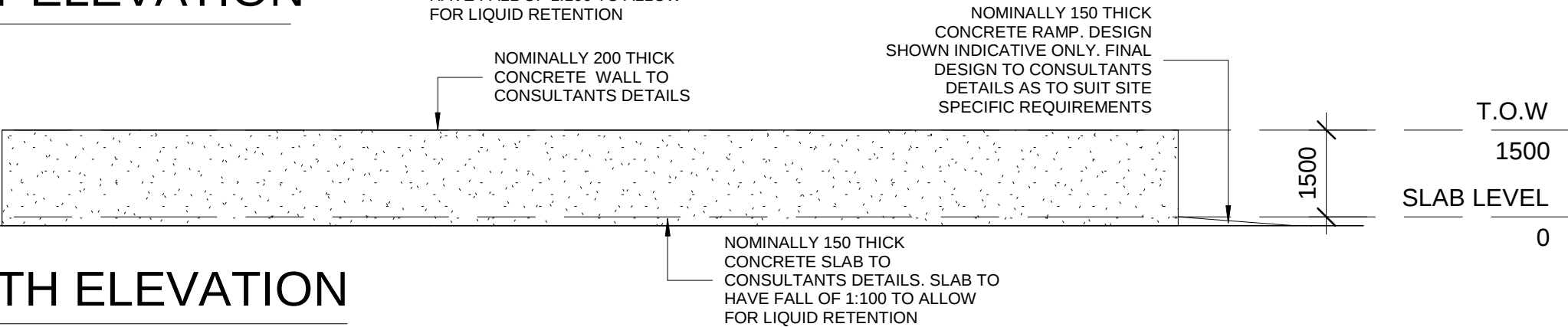
EAST ELEVATION

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SOUTH ELEVATION

1 : 100



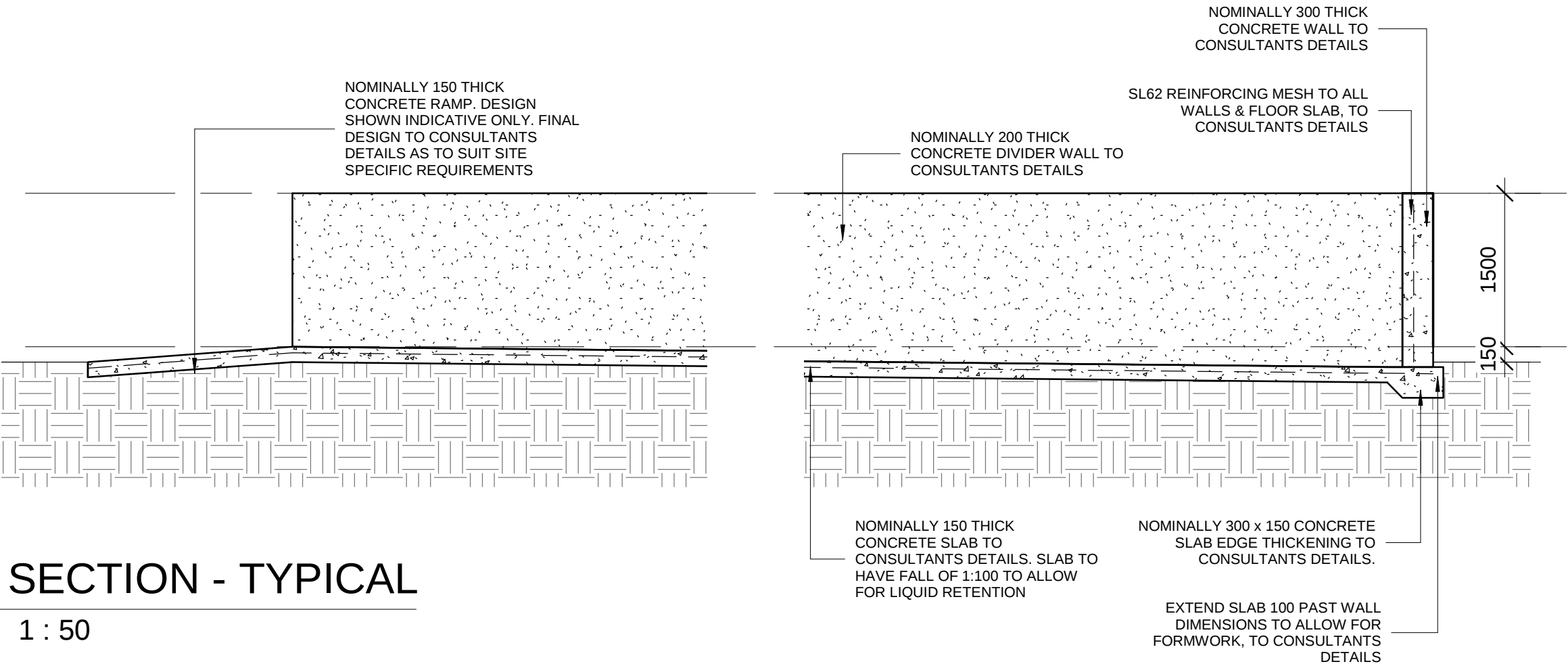
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	WONGAN HILLS, WA	SCALE	1 : 100
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SLAB LEVEL

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