Application for Works Approval

Division 3, Part V *Environmental Protection Act 1986*

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Applicant	Koojan Downs Pty Ltd
ACN	628 244 628
File Number	DER2019/000581
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1. Definitions of terms and acronyms

In this Decision Report, the terms in Table 1 have the meanings defined.

Table 1: Definitions

Term	Definition
ACN	Australian Company Number
ARI	Average Recurrence Interval
Applicant	Koojan Downs Pty Ltd
AWS	Automatic weather station.
Category/ Categories/ Cat.	Categories of Prescribed Premises as set out in Schedule 1 of the EP Regulations
CDA	Controlled Drainage Area
Decision Report	refers to this document.
Delegated Officer	an officer under section 20 of the EP Act.
Department	means the department established under section 35 of the *Public Sector Management Act 1994* and designated as responsible for the administration of Part V, Division 3 of the EP Act.
DMIRS	Department of Mines, Industrial Regulation and Safety
DPIRD	Department of Primary Industries and Regional Development
DWER	Department of Water and Environmental Regulation
EMP	Environmental Management Plan
EMS	Environmental Management Strategy
EP Act	*Environmental Protection Act 1986* (WA)
EP Regulations	*Environmental Protection Regulations 1987* (WA)
MEDLI	Model for Effluent Disposal Using Land Irrigation (MEDLI) is a Windows program for designing effluent re-use schemes.
MLA	Meat & Livestock Australia
NFAS	National Feedlot Accreditation Scheme
NLAR	Nutrient Limited Application Rate
Noise Regulations	*Environmental Protection (Noise) Regulations 1997* (WA)
Premises	refers to the premises to which this Decision Report applies, as specified at the front of this Decision Report
Risk Event	As described in *Guidance Statement: Risk Assessment*
SCU	Standard Cattle Unit – Equivalent to an animal with a live weight of 600kg (Meat and Live Stock Australia 2012)
UDR	*Environmental Protection (Unauthorised Discharges) Regulations 2004* (WA)

2. Purpose and scope of assessment

Koojan Downs Pty Ltd (the Applicant) lodged a works approval application under Part V of the *Environmental Protection Act 1986* (EP Act) on 24 October 2019 (the Application) to establish a 40,000 animal-capacity beef cattle feedlot on an approximately 7,200 ha consisting of four adjoining properties known as Koojan Downs, Avena Vale, Water Hill and Damper Downs in the Yathroo/Koojan area 22km south west of Moora.

The Application includes the construction of the cattle feedlot in two stages and initial stocking of cattle on the feedlot. Stage 1 of the feedlot includes the construction of cattle holding pens for a 20,000 head capacity along with a solid waste storage and composting area with associated sedimentation basins and effluent holding ponds. Stage 1 also includes the construction of an animal feed manufacturing facility with 320,000 tonnes per annum capacity. Stage 2 of the feedlot includes the construction of cattle holding pens to provide an additional 20,000 head capacity with additional sedimentation basins and effluent holding pond. The Application also include the proposed irrigation of effluent to land and the application of solid waste to land.

This Decision Report documents the Delegated Officer's assessment and determination of the Application consistent with the Department of Water and Environmental Regulation (DWER) Regulation Framework. As the Application has proposed to construct the premises in two stages, the scope of risk assessment includes potential impacts from emissions and discharges during the construction and operational phases of Stage 1 and the full design capacity at the completion of Stage 2.

2.1 Application details

Table 2 lists the documents submitted during the assessment process.

Table 2: Documents and information submitted during the assessment process

Document or information description	Date received
A1834718 New Works Approval application – Koojan Downs Pty. Ltd.	24 October 2019
A1834729 New Works Approval application – Koojan Downs supporting information.	24 October 2019
RFI on sediment ponds/infrastructure – Koojan Downs Pty. Ltd.	15 November 2019
RFI on geotechnical hydrogeological comment, re: holding ponds and groundwater.	7 February 2020
Nutrient and irrigation management plan – extract.	23 March 2020
Response from Applicant to the draft instrument.	22 May 2020
RFI on details on grazing activities proposed on the premises.	25 June 2020
Details on the proposed locations of monitoring bores	8 July 2020
Revised proposed locations of monitoring bores	7 August 2020

The Applicant has applied for the prescribed premises categories as shown in Table 3.

Table 3: Prescribed Premises Categories applied in the Application

Classification of Premises	Description	Proposed Premises production or design capacity or throughput
Category 1	Cattle feedlot: premises on which the watering and feeding of cattle occurs, being premises – situated less than 100 m from a watercourse; and on which the number of cattle per hectare exceeds 50.	Not more than 40,000 animals (37,500 SCU) at any one time with a maximum of 138,000 animals (128,375 SCU) per annual period

Category 23	Animal feed manufacturing: premises (other than premises within category 15 or 16) on which animal food is manufactured or processed.	Not more than 320,000 tonnes of feed produced per year

3. Background

The Applicant proposes to develop a beef cattle feeding facility on Koojan Downs with a capacity of up to 40,000 head to supply quality grain fed cattle to the parent company Harvest Road Group's Beef Operation (based in Harvey Western Australia). The facility is proposed to be developed in two stages with each stage having a capacity of 20,000 head for a total of 40,000 head.

The proposed development shall have a maximum capacity of 37,500 standard cattle units and incorporate a feed manufacturing facility to prepare the ration of the cattle within the finishing facility. The feedmill will have a capacity of 40 tonnes of grain per hour. The associated commodity storage and feed manufacturing facility will prepare approximately 320,000 tonnes of ration to be fed to the 40,000 head of cattle and sold to market per year.

Based on the Application, Stage 2 of the feedlot is expected to be go ahead within the next 5 years. The proposed development infrastructure will occupy a footprint of 160 ha and also includes an associated 1,106 ha of cropping land for solid waste and effluent utilisation.

4. Overview of Premises

4.1 Infrastructure

The Koojan Downs facility infrastructure, as it relates to Category 1 and 23 activities, is detailed in Table 4 and with reference to the Site Plan (Figure 3).

Table 4 lists infrastructure associated with each prescribed premises category.

Table 4: Koojan Downs facility Category 1 and 23 infrastructure

	Infrastructure
	Prescribed Activity Category 1
The Applicant is proposing to construct and operate a new cattle feedlot, with a maximum design capacity of 40,000 animals which, with an average weight of 645 kg, equates to 37,500 standard cattle unit (SCU). Cattle will be received onsite at around 450 kg and placed into pens where they will be held for fattening for ±100 days and then transported off site for processing at Harvey. The feedlot maximum design capacity will be achieved in two stages, each of 20,000 head capacity. Infrastructure associated with stage 1 and stage 2 is outlined below.	
1	244 open cattle pens approximately 2,877 m^2 with a total area of 701,988 m^2 (70.2 ha). 12 smaller pens approximately 1,570 m^2 with a total area of 18,840 m^2 (1.88 ha).
2	Water supply/storage and reticulation infrastructure.
3	Livestock handling which includes infrastructure and facilities for arrival, processing and dispatch of cattle and stabling for horses.
4	Access and internal roads.
5	Administrative and maintenance structures.
6	Controlled drainage areas.
7	Drainage systems.
8	Solid waste and effluent management areas.
9	Irrigation system.
	Prescribed Activity Category 23
The proposed development will incorporate a feed manufacturing facility to prepare the feed for the cattle in the finishing facility. The feedmill will have a capacity of 40 tonne of grain per hour. The associated commodity	

	Infrastructure
storage and feed manufacturing facility will prepare 320,000 tonnes of ration per year.	
1	Feed processing and commodity storage.
3	Grain storage and handling (silos, augers and conveyors).
4	Grain cleaner.
5	Steam chests, roller mills and steam generating infrastructure.
6	control and monitoring system equipment
7	Solar farm for power generation.
8	Backup diesel generators.

4.1 Exclusions to the Premises

This decision report is focussed on the infrastructure and proposed works that fall within the Categories given in Schedule 1 of the EP Act, which the Applicant has determined cover the proposed activities. Details and plans for infrastructure such as office building and staff amenities were included in the application and attachment documentation, submitted by the Applicant, but fall outside the scope of this decision report and are not included here.

Domestic sewage will be processed on-site as per AS 1547 within a dedicated land area adjacent to the respective source facility. The treated sewage will not be added to the controlled drainage system and the Applicant plans to dispose of treated sewage by absorption. Due to its rural location the proposed development shall have its own dedicated diesel fuel storage with a capacity of 68,000 L. The Applicant has indicated that fuel and other hazardous material will be contained within spill containment systems appropriate for the nature of the material and the associated pollution risk. This infrastructure has not been assessed as part of the works approval assessment. The code of practice for the storage and handling of dangerous goods applies and is regulated by the Department of Mines, Industrial Regulation and Safety (DMIRS).

4.2 Construction

The proposed development involves construction in two stages that will depend on operational requirements, market demand for beef and other business considerations. The construction period for all stages of the proposed development, if undertaken in one contiguous program, is estimated to take approximately 6-8 months depending on weather conditions. Construction work is likely to be undertaken in line with staging requirements.

The beef cattle feeding facility shall comprise a permanent production pen area with adjoining feed alleys in which the beef cattle are housed in the open air and provided with their daily feed and water requirements. The pen area shall incorporate water, feed and shade infrastructure.

There are two main components of the proposed development being the infrastructure and waste utilisation area. The infrastructure of the proposed development includes:

- production, induction and hospital pens for beef cattle;
- three separate controlled drainage areas. The controlled drainage system contains the beef production and hospital pens, cattle handling facility, holding yards, cattle lanes, catch drains, feed alleys, solid waste stockpile and carcass composting area, sedimentation basin(s) and holding pond(s);
- a cattle handling facility with receipt/dispatch and processing infrastructure;
- internal roadways connecting the subject land access to the cattle handling and feed storage and processing facilities;

The waste utilisation area includes:

- effluent and solid waste (manure) utilisation areas.

4.2.1 Bulk earthworks

No blasting is expected to be required during the construction of the proposed development. Topsoil, while unsuitable for use in bulk earthworks due to high organic matter and contamination by other material, will be stripped and stockpiled for subsequent spreading on areas marked for revegetation.

The Applicant has stated that the intent is for excavation and filling to produce a smooth, uniform surface. The Applicant shall obtain material for filling from excavations within the site. Fill material will be free from stumps and roots and will be capable of being compacted. The Applicant will place fill material in layers with a minimum thickness of 200 mm before compaction.

The Applicant has indicated that clay lining material shall be placed in layers of 150 mm (± 50 mm). The design criteria within the application specify that each layer of clay lining will be tined, wetted and compacted. The minimum depth for the clay liners will be 300 mm after compaction. The finished surface of the clay liner or pen surface shall be durable and trafficable for cattle and equipment.

4.2.2 Pen infrastructure

The proposed development will have a stocking density of 18 m^2/head (19.2 m^2/SCU) for the feeding pens. Pen sizes are designed to accommodate 160 head or half size of 80 head. For the proposed 160 head feeding pens, the combination of a nominal feed bunk length of 48 metres, design depth of pen of 54.5 metres and allowance for herringbone and feed bunk gate arrangement translates into a pen area of approximately 2,877 m^2. For the 80 head feeding pens the pen area will be 1,570 m^2. Pens will be orientated north-northeast-south-southwest and is dictated by site layout and surface topography. Pens have been designed with a slope of 3.0%.

4.2.3 Buildings and structures

The proposed development includes buildings and structures for grain storage and processing and commodity storage, cattle handling facility and office/weighbridge. While the design and layout of these buildings is not yet finalized it is expected that they shall be manufactured off-site and transported to site and then erected.

A dedicated feed processing and commodity storage facility shall be constructed to the north of the proposed development as part of Stage 1. The feed processing and commodity storage facility shall comprise an integrated system of infrastructure, including;

- grain storage and handling (silos, augers, conveyors);
- grain processing;
- other commodity storage and management;
- hay/straw storage and management;
- storage and handling of liquid ingredients and supplements; and
- ration batching and delivery systems.

4.2.4 Controlled Drainage Areas (CDA)

It is proposed that Controlled Drainage Area 1 and 2 be developed in Stage 1 with the construction of Controlled Drainage Area 3 included in Stage 2. The proposed design of Controlled Drainage Area 1 (which is felt to be indicative) is shown in Figure 1.

A low-permeability compacted clay barrier will be deployed in any parts of the controlled

drainage areas where the permeability of the underlying soil/rock strata exceeds 0.1 mm/day (3.5 cm/year).

Catch drains will be located along the bottom of each row of beef cattle production, induction and hospital pens. Catch drains will flow directly into sedimentary basins and will convey storm water runoff to the sedimentary basins. The base of catch drains will be underlain by a suitable liner with hydraulic conductivity of equal to or less than 0.1 mm/day.

Storm water runoff from around the proposed development is planned to be excluded from entering each controlled drainage area through the use of diversion banks and catch drains. Diverted upstream clean runoff will be redirected to flow with natural drainage lines. Catch drains will be grassed as an erosion preventative measure and the Applicant has specified that these grassed sections will be maintained to ensure operations at design capacity.

Figure 1: Proposed design of Controlled Drainage Area 1.

4.2.5 Sedimentation basin

Sedimentation basins are sited at the downslope end of each CDA. The sedimentation basins will be wide, shallow storage with a maximum water ponding depth of less than 1 metre and designed to drain completely down to bed level following a runoff event. Each sedimentation basin shall have a control outlet designed to temporarily retain storm water within the sedimentation system.

Across the proposed development (both stages) there will be seven sedimentation basins built, three to be constructed during Stage 1 with the remainder to be built as part of Stage 2 development. The volume of each basin is designed to cater for the peak flow rate from a '1 in 20 year' storm; using runoff coefficient of 0.8 from feeding pens, roadways and other hardstand areas and 0.4 for grassed areas within the Controlled Drainage Areas.

As such the various sedimentation basins are designed with system volumes of between 1,775 m^3 and 5,000 m^3. In Stage 1 the three proposed basins have volumes of 5,000 m^3, 3,500 m^3 and 2,000 m^3.

4.2.6 Holding pond

Each Controlled Drainage Area shall have a dedicated holding pond located at the lower end of the controlled drainage area, immediately below the sedimentation basin. The holding ponds are designed to temporarily store storm water runoff (effluent) from major storm events and/or when extended wet periods prevent irrigation of effluent so that overflowing events are prevented and/or limited to an acceptable frequency.

Model for Effluent Disposal via Land Irrigation (MEDLI) was used to size the holding ponds. The modelling period was over 50 years from 1968 to 2019 and the design criteria applied to the holding ponds allow for all runoff to be captured with no allowance for irrigation. The 96th percentile runoff for the winter months of May to October was used to set pond size.

Controlled Drainage Areas 1 and 2 are part of Stage 1 development and the holding ponds in these areas are designed to hold 80.0 million litres (ML) and 6.0 ML. The holding pond for Controlled Drainage Area 3 (to be built as part of Stage 2 development) will have a minimum design maximum operating level volume of 54 ML.

4.2.7 Solid waste stockpile area

The solid waste of the development includes manure, waste feed, mortalities and holding pool sludge. A dedicated solid waste stockpile allows pens to be cleaned out as frequently as required. Stockpiling of solid waste will be limited to windrows up to 2 metres high and a base width of 3 – 4 metres. The composting of mortalities shall be undertaken within the solid waste stockpile and carcass composting area.

The Applicant estimates some 15,050 tonnes of manure on a dry matter basis will be harvested from the pens per year. Based on the scraped manure moisture content of 50% this translates to some 30,100 tonnes of wet scraped manure per year to the stockpile. With the assumed windrow dimensions, 50,000 m^2 of pad area is required to store and process harvested manure. A total area of 60,000 m^2 (6.00 hectares) has been allocated for solid waste stockpile and carcass composting.

The solid waste stockpile will be placed on a suitably constructed pad within CDA 2. The solid waste stockpile and carcass composting area shall be underlain by a minimum of either 300 mm clay (or other suitable material), able to provide a design permeability of less than 1 x 10^{-9} m/s (~ 0.1 mm/day). Runoff from within the solid waste stockpile area will be diverted to drainage lines that divert to sedimentation basin 4, and ultimately to the effluent holding pond within controlled drainage area 2.

Runoff external to the solid waste stockpile and carcass composting area is diverted away from the solid waste stockpile and carcass composting area by the provision of diversion banks upslope of the area that prevent upslope runoff from entering the area.

4.3 Operational Aspects

4.3.1 Cattle management

When fully developed the proposed development will have about 720,000 m^2 of constructed outdoor beef cattle feeding pens within Controlled Drainage Areas 1 and 3 which equates to a cattle capacity of 40,000 head at an average stocking density of 18 m^2/head.

The proposed development aims to fatten beef cattle to a live weight of about 645 kg. Cattle will be produced predominately for the export market and all beef cattle fed shall be owned by the Applicant.

The Applicant expects total throughput to be 138,000 head of cattle annually when the feedlot is fully developed based on an occupancy of 95% and a mortality rate of 0.5%.

4.3.2 Feed management

Stage 1 of the development shall require about 61,000 tonnes of grain, 17,400 tonnes of the silage and 5,800 tonnes of finisher supplement and other commodities annually. When fully developed to 40,000 head the annual commodity requirement will be doubled.

The facility consists of storage silos to store grain, a grain movement system and a grain processing system. Grain is processed by steam flaking. The grain movement and processing system would be powered by electricity and require water for tempering the grains. The steam flaking system will require a steam generation system.

4.3.3 Water management

The Applicant is basing expected water usage on seven other Australian feedlots that use between 14.5 to 20.5 million litres (ML) of water per 1000 head-on-feed annually. This data includes the use of water for drinking, feed processing, cattle washing (where undertaken), trough cleaning, dust control, vehicle and facility cleaning and evaporation. Based on total development size, and assuming a 95% occupancy rate, the water requirement for 38,000 head of cattle may range from 550 to 780 million litres (ML) per year.

4.4 Waste management

4.4.1 Carcass management

Based on average mortality rates of 0.5% the Applicant expects 695 mortalities a year, which equates to about 382 tonnes of carcasses. Carcasses will be removed from the pens each day and taken to the cattle handling facility processing area for post-mortem or directly to the solid waste stockpile and carcass composting area.

The Applicant has indicated that at least 300 mm of carbon source (either sawdust or straw) will be used as bedding material in the composting area. Carcasses will be placed on bedding material and covered with at least 500 mm of manure on all sides. The carcass windrow will be limited to two carcasses high with a manure layer of 50 mm between carcasses and topped with at least 500 mm of manure.

The carcasses will be allowed to decompose for around 4 weeks before turning and this will generally be done with a front-end loader. Active composting may last for up to 4-8 months and the window will be turned every 2-3 months. The composted windrow is left to mature for 3-4 months. The Applicant has a plan for mass events and a site for a mass burial of mortalities has been identified.

4.4.2 Solid waste management

The Applicant has advised that pen clearing will be conducted depending on activity; with the removal of spilt feed every two days; elimination of wet patches, repair to potholes and cleaning of water troughs will be completed weekly and under-fence cleaning conducted monthly. Pen cleaning is scheduled at intervals not exceeding 10 weeks and pen surface and diversion banks and drain inspections to be conducted after runoff events and repaired as required.

Sedimentation basins are to be checked after each runoff event and the weeping outlets will be cleaned as needed with a rake or shovel to efficiently allow liquids through the sedimentation basin. Based on calculations of estimated solid waste generated (manure) along with mortalities the Applicant expects some 10,137 tonnes/year and 20,274 tonnes/year of solid waste for utilisation per year for Stage 1 and Stage 2 respectively. Solid waste is to be used as a soil conditioner and organic fertilizer on cropping and pasture operations and may be used on adjoining land owned by the Applicant and other cropping land in the local region.

Solids applied to land will include manures, spoilt feed, carcass compost and pond sludge. Solid waste is to be applied to 975 hectares of cropping and pasture land using a tractor drawn moving bed manure spreader. The Applicant assessed suitable application rates using the NLAR approach in MLA 2012a to ensure suitable rates that don't exceed the rates at which constituents of the effluent are taken up by plants, removed by harvesting, stored in the soil profile and released. Phosphorus was found to be the limiting nutrient when growing cereal silage in winter and corresponds to a maximum solid waste application rate of 1 t/ha (dry) per calendar year. There is insufficient land to sustainable utilise all solid waste on site and excess is proposed to be removed.

4.4.3 Liquid waste management

The Applicant has divided Controlled Drainage Areas 1 and 3 into three main sub-catchment areas. Each sub-catchment is divided into component areas, each of which has different runoff characteristics. These areas are:

- pen area – areas containing cattle and covered with manure e.g. beef cattle production induction and hospital pens etc;
- hard catchment – feed roads, cattle lanes, catch/main drains, sedimentation basin, holding pond etc; and
- soft catchment – areas with a low runoff yield such as grassed and other vegetated areas within the controlled drainage area.

Controlled Drainage Area 2 comprises the solid waste stockpile and carcass composting area and has only one hard sub-catchment area.

The Applicant has determined that the holding ponds are adequately designed as to store the storm water runoff prior to application to land. Sludge levels shall be monitored annually and will not be allowed to exceed more than 10% of the holding pond capacity. The clay lining of the holding ponds will be checked after each desludging to ensure its structure and integrity has not been compromised.

In order to undertake the necessary hydraulic modelling, the Applicant obtained daily climate data for the locality from the SILO database operated by the Bureau of Meteorology (BOM). Daily climate data for the site for 50 years shows mean annual rainfall is 475 mm/year, whilst the mean annual pan evaporation is 2,064 mm/year.

Approximately 140 ha of land has been identified by the Applicant as suitable for effluent irrigation, taking into account buffer sizes to sensitive areas (e.g. watercourses, vegetation communities, drainage lines and property boundaries). Figure 5 shows the location and size of the proposed waste utilisation, including liquid waste, area.

The Applicant propose that the effluent utilisation system be a full utilisation system. The Applicant plan for there to be no discharges to surface waters, with the area required for irrigation determined by calculating the limiting land area using a water and nutrient balance.

To avoid adverse environmental impacts, the National Guidelines for Beef Cattle Feedlots in Australia (MLA 2012a) state that application rates should not exceed the rates at which the constituents of the effluent (especially N, P and salts) are:

- taken up by plants and removed from the site by harvesting;
- safely stored within the soil profile; and

- released into the surrounding environment in an acceptable form.

MLA (2012a) express a mass balance equation in the form of a Nutrient Limited Application Rate (NLAR) equation and the Applicant provided their proposed annual application rate for the nitrogen and phosphorus contained in the effluent using the NLAR approach.

The Applicant has determined the minimum area required for effluent utilisation will be the largest calculated for any individual nutrient constituent. The minimum land area required for nitrogen and phosphorus was calculated by multiplying by the annual average runoff volume by the NLAR for each nutrient. Nitrogen was found to be the limiting nutrient when growing maize silage in summer with a minimum of effluent utilisation area of 52.4 ha for Stage 1 and 103.8 ha required for Stage 1 & 2.

The Applicant included the following data of predicted holding pond concentrations as given in Table 5.

Table 5: Predicted Effluent Concentrations in Holding Ponds

Parameter	Stage 1	Stage 2	
	CDA 1	CDA 1	CDA 2
Nitogen conc. (mg/L)	724	752	682
Phosphorous conc. (mg/L)	50	50	52
TDS conc. (mg/L)	733	721	762
Electrical conductivity (dS/m)	1.1	1.1	1.2

Using the BEEFBAL nutrient mass balance and MEDLI predicted holding pond concentrations for each stage and controlled drainage area (682-752 mg/L nitrogen and 50-52 mg/L phosphorus) the NLAR is calculated for application rates of 0.62 ML/ha for Stage 1 (see Table 6) and 0.65 ML/ha for Stage 2 (see Table 7).

Table 6: NLAR Calculation Summary for Stage 1

Parameter	Code	CDA 1	
		N	P
Crop requirements (kg/ha)	CR	445	87
Soil storage (kg/ha)	SS	0	0
Allowable losses (kg/ha)	EL	0	0
Concentration in pond (mg/L)	NW	724	50
NLAR (kL/ha)		615	1740
NLAR (ML/ha)		0.62	1.74

Table 7: NLAR Calculation Summary for Stage 2

Parameter	Code	CDA 1		CDA 2	
		N	P	N	P
Crop requirements (kg/ha)	CR	445	87	445	87
Soil storage (kg/ha)	SS	0	0	0	0
Allowable losses (kg/ha)	EL	0	0	0	0
Concentration in pond (mg/L)	NW	724	50	682	52
NLAR (kL/ha)		615	1740	652	1673
NLAR (ML/ha)		0.62	1.74	0.65	1.67

The Applicant's has 140 ha available for effluent utilisation as shown in Figure 3 and its calculations show there is sufficient area available (52.4 ha for Stage 1 irrigation and 103.8 ha for combined Stage 1 & 2 irrigation) on-site to sustainably utilise all the effluent generated each year.

4.5 Irrigation scheme

4.5.1 Irrigation system

The proposed irrigation systems is a centre pivot which is a self-propelled irrigation system that applies effluent to crops from above the canopy. Irrigation of crops using clean water is currently undertaken on the site using a centre pivot system.

The Applicant propose for the centre pivot system to consist of a series of towers, spans, pipes, droppers and sprinklers as seen in Figure 2. The centre pivots irrigate in a circular pattern rotating around a fixed central pivot point. Circular fields will therefore be irrigated and cropped.

Figure 2: Centre pivot irrigator

Each centre pivot will be fixed and used to irrigate one circular area of crops. Electricity will be supplied to the system by a solar array, backed up by a diesel generator. Due to the planned electricity generation, the centre pivots will be mostly limited to daylight operation though the hybrid nature does allow the system to operate autonomously outside of daylight hours if required.

4.5.2 Irrigation area

Each proposed centre pivot will be able to irrigate an area of 20 ha or 40 ha with a radius of 250 m and/or 360 m respectively. The irrigation areas are based on NLAR calculation and crops to be grown. This is reviewed in further detail in section 4.4.3.

4.5.3 Emitters

Emitter types vary depending on application pattern, uniformity requirements, droplet size and kinetic energy and they require different operating pressures. The proposed development will use sprinkler type emitters that are typically fitted with a pressure regulator, nozzle, distribution plate and weight fitted together and suspended from a flexible hose (dropper).

The Applicant will design the centre pivot system to achieve high uniformity in application, limit wind drift and efficiently irrigate the propped crops. An operating pressure of <20 psi will be needed to operate the sprinklers.

4.5.4 Source of clean water

The subject land does not have access to surface water and does not hold any surface water allocation. The subject land has an existing groundwater licence, allowing for the abstraction of up to 1,870 ML/year from the Leederville aquifer.

The Applicant will be constructing water reticulation infrastructure to convey clean water from bore/s to each centre pivot irrigator.

4.5.5 Effluent irrigation and application rates

Effluent will be diluted with extracted groundwater and applied to crops in the irrigation areas. The Applicant will be constructing infrastructure to reticulate effluent from each holding pond to each centre pivot irrigator.

The Applicant is designing the irrigation system to ensure peak demand of the crop to be grown (maize) can be met. This may be up to 15 mm/day gross irrigation. With an expected irrigation efficiency of 90%, this equates to 13.5 mm net irrigation per day. Irrigation will be scheduled according to soil moisture, weather forecasts and crop requirements.

4.5.6 Grazing of cattle on subject land

A grazing program is proposed to be based on maintaining a long term sustainable system. The grazing system shall include rotational grazing of the balance area and the effluent and solid waste utilisation areas to ensure that over grazing or over stocking of paddocks is prevented to assist with optimising pasture productivity and avoiding soil erosion as far as practicable. The grazing of the balance area shall be less intensive when compared to the effluent and solid waste utilisation areas.

The balance area suitable for grazing comprises some 1,650 hectares. This area does not include the effluent and solid waste utilisation area. The balance area is expected to sustain a long term capacity of in the order of 3 head per hectare.

Grazing of the effluent and solid waste utilisation areas will be short-term and depend on the nature of the crop grown and the purpose of the grazing (grazing stubble or failed crop). The short term stocking rate shall be sufficient to ensure high utilisation of the feed value and prevent preferential grazing. The short term stocking rate will be dependent on the available biomass. Whilst exact values have not been identified the short term stocking rate may be up to 20 head per hectare. The Applicant indicate that livestock shall be removed from the effluent and/or solid waste utilisation area before critical limits for minimum biomass, height and ground cover are reached.

Grazing management within the effluent and solid waste utilisation area shall involve monitoring of ground cover to ensure erosion is prevented and monitoring of nutrients applied in manure from grazing animals and nutrients applied in effluent and solid waste as part of a nutrient mass balance approach.

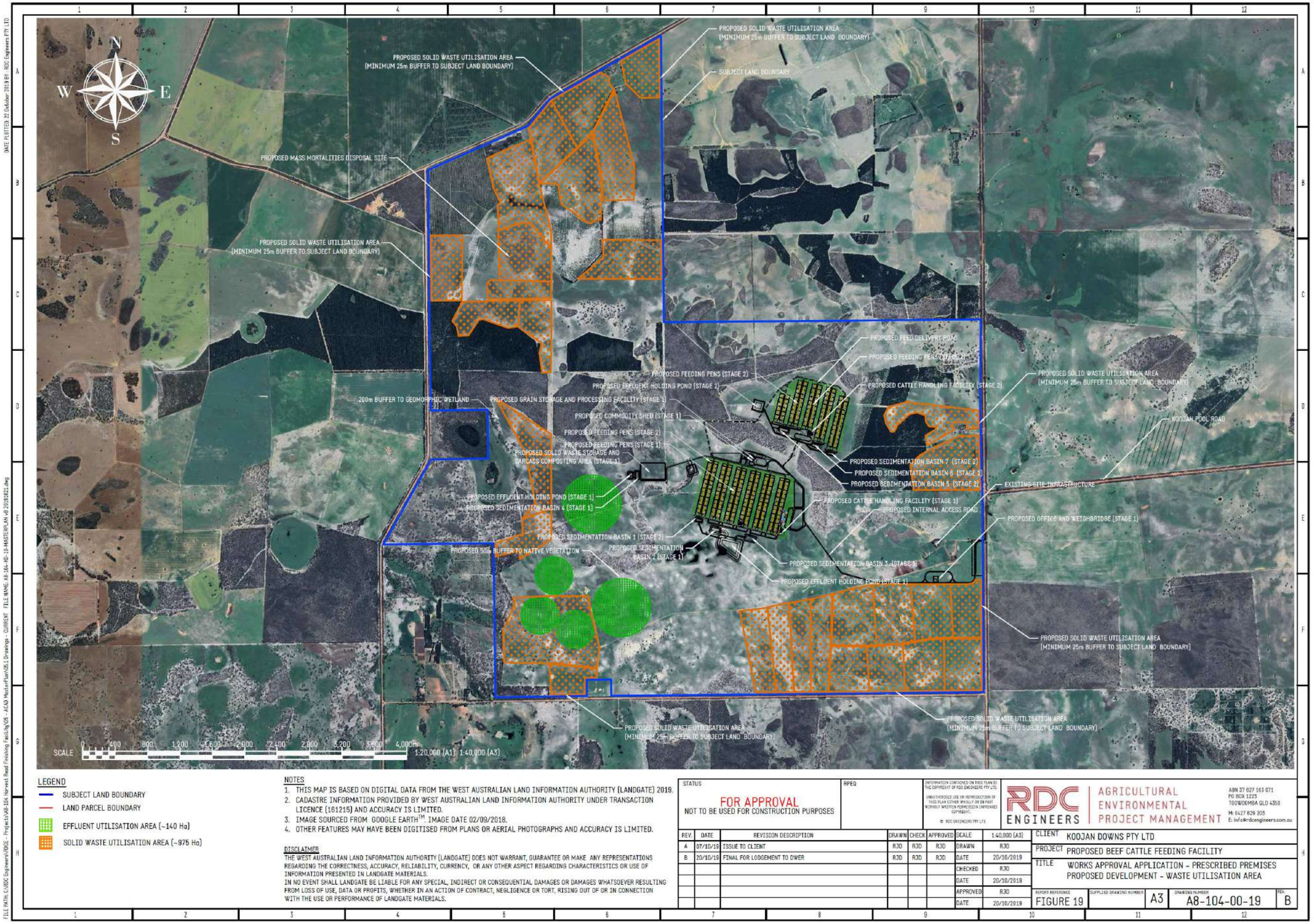


Figure 3: Waste utilisation area – site plan.

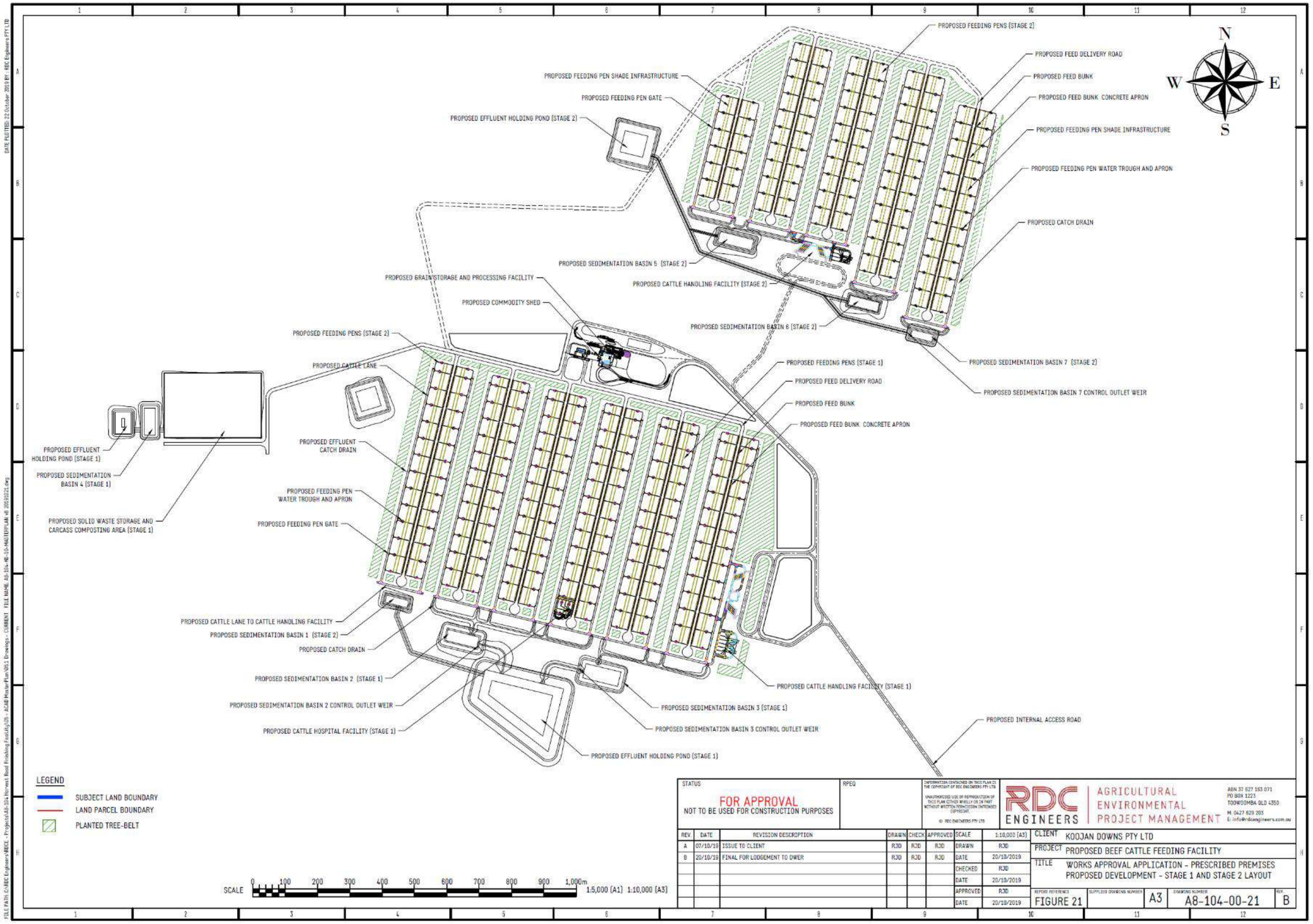


Figure 4: Proposed site layout (Stage 1 & 2) for Koojan Downs development

5. Legislative context

In relation to the *Rights in Water and Irrigation Act 1914* (RIWI Act) a related entity to the Applicant has two groundwater licences issued by DWER for taking water from the Mirrabooka aquifer on the subject land for irrigation and stock watering. The total volumetric capacity for the groundwater licence is 1.87 GL/year.

Table 8 summarises approvals relevant to the assessment.

Table 8: Relevant approvals and tenure

Legislation	Number	Subsidiary	Approval
Feehold Land Tenue	3556/DP206191	Western Australia State Government	The subject property is owned by Harvest Road Group Pty Ltd (ABN 31 169 138 014).
Local Government Authority; Shire of Dandaragan – Planning Approval	DAP File No. DAP/19/01691	Shire of Dandaragan	Development Approval subject to the Midwest Wheatbelt Joint Development Assessment Panel (JDAP) Shire of Dandaragan carried a motion to recommend development approval of an intensive cattle feedlot. JDAP granted development approval on 3/2/2020.
Rights in Water and Irrigation Act 1914	GWL167034(2) GWL175909(3)	DWER	Harvey Road Group Pty Ltd licence to take water; 57,960 kL from Gingin, Perth – Surficial & 1,816,650 kL from Gingin, Perth – Mirrabooka.

5.1 Part V of the EP Act

5.1.1 Applicable regulations, standards and guidelines

The overarching legislative framework of this assessment is the EP Act and EP Regulations. The guidance statements which inform this assessment are listed in Appendix 1.

5.1.2 Clearing

The Applicant has not applied to clear native vegetation and consequently clearing of native vegetation has not been assessment and no clearing of native vegetation will be authorised under the conditions of any works approval granted.

6. Modelling and monitoring data

For modelling within the application package, the Applicant has provided data from MEDLI® (a Windows® based computer model for designing and analysing effluent reuse systems for intensive rural industries, agri-industrial processors and sewage treatment plants). Intensive cattle feeding systems can be described in MEDLI using the waste estimation/feedlot option. The feedlot model contained in MEDLI models the daily water and nutrient balance of the pen/feeding area and its surrounding catchment (hard and soft) and predicts the quantity and quality of the runoff entering the holding pond following rainfall.

6.1 Modelling of discharges to land

The feedlot summary report includes information generated through MEDLI on annual runoff, nutrients contained in the runoff, manure harvesting rates and average pad nutrient and dry matter composition.

6.2 Monitoring of discharges to groundwater

Groundwater monitoring (quantity and quantity) is undertaken as prescribed by the Licence to Take Water conditions. Various hydrogeological reports were provided during the review process, as part of the original application, as responses to the department's Request for Further Information (RFI's) and as a response to the draft instruments. Monitoring of

groundwater depth and modelling has been carried out by hydrogeological consultants and this assessment also considered groundwater monitoring data and advice from DPIRD.

6.3 Modelling of noise emissions

The Applicant has included an Environmental Noise Screening Tool as an attachment to the works approval application. Potential noise impacts are expected to be minimal based on the implementation of several mitigation measures, the location of the proposed development and the absence of nearby sensitive receptors.

7. Consultation

The Applicant included notes with their application from meetings with the Shire(s) of Moora and Dandaragan prior to formal lodgement of their applications, and the Shire of Dandaragan approved planning for the feedlot on 24 January 2020.

The Works approval application was publically advertised by DWER on 4 December 2019 and referred to the Shire of Dandaragan, Shire of Moora and the Department of Primary Industries, Research and Development (DPIRD) for comment as direct interest stakeholders.

Comments received during the external consultation period, along with department response, are summarised in Appendix 3.

8. Location and siting

8.1 Siting context

The proposed development is to be located across four land parcels which form part of the properties known as Koojan Downs, Avena Vale and Damper Downs. Koojan Downs is located on Koojan West and Boundary Road, Koojan approximately 22 km by road south-southwest of Moora and some 160 km north of Perth in the wheatbelt region of Western Australia.

Avena Vale adjoins part of the northern boundary of the western land parcel of Koojan Downs. Damper Downs adjoins part of the northern boundary of the western land parcel of Koojan Downs and adjoins the western boundary of Avena Vale. The subject land comprises four cadastral portions. One land parcel comprises part of the property Koojan Downs. Two land parcel comprises part of the property Avena Vale and one parcel is known as the property Damper Downs.

The total area of the subject land is about 3,748.2 ha (~ 9,258 acres). The subject land is in the Shire of Dandaragan. The subject land is located in a landscape that has experienced significant modification by past land uses. These include clearing to allow for extensive broad acre agricultural activities including low intensity sheep grazing and extensive grazing and supplementary feeding of beef cattle on improved pastures and seasonal irrigated cropping of forage sorghum and/or maize. These uses will continue alongside the proposed development.

8.2 Residential and sensitive Premises

The distances to residential and sensitive receptors in comparison to s-factor distances calculated using MLA 2012a are detailed in Table 9. All receptors meet the calculated S-factor distances. The separation distance (S-factor) assessment can be seen in Table 9.

Table 9: Receptors and distance from perimeter of the controlled drainage areas (pens, basins and ponds)

Sensitive Land Uses	MLA 2012a calculated S-factor distance	Actual distance from perimeter of controlled drainage areas
Residential premises at 1635 Boundary Road, Yathroo	1,976 m	3,610 m
Residential premises at 804 Capitela Road, Koojan	2,196 m	4,520 m

Sensitive Land Uses	MLA 2012a calculated S-factor distance	Actual distance from perimeter of controlled drainage areas
Residential premises at 304 Koojan West Road, Koojan	1,976 m	7,350 m
Residential premises at 704 Scenic Drive, Yathroo	1,976 m	7,400 m
Residential premises at 65 Koojan West Road, Koojan	1,976 m	9,765 m
Residential premises at 6383 Bindoon-Moora Road, Koojan	1,976 m	10,675 m
Residential premises at 118 Boxhall Road, Gillingarra	1,976 m	11,150 m
Residential premises at 78 Boxhall Road, Gillingarra	1,976 m	11,445 m
Residential premises at 6335 Bindoon-Moora Road, Koojan	1,976 m	11,495 m
Residential premises at 6145 Bindoon-Moora Road, Gillingarra	1,976 m	12,100 m
Residential premises at 6172 Bindoon-Moora Road, Gillingarra	1,976 m	12,230 m
Township of Moora	8,784 m	>19,000 m

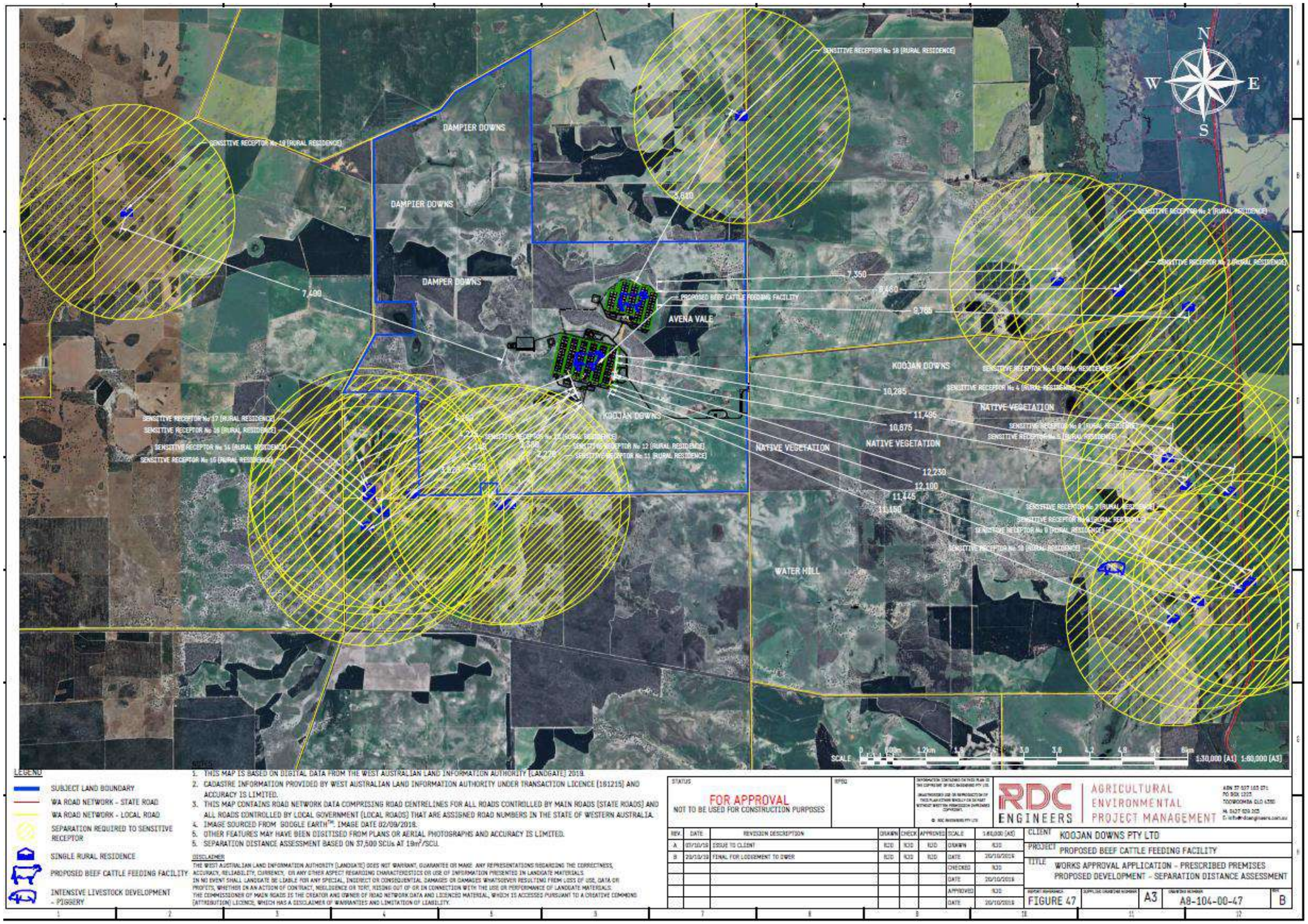


Figure 5: Proposed development seperation distance fom sensitive receptors

8.3 Specified ecosystems

Specified ecosystems are 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 to specified ecosystems are shown in Table 10. Table 10 also identifies the distances to other relevant ecosystem values which do not fit the definition of a specified ecosystem.

The table has also been modified to align with the *Guidance Statement: Environmental Siting.*

Table 10: Environmental values

Specified ecosystems	**Distance from the Premises**
Geomorphic Wetlands	Swan Coastal Plain geomorphic wetlands fall within the premises along the west boundary and abuts the south west corner of the premises.
Parks and Wildlife Managed Lands and Waters	Nearest managed land and waters are about 12,800 m to the east and 13,100 m east north-east.
Threatened Ecological Communities and Priority Ecological Communities	Several Threatened Ecological Communities surround the Applicant freehold. Banksia Dominated Woodland exist to the east (about 4,100 m distance) and south west (4,800 m)
Biological component	**Distance from the Premises**
Threatened/Priority Flora	The proposed development site has been previously cleared and no native vegetation will be removed as a result of the development. A total of 131 flora species were returned through a NatureMap search (Department of Biodiversity, Conservation and Attractions, 2019), of the proposed development site using a 10 km buffer, as having been previously recorded in the area. Two (2) are listed as threatened and twelve (12) are listed as conservation significant species under the Wildlife Conservation Act 1950 (WC Act). Of these species, one is listed as threatened nationally under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*.
Threatened/Priority Fauna	A total of 38 fauna species were returned through a NatureMap search (Department of Biodiversity, Conservation and Attractions, 2019) of the proposed development site using a 10 km buffer as having been previously recorded in the area. All of these are bird species and 1 is listed as threatened under the Wildlife Conservation Act 1950 (WC Act). This species is also listed as threatened nationally under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*.

8.4 Groundwater and water sources

The Applicant proposes to construct a 40,000 head cattle feedlot in the Koojan area near Moora. The proposal includes effluent storage ponds that will be constructed to a maximum depth of 4 m below the ground surface. The Applicant also proposes to irrigate effluent and apply solid waste to land within the premises. It is therefore important to establish the hydrogeological context of the site to establish risks to groundwater from proposed activities.

The Applicant's hydrogeological model was largely based on groundwater investigations in the region since the 1970's by DWER. Some of the key points are:

- the Premises is located on the Dandaragan Plateau within the Perth Basin and overlies regionally important sandstone aquifers of Mesozoic age;

- in the vicinity of Koojan Downs, these aquifers are overlain by a thick sequence of silty sediments which provide confining conditions for these systems and limit the extent to which seepage from surface land uses could affect groundwater quality;
- the Dandaragan Plateau does not have a regionally extensive shallow groundwater flow system. Shallow groundwater on the Dandaragan Plateau typically occurs in localised (and often seasonal), perched flow-systems; and
- potentiometric heads in aquifers in the region are increasing due to the effects of historical land clearing. These increases in heads have the potential to increase the lateral extent and seasonal duration of perched groundwater flow systems. These changes could, in turn, cause seasonal water logging and soil salinization in low-lying areas.

The Delegated Officer formed the preliminary view that it was likely that the shallow groundwater levels observed at the proposed pond site indicated the presence of an ephemeral perched groundwater flow system caused by a recent heavy rainfall event. It was initially considered these levels are not indicative of the long-term natural groundwater level below the base of the proposed ponds.

However, if regional groundwater levels in the area continue to rise, the Delegated Officer believed that there was a possible risk that groundwater would eventually intersect the base of the proposed ponds at the site. Additionally, prolonged heavy rainfall and extensive seepage from the ponds could lead to local waterlogging and soil salinisation near the ponds.

As a consequence of the preliminary view, the Delegated Officer requested the Applicant review its proposed pond design with consideration to a high level of containment, potentially incorporating a composite lining, underdrainage and a leak detection system. The Applicant provided reasoning to support a preferred option to increase the thickness of the proposed compacted clay liner from 300 mm to 450 mm.

Additional information was received from the Department of Primary Industries and Regional Development (DPIRD) suggesting that both the Applicant's conceptual hydrogeological model and DWER's assessment of this may have inaccuracies. DPIRD provided DWER with hydrogeological data which is summarised below.

8.4.1 Assessment of subsurface lithology from DPIRD monitoring bores

DPIRD has drilled and constructed a number of monitoring bores within and in the immediate vicinity of the proposed Koojan Downs feedlot site (Figure 6). Lithological and geophysical logs from two of these bores indicated that the dominant lithology to a depth of about 60 metres is sandstone. Although the gamma-logs for these bores indicate that siltstone/shale units are present within the dominant sandy lithology, these units appear to be thin and are probably not laterally extensive.

These logs do not indicate that there is an extensive aquitard present that would protect deeper groundwater from the seepage of contaminants from the land surface. Additionally, the drilling logs do not suggest that a perched water table is present beneath the Koojan Downs site. It is more likely that there is a direct hydraulic connection between shallow groundwater near the water table and deeper groundwater beneath the site.

The monitoring of depth to groundwater by DPIRD indicates that there is a strong downward head gradient in the aquifer. This suggests that the Koojan Downs site is located within a recharge area for deeper aquifers.

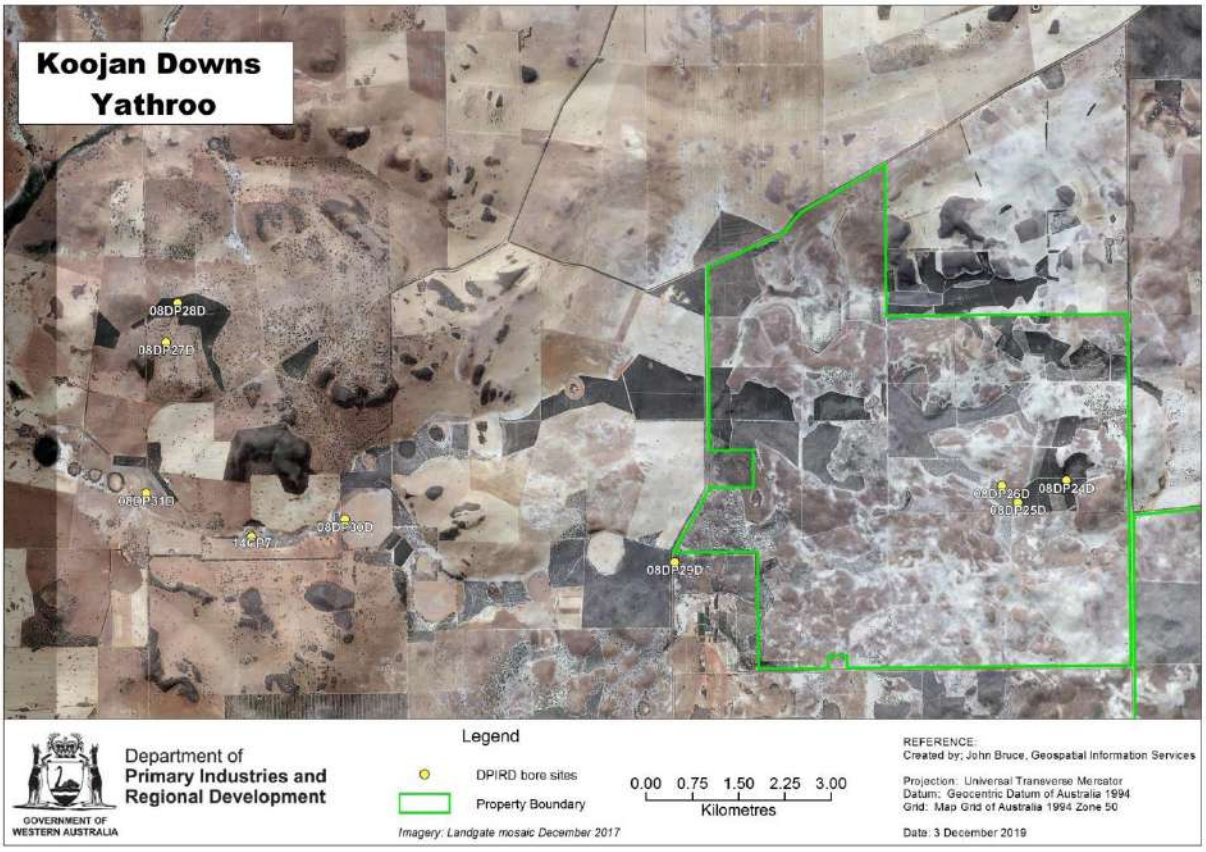


Figure 6: Location of DIRD groundwater monitoring sites

8.4.2 Water level trends in DPIRD monitoring bores and potential implications

Hydrographs for the DPIRD monitoring bores (Figure 7) indicate that there is a long-term trend of increasing groundwater levels at a rate of about 0.2 m/year. This trend is occurring despite a long-term trend of declining rainfall in the area, indicating that the hydrological system is still adjusting to increases in recharge caused by historical land clearing in the area.

This trend of increasing groundwater levels is a relevant consideration for the construction of wastewater ponds at the site and for the long-term sustainability of the proposed wastewater irrigation scheme at the site. Without adequate management, a rising water table could cause damage to the liners of wastewater ponds. A possible way to prevent this is through the construction of an underdrainage system beneath the ponds.

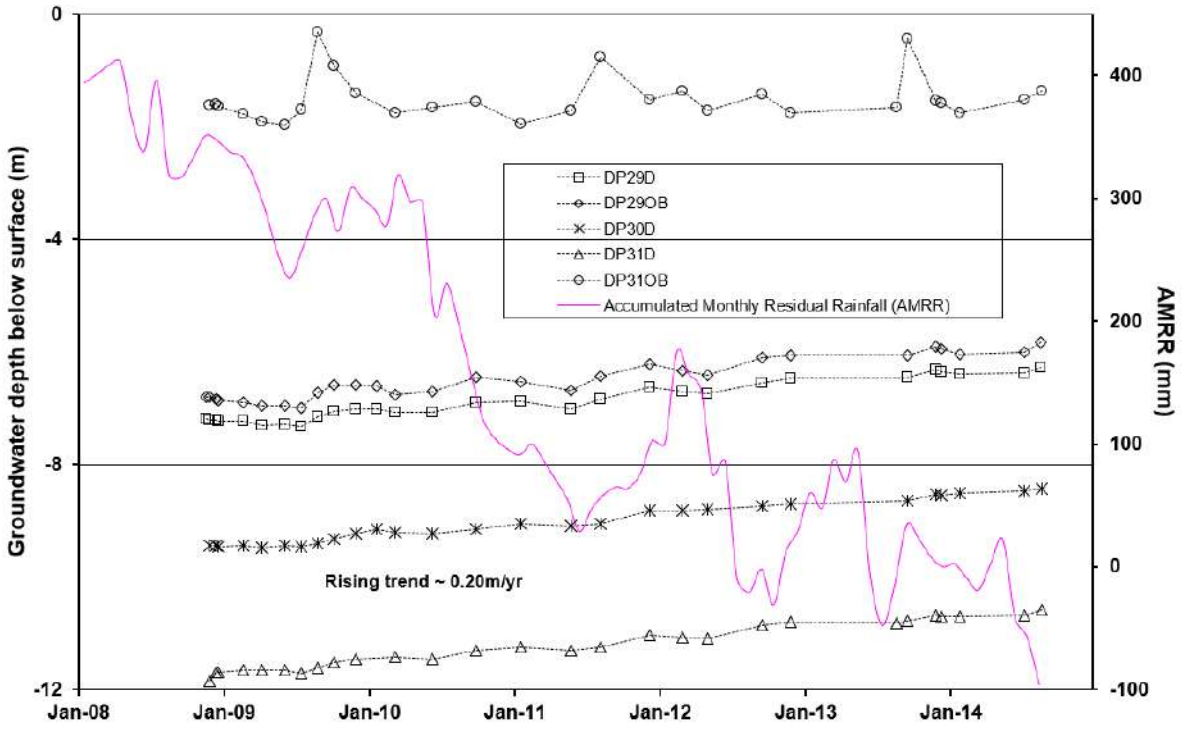


Figure 7: Water level changes over time in DPIRD monitoring bores

Based on the DPIRD data the Delegated Officer specified in the draft works approval the requirement of underdrainage beneath a 450 mm compacted clay liner. The Applicant responded to the draft works approval that they believed the underdrainage was not required and that a compacted clay liner of 450 mm would be sufficient to manage the risk. The Applicant provided additional technical detail on the underlying hydrogeological site structure that was reviewed by hydrogeologists at both DWER and DPIRD.

The Applicant maintained that rising water tables were unlikely to be an issue on Koojan Downs because of the proposed irrigation bore field. The bores would pull water from the aquifer forming a cone of depressurisation that will act as a sink for local groundwater migration. The Applicants hydrogeological consultant stated that as the water table is between 10 to 20 m below ground level, the hydrostatic uplift pressure from groundwater would not adversely affect the proper functioning of the compacted clay liner of the holding ponds.

The Applicant also stated that underdrainage would add significant cost to the project and generate technical and engineering challenges that were not suitable for the risk to groundwater. DWER's discussed new information with DPIRD and conceded that provided adequate monitoring be undertaken by the Applicant, the risk to groundwater could be managed without the requirement of underdrainage beneath the holding ponds.

The potential impacts of a rising water table beneath the proposed wastewater irrigation area are also a consideration in the risk assessment. While the Delegated Officer had the view that there was sufficient land available at the Koojan Downs site to accommodate the hydraulic loading of the wastewater, there is a risk that nitrogen stored within the soil profile would be progressively leached into groundwater if the water table continues to rise under the site.

The Applicant provided DWER with a draft nutrient and irrigation management plan (NIMP) to consider future operational controls for waste disposal areas, grazing of cattle and complement irrigation loading analysis in the Application. The Applicant will need to ensure that a final and robust site specific NIMP is provided in advance of any future licence application. It will be important for the NIMP to show that irrigation of effluent will be managed

to maximise the uptake of nitrogen by vegetation and will prevent nutrients leaching below the root zone of irrigated crops. The NIMP should be complemented by a detailed nutrient balance for soils and crops in the irrigation area to demonstrate that all of the nitrogen that is applied in effluent and through the grazing of cattle is removed from the system and that negligible amounts of leaching to groundwater will take place.

The distances to groundwater and water sources are shown in Table 11.

Table 11: Groundwater and water sources

Groundwater and water sources	Distance from Premises	Environmental value
Public drinking water source areas	Moora Eastern Water Reserve is 18 km to the north-east. Dandaragan Water Reserve is 20 km to the north-west.	
Major watercourses/ waterbodies	Moore River is 7,800 m east and ~14 km south. Caren Caren Brook (a significant stream) is 9,500 m to the north west.	There are no drainage features or watercourses mapped on the subject land. The various overland flow paths and drainage lines originating from the upper slopes of the subject land disappear before reaching watercourses. The subject land does not have access to surface water and does not hold any surface water allocations.
Groundwater	Refer to discussion in section 8.4	The subject land has a groundwater allocation of 1.87 GL/year from the Mirrabooka aquifer for the purpose of stock watering and irrigation. The irrigation bore is equipped with a submersible pump and is metered in accordance with licence requirements.

8.5 Soil type

Soil types were investigated by the Applicant for both the infrastructure and effluent utilisation areas. The infrastructure site has varied soil types, comprised of both wind (aeolian) and water (alluvial) deposited and eroded soils that vary in levels of sand, clay and gravel densities. The sandy/gravel areas vary between very loose and dense while the sandy clay/gravelly sandy clay soil structure varies between firm and very stiff.

The effluent utilisation areas are dominated by sandy gravel soil types. The soils are ironstone gravel soils with a slightly acidic to neutral pH (pH_w 6.2–7.0) in the topsoil and slightly acidic (pH_w 6.0-6.4) in the deep subsoil (90-100 cm).

Table 12 details soil types and characteristics relevant to the assessment.

Table 12: Soil and sub-soil characteristics

Groundwater and water sources	Description
Soil type classification	The subject land falls predominantly under the Capitella System and presents as gently undulating landscape with lateritic ridges and sandy colluvial slopes. Very few slopes exceed 3% and almost all of the system are well drained. The system is dominated by yellow deep sands and pale deep sands, with sandy duplex soils and gravelly sands also present.
Acid sulfate soil risk	No known risk across the proposed cattle feedlot area. Nearest recorded acid sulfate soil is 27 km west at points along Brand Highway at a recoded depth of 5.5 m.

8.6 Meteorology

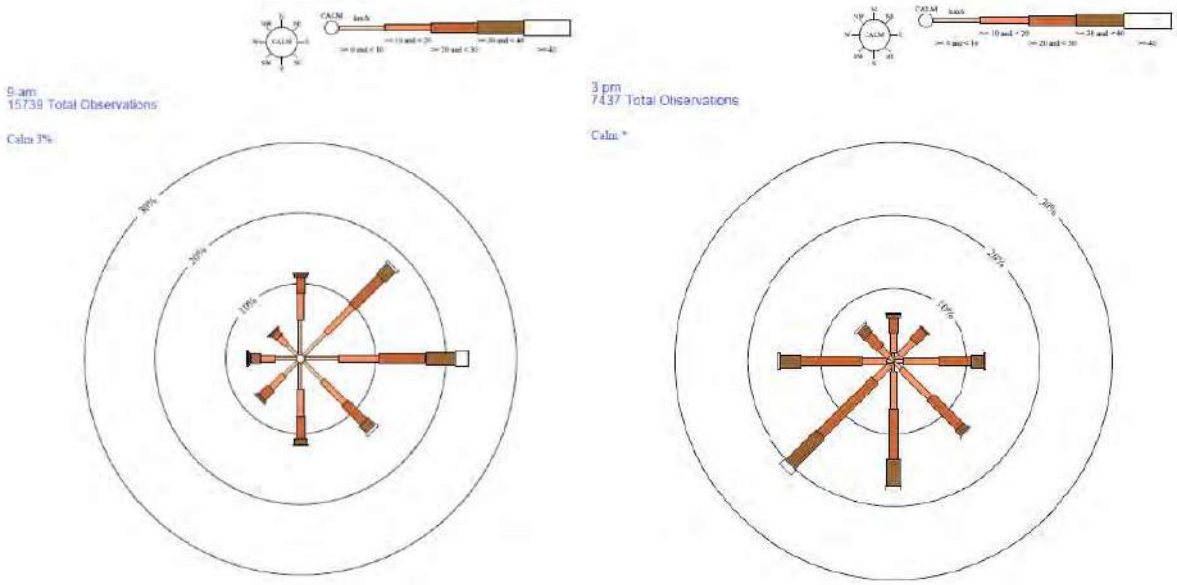
Meteorological data does not exist for the proposed site and data was obtained for the closest record station. The closest meteorological station to the subject property is the Bureau of Meteorology (BoM) station at Moora located about 22 km north-north-east of the subject land. However, the BoM station at Moora was closed in 2004.

Consequently, the long-term daily climate data for the area were derived from the Department of Science, Information Technology and Innovation (DSITIA) Silo Data Drill database (Department of Science, Information Technology and Innovation (DSITIA), 2018).

The Data Drill accesses data on a 5 km grid derived by interpolation from point observations by the Bureau of Meteorology station records. The data in the Data Drill are all synthetic; there are no original meteorological station data left in the calculated grid fields (Jeffrey et al. 2001).

The data are supplied as an individual file of interpolated daily rainfall, maximum and minimum temperature, potential evapotranspiration and radiation at the nominated point location for the period 1/1/1889 to 16/07/2018 (DSITIA, 2018).

8.6.1 Wind direction and strength



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

8.6.2 Regional climatic aspects

The climate of the region is Mediterranean and experiences typical cool wet winters and hot dry summers. The mean annual maximum and minimum temperatures are 24.9°C and 11.8°C, respectively with the highest temperatures usually experienced in February. Lowest temperatures typically occur in July and August. The mean maximum temperature is 33.1ºC in February and the mean minimum is 7.0ºC recorded for July.

8.6.3 Rainfall and temperature

The long-term average rainfall recorded at Moora for the period 1897 to 2004 was 459 mm. There is a large degree of variability in rainfall between years and there has been a trend of drying climate with lower rainfall since about 1975.

Rainfall varies with time of year due to the latitude of the region (-30.850) with a highly seasonal weather pattern resulting in low summer rainfall and high winter rainfall. The average annual rainfall of the area is about 507 mm and is generally confined to the winter months with the highest rainfall totals occurring in June, July and August. The lowest rainfall totals are in the summer months December to February. The annual evaporation is approximately 2,088 mm/yr. Monthly evaporation rates are lowest during the wet winter months and highest in the dry summer months. The region has net deficit rainfall with rainfall less than the evaporation and transpiration rates.

9. Risk assessment

9.1 Determination of emission, pathway and receptor

In undertaking its risk assessment, DWER will identify all potential emissions pathways and potential receptors to establish whether there is a Risk Event which requires detailed risk assessment.

To establish a Risk Event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission. Where there is no actual or likely pathway and/or no receptor, the emission will be screened out and will not be considered as a Risk Event. In addition, where an emission has an actual or likely pathway and a receptor which may be adversely impacted, but that emission is regulated through other mechanisms such as Part IV of the EP Act, that emission will not be risk assessed further and will be screened out through Table 14. The identification of the sources, pathways and receptors to determine Risk Events are set out in Table 13 and Table 14 below.

Table 13. Identification of emissions, pathway and receptors during construction

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**		
Construction of the proposed cattle feedlot	Vehicle movements on unsealed roads and construction of infrastructure	Noise	Closest rural residential premises located approximately 3610 m east of activity boundary.	Air / wind dispersion	Potential amenity impacts	No	The Delegated Officer considers that the separation distance from the proposed location of the feedlot to the closest single rural dwelling is sufficiently large for there to be no adverse impact from noise or dust emissions from the construction of the facility. The EP Noise Regulations apply to noise emissions.
		Fugitive dust			Potential health and amenity impacts.	No	

Table 14: Identification of emissions, pathway and receptors during operation

Risk Events						Continue to detailed risk assessment	Reasoning
Sources/Activities		**Potential emissions**	**Potential receptors**	**Potential pathway**	**Potential adverse impacts**		
Operation of the proposed feedlot	Movement and housing of cattle (drafting yard; and cattle production, induction & dispatch, and hospital pens); Mechanical spreading of manure to land; Unloading and loading of materials, crushing of grains, combining of grains, hay and silage in the vertical mixer.	Fugitive dust from movement of cattle	Closest rural residential premises located approximately 3610 m east of activity boundary.	Air / wind dispersion	Potential health and amenity impacts	No	The Delegated Officer considers that the separation distance from the proposed location of the feedlot to the closest single rural dwelling is sufficiently large for there to be no adverse impact from dust emissions from the of the facility. The Delegated Officer considers any dust generated from spreading of manure would be minimal and acceptable for short term emissions from this type of agricultural activity.
	Storage of wastewater containing nutrients and sediments in the effluent holding ponds and sedimentation basin; Evaporation pond and silt trap desludging activities (removal and storage of sludge); Mortalities; Preparation of feed; Unstabilised cattle manure discharge to land; Mechanical spreading of manure to land.	Odour			Potential amenity impacts	No	The proposed development meets the conservative separation distance requirements for sensitive receptors calculated in accordance with the S-factor method outlined in the National Guidelines for Beef Cattle Feedlots in Australia (3rd Edition) (MLA, 2012a). The Delegated Officer considers any odour generated from the preparation of feed would be minimal. Odour can be regulated under general provisions of the EP Act The Delegated Officer considers that the separation distance to nearby rural residents are sufficient to mitigate odour emissions.
	Wastewater collected within the cattle pens; Storage of wastewater containing nutrients and sediments in the effluent holding ponds and sedimentation basin; Overflow of wastewater containing nutrients and sediment from containment infrastructure; Mortalities.	Seepage of wastewater containing nutrients through base of pens and central drain / raceway; Overflow of wastewater containing nutrients and sediment from containment infrastructure	Shallow groundwater Deeper aquifers Multiple groundwater bores are located on site of proposed development.	Hydraulic link between “perched” shallow groundwater near the water table and deeper aquifers	Nitrogen and salt concentration in shallow groundwater. Infiltration to deeper aquifers. Groundwater contamination and impacts on its beneficial use	Yes	See section 9.4
	Application of solid waste to dedicated solid waste utilisation areas using a tractor towed spreader. Irrigation of effluent to dedicated effluent utilisation areas using centre pivot irrigation systems.	Direct discharge to land	Shallow groundwater Deeper aquifers Multiple groundwater bores are located on site of proposed development	Hydraulic link between “perched” shallow groundwater near the water table and deeper a	Nitrogen and salt concentration in shallow groundwater. Infiltration to deeper aquifers. Groundwater contamination and impacts on its beneficial use	Yes	See section 9.5

9.2 Consequence and likelihood of risk events

A risk rating will be determined for risk events in accordance with the risk rating matrix set out in Table 15 below.

Table 15: Risk rating matrix

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

The department will undertake an assessment of the consequence and likelihood of the Risk Event in accordance with Table 16 below.

Table 16: Risk criteria table

Likelihood		**Consequence**		
The following criteria has been used to determine the likelihood of the Risk Event occurring.		**The following criteria has been used to determine the consequences of a Risk Event occurring:**		
			Environment	**Public health* and amenity (such as air and water quality, noise, and odour)**
Almost Certain	The risk event is expected to occur in most circumstances	Severe	• **onsite impacts**: catastrophic • **offsite impacts local scale**: high level or above • **offsite impacts wider scale:** mid-level or above • Mid to long-term or permanent impact to an area of high conservation value or special significance^ • Specific Consequence Criteria (for environment) are significantly exceeded	• Loss of life • **Adverse health effects:** high level or ongoing medical treatment • Specific Consequence Criteria (for public health) are significantly exceeded • **Local scale impacts:** permanent loss of amenity
Likely	The risk event will probably occur in most circumstances	Major	• **onsite impacts**: high level • **offsite impacts local scale**: mid-level • **offsite impacts wider scale**: low level • Short-term impact to an area of high conservation value or special significance^ • Specific Consequence Criteria (for environment) are exceeded	• **Adverse health effects:** mid-level or frequent medical treatment • Specific Consequence Criteria (for public health) are exceeded • **Local scale impacts**: high level impact to amenity
Possible	The risk event could occur at some time	Moderate	1. **onsite impacts**: mid-level 2. **offsite impacts local scale**: low level 3. **offsite impacts wider scale**: minimal 4. Specific Consequence Criteria (for environment) are at risk of not being met	5. **Adverse health effects:** low level or occasional medical treatment 6. Specific Consequence Criteria (for public health) are at risk of not being met 7. **Local scale impacts:** mid-level impact to amenity
Unlikely	The risk event will probably not occur in most circumstances	Minor	8. **onsite impacts**: low level 9. **offsite impacts local scale**: minimal 10. **offsite impacts wider scale**: not detectable 11. Specific Consequence Criteria (for environment) likely to be met	12. Specific Consequence Criteria (for public health) are likely to be met 13. **Local scale impacts:** low level impact to amenity
Rare	The risk event may only occur in exceptional circumstances	Slight	• **onsite impact**: minimal • Specific Consequence Criteria (for environment) met	• **Local scale**: minimal to amenity 14. Specific Consequence Criteria (for public health) met

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

* In applying public health criteria, DWER may have regard to the Department of Health's *Health Risk Assessment (Scoping) Guidelines.*

"onsite**"** means within the Prescribed Premises boundary.

9.3 Acceptability and treatment of Risk Event

DWER will determine the acceptability and treatment of Risk Events in accordance with the Risk treatment (Table 17) below.

Table 17: Risk treatment table

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

9.4 Risk Assessment – Containment of wastewater – overtopping or liner failure

9.4.1 Description of Risk Event

Failure of wastewater containment infrastructure causing land, soil, surface water or groundwater contamination affecting ecosystem health and reducing the beneficial use of groundwater.

9.4.2 Identification and general characterisation of emission

Cattle feedlot waste water is known to contain high levels of bacteria, nutrients, salts and sediments.

A MLA 2011 report on "*Treatment Technologies for Feedlot Effluent Resue*" found that feedlot manure samples often contained the pathogenic *E. coli*, *Listeria moncytogenes* and *Campylobacter jejuni*, followed by the protozoan pathogens *Giardia* and *Cryptosporidium*. It is likely that some of these pathogens would be present in the effluent. In samples taken from 18 Australian feedlots, median bacterial colony-forming unit (CFU) levels were about 45 million CFU/100 mL

The concentrations of both inorganic and organic nutrients were found to be elevated in feedlot effluent with nitrogen levels at 134 mg/L and phosphorus at 61 mg/L. Salinity (EC) can also be high with an average of 6.3 mS/cm. The average levels of total dissolved solids (TDS) in feedlot effluent is 4,330 mg/L.

9.4.3 Description of potential adverse impact from the emission

Refer to discussion in section 8.4. Subsurface lithology data does not necessarily indicate there is an extensive aquitard present to protect deeper groundwater from surface seepage. Also there is evidence to suggest there is no perched water table, but rather a direct hydraulic connection between shallow groundwater near the water table and deeper groundwater beneath the site. Monitoring of potentiometric heads at different depths by DPIRD indicates a strong downward head gradient in the aquifer indicating Koojan Downs is located within a recharge area for deeper aquifers. Hydrographs indicate a long-term trend of increasing water levels (approx. 0.2 m/year) despite a long-term trend of declining rainfall indicating the hydrological system is still adjusting to increases in recharge cause by historical land clearing.

Nutrients and salts in animal wastes have the ability to concentrate in soils and the shallow water table, and the potential to infiltrate and contaminate deeper groundwater aquifers.

9.4.4 Criteria for assessment

The following guidelines are considered appropriate assessment criteria to assess the potential impact on the beneficial use of groundwater.

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality ANZECC & ARMCANZ (2000) for livestock drinking water quality.
- The MLA 2012a and MLA 2012b documents specify that a feedlot water supply is suitable for quality for stock use and that infrastructure design and controls manage environmental impacts.
- General provisions of the EP Act make it an offence to cause or allow pollution. Additionally, it is an offence to discharge animal wastes and sediments into the environment under regulation 3 of the UDR.

Many factors influence the concentration of salts that cattle can tolerate in their drinking water. Cattle can tolerate a TDS concentration up to 9,000 mg/L (13.6 dS/m) and for short periods, up to 10,000 mg/L (15.2 dS/m); but levels above 10,000 ppm should never be used as water sources for beef cattle.

The ANZECC guidelines (ANZECC 2000) suggest that the desirable maximum TDS concentration for healthy growth of beef cattle is 4000 mg/L (6.25 dS/m), but it is generally recommended that the TDS concentration should not exceed 5,000 mg/L for cattle drinking watering purposes.

The recent monitoring results (Pennington Scott, 2019) showed that the highest result of TDS was from bore KDS01, which is located in the centre of the premises, and was 1,300 mg/L. The average across nine boreholes drilled on the premises was 921 mg/L

9.4.5 Applicant controls

This assessment has reviewed the controls set out in Table 18 below.

Table 18: Applicant's proposed controls for containment of wastewater and leachate

Infrastructure	Design and construction requirements
Feedlot – feeding pens, holding pens, catch drains / main drains and roadway	(a) 244 open cattle pens of feed bunk length of 48 m and depth of 54.5 m (approximately 2,877 m^2 each) with a total area of 701,988 m^2 (70.2 ha).12 smaller pens approximately 1,570 m^2 with a total area of 18,840 m^2 (1.88 ha). This forms part of the controlled drainage area calculations for the effluent system design. (b) Pens, catch drains and main drains are to be constructed such that they are lined to achieve permeability of at less than or equal to 1 x 10^{-9} m/s. (c) Slope of 3% across the cattle feedlot towards the catch drains / main drains. (d) Feed bunks for each row constructed in-situ as continuously formed 6 m long concrete sections with length of bunk space to be 300 mm. The feed bunk will be placed over compacted gravel base with a minimum thickness of 100 mm. (e) Concrete aprons along the feed bunks will be constructed in-situ and extend 3 m into the pen and be suitably reinforced to withstand the loading of pen cleaning equipment. (f) Catch drains / main drains will direct all runoff from the cattle feedlot to the sedimentation basin. (g) Water troughs fitted with drainage system to minimise manure becoming wet during cleaning or overfilling.
Sedimentation basin, including outlet weir, pipes and spill drain	(a) Sedimentation basin will be sloped to direct water to the holding pond. (b) The sedimentation basin will be clay lined to achieve a permeability of less than or equal to 1 x 10^{-9} m/s. (c) Sedimentation basins are designed with system volumes of between 1,775 m^3 and 5,000 m^3. In Stage 1 the three proposed basins have volumes of 5,000 m^3, 3,500 m^3 and 2,000 m^3. (d) Sedimentation basins will have a maximum water depth of less than 1 m and designed to drain completely to bed level with a 0.9 m freeboard. (e) Control outlet weir will be constructed on a 200 mm reinforced concrete slab.

Infrastructure	Design and construction requirements
Holding ponds	(a) The holding ponds must be constructed such that it has a minimum containment volume, excluding a 900 mm freeboard, of 80 ML (P1), 6 ML (P2) and 54 ML (P3). (b) A minimum 150 mm thickness compacted subgrade that is smooth and free of stones and proof-rolled to identify and troubleshoot zones that require subgrade improvement. (c) A compacted clay liner with a minimum thickness of 450 mm constructed in three layers of 150 mm following compaction with an in-situ coefficient of permeability of less than 1 x 10^{-9} m/s. (d) The material used as a clay liner must be well graded, of low permeability and tested for its conformance against the particle size distribution, plasticity index and other characteristics listed in Schedule 3. (e) The finished liner thickness must be surveyed to confirm it meets the design specifications and be tested in-situ to ensure it meets specified permeability criteria in AS 1289.6.7.3.
Solid waste stockpile and composting area	(a) Surface area of 60,000 $m^{2.}$ Which has informed controlled drainage area calculations for the effluent system. (b) A minimum 150 mm thickness compacted subgrade that is smooth and free of stones and proof-rolled to identify and troubleshoot zones that require subgrade improvement. (c) A compacted clay liner with a minimum thickness of 300 mm constructed in two layers of 150 mm following compaction with an in-situ coefficient of permeability of less than 1 x 10^{-9} m/s. (d) Diversion banks upslope of the area that prevent upslope runoff from entering the area. (e) Bunded to prevent any runoff exiting the area and sloped to direct any runoff within the area to a sedimentation basin and holding pond.

9.4.6 Consequence

If overtopping and/or infiltration to groundwater of wastewater occurs, then the Delegated Officer has determined that the impact on land, soil, surface water and groundwater from stormwater containing high levels of nutrients and sediments will have mid-level onsite impacts. Therefore, the Delegated Officer considers the consequence to be **Moderate.**

9.4.7 Likelihood of Risk Event

The Delegated Officer has determined that the likelihood of impacts from failure of containment of contaminated and potentially contaminated stormwater will occur only in exceptional circumstances. Therefore, the Delegated Officer considers the likelihood to be **Rare**.

9.4.8 Overall rating of Risk Event

The Delegated Officer has compared the consequence and likelihood ratings described above with the risk rating matrix (Table 15) and determined that the overall rating for the risk of wastewater impacting on land, soil, surface water and groundwater due to overtopping of infrastructure or liner failure is **Medium**.

9.5 Risk Assessment – Irrigation of effluent & application of solid waste

9.5.1 Description of Risk Event

Irrigation of nutrient rich wastewater and application of solid wastes causing land, soil and groundwater contamination affecting ecosystem health and reducing the beneficial use of cropping land and groundwater.

9.5.2 Identification and general characterisation of emission

Cattle feedlot waste water is known to contain high levels of bacteria, nutrients, salts and sediments. Solid waste applied to land will consist of manure, spoilt feed, carcass compost

and holding pen sludge.

A MLA 2011 report on "*Treatment Technologies for Feedlot Effluent Resue*" found that feedlot manure samples often contained the pathogenic *E. coli*, *Listeria moncytogenes* and *Campylobacter jejuni*, followed by the protozoan pathogens *Giardia* and *Cryptosporidium*. It is likely that some of these pathogens would be present in the effluent and in samples taken from 18 Australian feedlots, median bacterial colony-forming unit (CFU) levels were about 45 million CFU/100 mL

The concentrations of both inorganic and organic nutrients were found to be elevated in feedlot effluent with nitrogen levels at 134 mg/L and phosphorus at 61 mg/L. Salinity (EC) can also be high with an average of 6.3 mS/cm. The average levels of total dissolved solids (TDS) in feedlot effluent is 4,330 mg/L.

The Applicant used the NLAR approach in MLA 2012a and found that phosphorus was the limiting nutrient when growing cereal silage in winter which corresponds to a maximum solid waste application rate of 1 t/ha (dry). There is insufficient land available on the premises to sustainably utilise all solid waste generated each year and excess will require removal from site.

The irrigation and solid waste utilisation areas are separate dedicated areas for each activity.

9.5.3 Description of potential adverse impact from the emission

Refer to discussion in section 8.4. Subsurface lithology data does not necessarily indicate there is an extensive aquitard present to protect deeper groundwater from surface seepage. Also there is evidence to suggest there is no perched water table, but rather a direct hydraulic connection between shallow groundwater near the water table and deeper groundwater beneath the site. Monitoring of potentiometric heads at different depths by DPIRD indicates a strong downward head gradient in the aquifer indicating Koojan Downs is located within a recharge area for deeper aquifers. Hydrographs indicate a long-term trend of increasing water levels (approx. 0.2 m/year) despite a long-term trend of declining rainfall indicating the hydrological system is still adjusting to increases in recharge cause by historical land clearing.

Nutrients and salts in animal wastes have the ability to concentrate in soils and the shallow water table, and the potential to infiltrate and contaminate deeper groundwater aquifers. A rising water table has the potential to progressively leach stored nitrogen into groundwater as the water table continues to rise.

9.5.4 Criteria for assessment

The following guidelines are considered appropriate assessment criteria to assess the potential impact on the beneficial use of groundwater.

- The Department of Water 2008 "*Irrigation with nutrient-rich wastewater*" includes guidance on acceptable practices used to protect the quality of Western Australian water resources.
- The MLA 2012a and MLA 2012b documents specify that a feedlot water supply is suitable for quality for stock use and that infrastructure design and controls manage environmental impacts.
- The US EPA, 2006. *Process design manual, land treatment of municipal wastewater effluents* report was used to predict the loading-rates of on-site soil.
- General provisions of the EP Act make it an offence to cause or allow pollution. Additionally, it is an offence to discharge animal wastes and sediments into the environment under regulation 3 of the UDR.

9.5.5 Applicant controls

This assessment has reviewed the controls set out in Table 19 below.

Table 19: Applicant's proposed controls effluent irrigation

Site infrastructure	Description
Infrastructure	Proposed irrigation area of approximately 140 ha after Stage 2 as calculated through nutrient balancing. Additional land is available. Land has been identified on the subject land as being suitable for application of effluent. The amount of land proposed for irrigation of effluent is approximately 140 ha. Effluent shall be applied to cropping land using a centre pivot overhead irrigation system within the dedicated effluent utilisation area for uniform application with minimal spray drift. A minimum 50 m buffer zone shall be maintained between effluent utilisation areas drainage lines and public spaces; and A minimum 25 m buffer zone shall be maintained between effluent utilisation areas and property boundaries. 25 m separation from solid waste areas to watercourses, drainage vegetation and public areas. Available land of 975 ha of cropping land available for solid waste utilisation. Solids applied to land using tractor drawn move med manure spreader as a soil conditioner and organic fertiliser on cropping and pasture operations.
Procedures / management	Annual effluent application rates shall be based on annual soil tests and would not exceed nutrient recommendations for a particular crop, soil type or yield goal. Suitable application rates of nitrogen (445 kg/ha) and phosphorus (87 kg/ha) are proposed; Application of effluent shall occur over the crop growing period with timing and application rates based on soil moisture deficit levels; Design criteria applied to the holding pond allows all runoff to be captured with no allowance for irrigation of effluent during winter rainfall (May to October inclusive); Neighbouring landholders are not subjected to odour and aerosol nuisance because of poorly timed and managed effluent application practices; and The application method adopted ensures that no ponding occurs on the soil surface or runoff occurs from the utilisation areas to drainage lines or watercourses. Solid waste applied at no more than 1 t (dry) per ha/calendar year Excess solid waste composted and/or removed from site. Groundwater monitoring, soil monitoring, soil moisture monitoring.

9.5.6 Consequence

Shallow groundwater exist at the premises with evidence of rising water tables and also indications of hydraulic links to deeper aquifers. Effluent irrigated to land and solid waste applied to land has the potential to salinise soil and result in leaching of nutrients into deeper aquifers. Therefore Delegated Officer considers the consequence of irrigating effluent and applying solids to land to be **Moderate.**

9.5.7 Likelihood of Risk Event

The Applicant has proposed infrastructure and management controls based on modelled and calculated loading rates and available land. Noting the hydrogeological context, irrigation and solid waste application activities require careful operational management and monitoring to ensure these activities remain sustainable and don't result in unacceptable impacts to soil and groundwater. If operational controls are implemented the Delegated Officer considers impacts to be **Unlikely**.

9.5.8 Overall rating of Risk Event

The Delegated Officer has compared the consequence and likelihood ratings described above

with the risk rating matrix (Table 15) and determined that the overall rating for the risk of impacts from irrigation and solid waste application to land is **Medium**.

9.6 Comparison of application against guidelines

The application was compared against "*Irrigation with nutrient-rich wastewater*" (DOW, July 2008) and National Beef Cattle Feedlot Environmental Code of Practice & Guidelines (MLA 2012a and MLA 2012b). These comparison against relevant specifications are included in Appendix 2.

The application was found to address most of the relevant specifications of the guidelines for feedlot design and operation. The Applicant was found to not meet some of the specifications of DOW 2008 and MLA 2012a and MLA 2012b that stipulate manuals (procedures and plans) be drafted by the Applicant. The Delegated Officer understands that these documents are prerequisites for accreditation through the National Feedlot Accreditation Scheme (NFAS). The department acknowledges that drafting various documents require infrastructure to be confirmed to a final form, and the department understands that these documents will be available prior to feedlot operation and accreditation by NFAS. It is not a requirement for these documents to be assessed by the Department of Water and Environmental Regulation.

10. Regulatory controls

10.1 Works approval

10.1.1 Design of infrastructure and equipment

The works approval will specify requirements for the design and installation of key infrastructure related to the risk of impacts to soil and groundwater. Infrastructure includes:

(i) the feedlot holding pens (including feeding pens, holding pens, drains and laneways);

(ii) sedimentation basins;

(iii) holding ponds;

(iv) solid waste stockpile and composting area; and

(v) irrigation areas and related irrigation system

The Applicant will also be required to install and test the compacted clay liners in accordance with specified criteria.

The works approval will require the installation of continuous flow meters for the measurement of pond discharge volumes and the installation of an onsite automatic weather station.

The works approval will require the installation of a groundwater monitoring bore network for the purposes of monitoring shallow groundwater quality in proximity to the feedlot pens, holding ponds, effluent utilisation areas and solid waste utilisation areas.

Grounds: The infrastructure design and installation requirements related to the risk assessment outcomes primarily related to potential for soil and groundwater impacts. The specific design controls reflect the design controls proposed by the Applicant which were found to be adequate and acceptable. The Delegated Officer has included requirements for the installation of flow meters for pond discharge and an onsite station. This data will be critical as an input to annual detailed water balance calculations that will be required in the future licence to manage the risk of seepage impacts from the holding ponds.

The Applicant will be required to undertake an annual detailed water balance through the future licence using site specific measurements to identify potential water losses through seepage to completed groundwater monitoring. Design requirements for the pond are based on the Applicant's proposed controls and guidance in the SA EPA Lagoons Guideline.

The Delegated Officer specified requirements for establishing a groundwater monitoring bore

network. While the Applicant had provided indications that a monitoring network would be established, there was limited specific detail in the Application. The Delegated Officer therefore specified the minimum requirements for the network.

After a review of the draft instrument the Applicant proposed a modified monitoring bore network that was further amended once the requirement for underdrainage of the holding ponds was removed in the final instrument. The Delegated Officer accepted the proposed monitoring bore network layout as a suitable method of early detection of effluent loss from the holding ponds.

The Applicant proposes to apply solid waste to land in dedicated solid waste utitlisation areas within the premises. The application of solid waste is using a tractor drawn moving bed manure spreader therefore there is no infrastructure is specified.

10.1.2 Compliance reporting

The works approval will require an Environmental Compliance Report to be submitted to DWER to report on completed infrastructure compliance with specified design and construction requirements. This includes reporting on the completed installation of groundwater monitoring bores.

10.1.3 Time limited operation of infrastructure

Upon lodging relevant Environmental Compliance Reports, the works approval will allow for the operation of infrastructure including feedlot pen areas, wastewater treatment and storage infrastructure and the solid waste stockpile and composting area.

Grounds: The infrastructure operational requirements relate to the risk assessment outcomes primarily related to potential for soil and groundwater impacts. The specific requirements reflect the controls proposed by the Applicant which were found to be adequate and acceptable.

10.1.4 Monitoring

(a) The works approval will require commencement of a program for ongoing groundwater bore monitoring.

(b) The works approval will require monitoring of cattle numbers.

Grounds: The Applicant is required to install a groundwater monitoring bore network. It is appropriate that the Applicant commence monitoring during time limited operations to establish baseline water quality and water levels. The Delegated Officer specified a monitoring program in the absence of specific detail from the Applicant. This was later amended following a response from the Applicant and technical hydrogeological advice. Monitoring results will be required to be reported.

10.1.5 Specified actions

(a) The works approval will require that no effluent is irrigated or solid waste applied to land during the time limited operations phase.

(b) The works approval will require a soil monitoring strategy to be submitted.

Grounds: The Applicant does not expect to require the discharge of wastes to land during the time limited operations phase. The Delegated Officer has undertaken a risk assessment of potential operational impacts from irrigation and land application activities and is satisfied risks can be adequately managed through controls on a future licence as discussed in section 10. Restricting the discharge of waste during the time limited operations phase also provides the opportunity for the Applicant to commence groundwater monitoring, prepare and commence a soil monitoring strategy and finalise the draft NIMP.

10.2 Licence controls

The works approval allows the Applicant to establish both Stage 1 and Stage 2 of the feedlot operation, subject to conditions. It provide the Applicant with the flexibility to construct and time limited operate each stage. The disposal of effluent and solid waste to land will not occur during time limited operation and will be subject to requirements of a licence which the Applicant will need to apply for at the completion of Stage 1 works. The Applicant's licence application will be assessed during the time limited operations phase of the works approval.

This section outlines the proposed conditions for a future licence that the Delegated Officer has identified as adequate and necessary for the purposes of managing the risk of impacts from emissions and discharges. Conditions in a future licence are expected to be consistent with time limited operations conditions on the works approval and additionally include requirements to manage risks from the irrigation of effluent and application of solid waste to land. The Delegated Officer had identified licence controls for these discharges, however the Applicant is expected to update and finalise its draft NIMP for submission to DWER prior to or with a licence application. Reported information under requirements of the works approval will also inform the final conditions for a licence.

The preliminary controls for a licence are summarised as follows:

1. Operational requirements for infrastructure and equipment
    (a) Consistent with operational requirements in the works approval during time limited operations.
    (b) Limits on the stocking rate and areas for cattle outside of holding pen areas – refer to Appendix 4. The inclusion of this condition in the licence is subject to the Applicant providing its NIMP including any necessary revisions to nutrient balance models to allow risk assessment and determination of an acceptable stock rate.
2. Requirements for effluent irrigation
    (a) Specification of approved irrigation areas
    (b) Specification of irrigation system inspection, repair and maintenance
    (c) Requirements for the management of the irrigation area including even distribution, prevention of runoff/spray drift, prevention of soil erosion, avoidance of irrigating to waterlogged land and crop maintenance. Final requirements will be informed by the final NIMP.
    (d) Effluent irrigation loading limits - 615 kL/ha/year for Stage 1 and 1.74 ML/ha/year for Stage 2 based on minimum area (52.4 ha Stage 1 and 103.8 ha at Stage 2)
3. Requirements for solid waste application to land
    (a) Specification of approved disposal areas (975 ha)
    (b) Requirements for the management of solid waste disposal including even distribution, maximum application rates, avoiding periods of rainfall and waterlogged areas and timing with crop activities.
    (c) Separation distances to boundaries and receptors.
    (d) Solid waste application rate limit – 1 tonne (dry) per hectare per calendar year.
    (e) Excess quantities solid wastes beyond authorised application rates are to be removed from premises.
4. Monitoring
    (a) Cattle inputs / outputs;
    (b) Holding pond water quality sampling on a quarterly basis with parameters consistent with groundwater quality monitoring;
    (c) Monitoring of discharge volumes to irrigation;
    (d) Soil sampling program for the effluent and solid waste utilisation areas;
    (e) Groundwater monitoring program consistent with the works approval requirements. This will include identified triggers for reporting and further action based on water

level and quality trends;

(f) Onsite automatic weather station monitoring

(g) Monitoring of discharge volumes/tonnages of solid waste (manure) to the solid waste utilization areas

11. Determination of Works Approval conditions

The conditions in the issued Works Approval in Attachment 1 have been determined in accordance with the *Guidance Statement: Setting Conditions*.

The Delegated Officer notes that it may review the appropriateness and adequacy of controls at any time and that, following a review, amendments to the works approval may be initiated under the EP Act.

12. Applicant's comments

The draft decision report and draft works approval were sent to the Applicant for comment on 9 April 2020. The Applicant organised a meeting (tele-conference) with the department and external consultants on 28 April 2020. A formal response to the draft decision report and draft works approval was provided by the Applicant on 22 May 2020.

The comments from the Applicant to the draft decision report and draft works approval are summarised, along with Delegated Officer response, in Appendix 4. The Delegated Officer made the corrections and clarifications in the final decision report and final works approval.

13. Conclusion

This assessment of the risks of activities on the Premises has been undertaken with due consideration of a number of factors, including the documents and policies specified in this Decision Report (summarised in Appendix 1).

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

Chris Malley

A/Manager, Process Industries

Delegated Officer under section 20 of the *Environmental Protection Act 1986*

Appendix 1: Key documents

Table 20: Key reference documents

	Document title	In text ref	Availability
1.	Works Approval Application Koojan Downs feedlot and supplementary information	W6330/2019/1	DWER records
2.	RFI response re: Hydrogeological evidence to depth to groundwater.	DWERDT224141	DWER records
3.	RFI response re: Holding pond design.	DWERDT253470	DWER records
4.	MLA 2011. *Treatment Technologies for Feedlot Effluent Reuse*, Meat and Livestock Australia, North Sydney	MLA 2011	accessed at www.mla.com.au
5.	MLA, 2012a. *National Beef Cattle Feedlot Environmental Code of Practice,* Meat and Livestock Australia, North Sydney	MLA 2012a	
6.	MLA, 2012b. *National Guidelines for Beef Cattle Feedlots in Australia,* Meat and Livestock Australia, North Sydney	MLA 2012b	
7.	DOW, July 2008. *WQPN 22: Irrigation with nutrient-rich wastewater,* Department of Water, Perth.	WQPN 22	accessed at www.water.wa.gov.au
8.	DOW, June 2010. *WQPN 33: Nutrient and irrigation management plans*, Department of Water, Perth.	NA	
9.	US EPA, 2006. *Process design manual, land treatment of municipal wastewater effluents*.	EPA/625/R-06/016	accessed at www.epa.gov
10.	DWER, June 2019. *Guideline Industry Regulation Guide to Licencing*, Department of Water and Environmental Regulation, Perth.	NA	accessed at www.dwer.wa.gov.au
11.	DER, July 2015. *Guidance Statement: Regulatory principles.* Department of Environment Regulation, Perth.		
12.	DER, October 2015. *Guidance Statement: Setting conditions.* Department of Environment Regulation, Perth.		
13.	DER, February 2017. *Guidance Statement: Risk Assessments*. Department of Environment Regulation, Perth.		
14.	DWER, June 2019. *Guideline: Decision Making*. Department of Water and Environmental Regulation, Perth.		

Appendix 2: Comparison of Application against MLA Guidelines

Table 21 shows a comparison of specifications within the MLA 2012a and MLA 2012b guidelines to the proposed application. The table does not include all of the specifications, but shows most of the specifications that may be applicable to this application.

Table 21: MLA 2012a and MLA 2012b guideline specifications compared to Application

Guideline specifications	Proposed by Applicant	DWER comments
MLA 2012b guideline		
Site selection and design - Surface water		
The feedlot complex is not located in a flood-prone area. The feedlot complex should generally be above a 1 in 100 year average recurrence interval flood height.	The proposed development is sited above the height of a 100-year average recurrence interval flood level.	**Meets guideline.**
The feedlot complex is enclosed within a controlled drainage area, which is designed to an acceptable hydrological standard that prevents unauthorised discharges of runoff from the feedlot complex. Site selection considers the natural attributes and general suitability of the site for drainage and capturing runoff from the feedlot complex. Runoff external to the controlled drainage area is diverted away from the controlled drainage area.	The proposed development will have three controlled drainage areas. Controlled drainage areas will include pen areas (areas containing cattle and covered with manure e.g. beef cattle production induction and hospital pens), hard catchment (feed roads, cattle lanes, catch/.main drains, sedimentation basis, holding ponds), and soft catchment (areas with low runoff yield such as grassed or other vegetated areas within the controlled drainage areas). Stormwater runoff from around the proposed development shall be excluded from entering each controlled drainage area. Diversion banks and catch drains will redirect upstream clean runoff around each controlled drainage area.	**Meets guideline.**
The design of the controlled drainage area incorporates: - catch drains or similar structures that capture contaminated runoff from within the feedlot complex and safely divert it to a sedimentation system; - a sedimentation system that is designed to provide flow velocities less than 0.005 m/s and which discharges to a holding pond or ponds; - a holding pond or ponds large enough to store runoff from the controlled drainage area without spilling or overtopping at an unacceptable frequency; and - appropriately designed weirs, by-washes and channels are used to discharge excess runoff during overtopping or spill events in the sedimentation system and holding pond.	Applicant has proposed a dedicated sedimentation system for each controlled drainage area, comprising one or more sedimentation basins. Sedimentation basins will be wide, shallow storages, with a maximum water ponding depth no greater than 1 m and that are designed to drain completely (down to bed level) following a runoff event. The design specification, given by the Applicant, include: 5. cater for the peak flow rate from a design storm having an average recurrence interval of 1 in 20 years; using runoff coefficients of 0.8 from feeding pens, roadways and other hard stand areas and 0.4 for grassed areas within the controlled drainage area; 6. the maximum flow velocity in the sedimentation system of 0.005 m/s; 7. flow from the sedimentation system will be regulated by a control weir; 8. provide embankment freeboard of 0.9 m above the top water level; and 9. provide embankment batters of 1V:3H or greater.	**Meets guideline.**
The feedlot waste utilisation areas are designed to enable the sustainable use of effluent and any solid waste that is utilised onsite.	The Applicant states that an area of at least 975 ha of cropping land available for solid waste utilisation. There is insufficient land available on-site to sustainably utilise all the solid waste generated each year. The Applicant indicates that solid waste not utilised on-site shall be removed off-site for utilisation on other land owned by the applicant. The amount of land proposed for irrigation of effluent is approx. 140 ha. The Applicant used NLAR approach to estimate minimum area required for effluent utilisation of 52.4 ha for Stage 1 and 103.8 ha required at the conclusion of Stage 2 development.	**Meets guideline.mmm**
The storage and use of hazardous and dangerous materials do not pose an unacceptable risk in respect to the pollution of surface water. Any facilities to store hazardous materials are designed to meet relevant guidelines and Australian Standards for the storage of hazardous and dangerous goods and spill management.	All hazardous materials stored on-site during construction shall be kept in designated bunded areas or stored in transportable bunded vessels. This includes fuels (diesel, petrol), lubricants (oils, grease) and chemicals (concrete plasticisers) etc. Fuel used during construction of the proposed development will be stored in bunded facilities such as a TransTank type arrangement constructed in accordance with Australian Standard AS 1940-2004. The Construction Contractor will be responsible for servicing their equipment and management of their waste products. Minor maintenance of construction equipment may be conducted on site such as tyre replacement, repairs of leaks etc. if required. The estimated capacity of fuel stored on-site for construction activities is expected to be in the order of 68,000 L.	**Meets guideline.**
Site selection and design - Groundwater		
The feedlot complex and its associated waste utilisation areas are not sited above groundwater resources that are deemed vulnerable unless suitable measures can be put in place to protect those resources.	Depth to groundwater is approximately 10-20 m beneath the proposed cattle feedlot and evaporation pond. The subject land is located within the Victoria Plains subarea of the Gingin Groundwater Area which is a proclaimed area under the *Rights in Water and Irrigation Act 1914.*	**Meets guideline.**
Leachate or percolate from the feedlot complex and associated infrastructure does not contaminate groundwater. Areas where in which there is a risk that soil leachate movement might contaminate groundwater is underlain by a liner able to satisfactorily mitigate that risk. Where soil lining materials are used in areas subject to traffic or in drains exposed to flow velocities then sufficient depth of these materials is laid to prevent failure of the lining under normal conditions.	The feeding pens, catch drains, sedimentation basins and holding ponds shall be lined with an impermeable clay base to achieve a permeability of 1 x 10^{-9} m/s. The solid waste stockpile and carcass composting area will also have a base permeability of 1 x 10^{-9} m/s. Holding ponds will be inlaid with compacted clay liner of 450 mm, laid down in three 150 mm layers. Mass death events shall be contained within burial pits, lined with at least 600 mm of clay if required.	**Meets guideline.**

The proposed development prevents or minimises the risk of new salinity outbreaks and does not exacerbate any existing outbreaks.	Irrigation and solid waste application to be managed and monitored to avoid risks of salt accumulation and concentration. Siting of infrastructure to avoid clearing remnant native vegetation.	**Meets guideline.**
The storage and use of hazardous and dangerous materials does not pose an unacceptable risk to the pollution of groundwater	Hazardous materials are stored and used in accordance with relevant guidelines and Australian Standards for the storage of hazardous and dangerous goods and spill management.	**Meets guideline.**
Site selection and design – Community		
The feedlot is sited away from incompatible land uses. The feedlot site is in an area which under any local or regional planning scheme or environmental plan is designated for a rural, agricultural, or an analogous land use.	The subject land is not located within a Bush Forever site. The land is zoned as Rural under Scheme 7 from the Shire of Dandaragan. Agricultural pursuits in the area include significant areas of dryland broad acre cropping, limited irrigated cropping, low intensity sheep and beef cattle grazing and a small number of intensive animal industries such as piggeries. The Applicant was granted planning approval by the Shire of Dandaragan in January 2020.	**Meets guideline.**
The feedlot development does not detract significantly from visual amenity.	The proposed development has been sited and designed to be consistent with the rural character of the area. As far as practical all native vegetation around the proposed infrastructure area shall not be disturbed. Landscaping is planned throughout the development to provide visual attraction and ambience. The predominant landscaping will include tree plantings between each 'bunk-to-bunk' arrangement to provide shelter and enhance the environment. Glimpses of the proposed development shall be visible from Koojan West Road, Koojan Pool Road and Boundary Road.	**Meets guideline.**
The feedlot is sited and designed so that odour, dust and noise generated by the development do not unreasonably impact community amenity.	The proposed development is separated by over 1,000 m and 5,000 m for a neighbouring isolated residence and residential areas and therefore comply with buffer distances for feedlots under Shire of Dandaragan local health laws. The available separation distance from the feed storage and processing facility within the proposed development and a sensitive receptor is greater than 500 m. Closest residence is approx. 3,500 m from the feedlot. Applicant indicates that the proposed development meets the conservative separation distance requirements for sensitive receptors calculated in accordance with the S-factor method.	**Meets guideline.**
The feedlot development does not compromise a site having significant archaeological or heritage values.	There are no heritage places listed on the State Register of Heritage Places identified on the subject land and the subject land is not affected by: • Heritage Council - Assessment Program; • Heritage Council - Conservation Orders; or • Heritage Council - Heritage Agreement. The closest heritage place to the subject land is the former Mogumber Mission and Cemetery located some 18 km south of the subject land at Mindarra. A Historic Heritage Municipal Inventory listing being Farm, Outbuildings & ruins of School (fmr) of Koojan under the Planning & Development Act 2005 and Moora Local Planning Scheme is located at Koojan some 8 km east of the subject land.	**Meets guideline.**
The siting and design of the feedlot considers road safety and traffic issues. Site access is designed to comply with relevant road design and road safety guidelines, rules and standards. Access to the site is planned so that the resultant traffic noise levels conform to relevant state and territory guidelines, regulations and policies and minimises potential impact on amenity of nearby neighbours.	Access to the proposed development shall be from the existing subject land entrance off Boundary Road. A dedicated internal road shall be constructed connecting the subject land entrance to the proposed development infrastructure area. The subject land entrance has a compacted gravel entrance from Boundary Road designed to accommodate the number of vehicle movements and type of vehicles servicing the existing agricultural operations on the subject land. The entrance shall be upgraded to accommodate the number of vehicle movements and type of vehicles servicing the proposed development. The internal road connecting to the proposed development shall be a well-formed durable gravel surface that shall provide access in all weather conditions and shall be constructed to cater for the traffic demands of the proposed development. All signs shall be fully contained within the subject land. Sufficient on-site car parking shall be provided commensurate with the scale and use. Due to the nature of the development and rural character of the site, the provision of a formal car parking area is unnecessary. However, any gravel hardstand areas used as car parking areas such as adjacent to the site office shall be designed in accordance with relevant Australian Standards (e.g. Standards Australia, 2890.1- 2004) where relevant. Sufficient on-site manoeuvring area shall be provided to enable all vehicles to enter and exit the site in the forward direction.	**Meets guideline.**
The storage and use of hazardous materials do not pose an unacceptable safety risk.	Hazardous materials are stored and used in accordance with relevant guidelines and Australian Standards for the storage of hazardous and dangerous goods and spill management.	**Meets guideline.**
Site selection and design - Ecology		
The feedlot is sited and designed so that it does not have a significant impact on threatened or endangered species	Biodiversity issues and safeguards are a component of Construction Contractor personnel including staff and sub-contractors' induction. The Applicant has listed the following as controls to manage this issue: • Prior to construction all sensitive habitats shall be clearly demarcated as no-go areas with fencing, bunting or orange mesh netting or similar controls, • Minimise clearing of all vegetation.	**Meets guideline.**

	• Implement ongoing weeding and weed monitoring programs to remove noxious plant species and weeds. • Disturbed areas will be monitored for effective soil stabilisation and restoration and rehabilitation. • Retain all habitat trees where practicable. • Implement vehicle hygiene procedures to prevent the spread of pests and disease. • Provisions to limit heavy vehicle speeds and for signage along access roads • Methods and communication tools to monitor road strike and mortality of wildlife • Implement a pest management program to control pest animal species already present, using acceptable methods as well as identifying potential pest species, their likely distribution and methods to prevent their spread • Monitor and manage populations of pest animal species on the subject land to prevent proliferation and spread. • Pest animal control programs shall use the most humane, target specific, cost effective and efficacious techniques available • Sewage and domestic putrescibles shall be managed appropriately and in accordance with any relevant statutory requirements.	
The feedlot is sited and designed so that the impact of pests and weeds on the local ecosystem is minimised.	The catch drains will be maintained (grazed, removal of weeds which create ponding etc.) to ensure operation at design capacity. Applicant will implement ongoing weed monitoring and management program to remove pest plant species and weeds. Control shall be achieved by regular mowing or herbicide application. Knockdown or residual herbicides (or a combination of the two) shall be used depending on whether the weeds have emerged, the time of year and the weeds present.	**Meets guideline.**
The storage and use of hazardous materials does not pose an unacceptable pollution risk.	Hazardous materials are stored and used in accordance with relevant guidelines and Australian Standards for the storage of hazardous and dangerous goods and spill management.	**Meets guideline.**
Site selection and design - Resources		
Feedlot waste utilisation areas are of sufficient size and have soil characteristics such that, under appropriate management, organic matter, nutrients and salts in the applied feedlot effluent and solid wastes can be sustainably utilised. An alternate disposal method (sale) is available for that portion of manure not intended for use onsite. Climatic and seasonal conditions at the feedlot site are considered in any proposed scheduling of use onsite.	• Refine cut-and-fill balance and maximise reuse of material on-site. • Develop and implement a resource management strategy. • Waste materials contained in waste bins or other suitable containers, and collected for recycling, reuse or disposal by the licensed waste contractor. • Use recycled products where possible. • Separate, contain, manage and dispose contaminated waste to prevent migration and further contamination whilst maintaining compliance with regulatory requirements. • Label and store all liquid waste containers in a bunded area prior to removal off-site. • Undertake inspections of the worksite and waste storage areas to ensure litter / debris is regularly cleaned up and contained on site. • Bunding of areas used for fuel and oil and chemical storage in accordance with Australian Standards and relevant state guidelines. • Locate appropriate waste removal contractor and/or appropriately licenced waste facilities in the area. • Sustainable use of groundwater in accordance with the Subject Land's allocation and entitlements. • Sustainable use of surface water in accordance with the Subject Land's allocation and entitlements. • Maintain a waste register. • Modern and well-maintained equipment is to be used to encourage fuel efficiency • Water recycling measures are implemented where practical.	**Meets guideline.** Based on Applicant calculations there is sufficient size to allow for effluent and solid waste to be utilized.
The feedlot has a water supply able to sustain the operations of the feedlot under normal conditions. Where effluent irrigation is to be used as a method of effluent disposal, sufficient irrigation water is available for dilution and supplementation of effluent applications to allow crops to be grown to fully utilise feedlot wastes.	Currently, groundwater and rainfall runoff are used as the source of livestock drinking water for the existing extensive beef cattle grazing enterprise and for domestic purposes. This water is obtained from stock bores and dams across the subject land. Groundwater from the stock bores is not metered. The subject land also has a groundwater allocation of 1.87 GL/year from the Mirrabooka aquifer for the purpose of stock watering and irrigation. The irrigation bore is equipped with a submersible pump and is metered in accordance with licence requirements.	**Meets guideline.**
The storage and use of hazardous materials do not pose an unacceptable risk of site contamination.	Hazardous materials are stored and used in accordance with relevant guidelines and Australian Standards for the storage of hazardous and dangerous goods and spill management.	**Meets guideline.**
Construction phase – Surface water		
The quality of surface waters is not adversely affected by construction phase activities. The area of land disturbed during construction is limited to that necessary for undertaking the required activities in an efficient, timely and safe manner. Upslope runoff ('run-on') is suitably diverted away from the construction site. The movement or erosion of soil from the construction site is limited by; the installation of appropriate sediment capture and erosion control structures downslope of the site and around stockpiled materials, and covering any exposed sodic subsoils with topsoil or similar material as soon as practical after earthworks in any affected parts of the site are completed. Building wastes are disposed of in an appropriate manner (e.g. appropriately licensed municipal waste facility), reused or recycled.	• Appropriately designed erosion control structures such as sediment basin, straw bales, silt fences and sandbags will be installed, maintained and cleaned regularly. • Locate spoil stockpiles, plant and equipment away from drainage lines and waterways in accordance with established best management guidelines. • Development and implementation of emergency and contingency plans detailing methods to manage spills or other emergencies on site, such as storage failure, pipe breakages, pump failures etc. • Wheel cleaning measures at exit of all sites where required. • Buffer zones of vegetation will be maintained adjacent to waterways for as long as practical and maintained in their intended condition. • Rehabilitation and landscaping works of disturbed areas undertaken as soon as the works are completed.	**Meets guideline.**

Topsoil removed during construction is stockpiled, with; this material being used during and at the completion of construction activities to dress and stabilise exposed surfaces on earthworks not covered by the feedlot pens or associated infrastructure, and any balance being retained for future site rehabilitation or stabilization. Plant and equipment is well maintained and regularly checked for leaks (e.g. fuels, oils, hydraulic fluids).	• No extraction of surface water from waterways or drainage lines. • Implement concrete washout process within bunded areas. • Vegetative buffers around drainage lines designed to help protect surface water are maintained in their intended condition. • Sustainable use of surface water in accordance the Development's allocation and entitlements.	
The storage and use of hazardous materials do not pose an unacceptable risk in respect to the pollution of surface water.	Hazardous materials are stored and used in accordance with relevant guidelines and Australian Standards for the storage of hazardous and dangerous goods and spill management.	**Meets guideline.**
Construction phase – Groundwater		
The storage and use of hazardous and dangerous materials does not pose an unacceptable risk in respect to the pollution of groundwater.	Hazardous materials are stored and used in accordance with relevant guidelines and Australian Standards for the storage of hazardous and dangerous goods and spill management.	**Meets guideline.**
Construction phase – Community		
Construction activities are undertaken so that dust, noise and traffic that are generated by those activities do not have an unreasonable impact on community amenity. During earthworks, the moisture content of worked materials and traversed surfaces is monitored and dust suppression (e.g. watering) undertaken whenever material, surface dryness and or weather conditions are conducive to excessive dust emissions. The loads on vehicles moving soil, gravel or other dusty construction materials onto or off the site are covered during transit. Stockpiled soil, gravel and other dusty construction materials are appropriately maintained to minimise dust emissions. All mechanical equipment used on site is operated in accordance with the manufacturer's specifications, with any noise suppression equipment retained in place and maintained. Any blasting associated with construction or on-site quarrying of construction materials is undertaken in accordance with licence or approval conditions. Site access is designed and constructed to comply with relevant road design and road safety guidelines. Traffic movements to and from the site are managed to minimise the risk of; unreasonable noise impacts, excessive dust emissions, and dangerous road conditions. Disturbed soil surfaces are stabilised and revegetated as soon as practicable after construction. A complaints register is kept, documenting details of the nature of any complaint received, the response made and any mitigation measures implemented.	• Awareness training for Construction Contractor personnel including staff and contractors in environmental noise issues. • Adherence to working hours in development approval conditions unless otherwise approved. • Respite periods for noisy activities (in accordance with regulatory guidelines). • Construction equipment selected, operated and maintained to minimise noise impacts and where necessary fitted with silencers and "smart" reversing safety devices. • Reduced use of horns to signal trucks loaded where residences are close by. • Managing construction vehicle routes and speed of vehicles. • Establish and maintain complaints management system. • Operation equipment selected, operated and maintained to minimise noise impacts and where necessary fitted with silencers and "smart" reversing safety devices. • Minimising the use of horn signals and consideration of alternative methods of communication. • Switching off any equipment not in use for extended periods. • All plant and equipment required would be well maintained and regularly serviced. • Community consultation with local residents to assist in the alleviation of community concerns as required. • Selection of machines that are inherently free of or have low vibration. • Vibration-producing machinery shall be supported on stiff structural components and be provided with efficient vibration isolation systems. • Maintenance of plant and equipment machinery – ensuring rotating parts are balanced, vibration isolators are functioning as intended etc. • Complaints register is kept, including details of the nature of any complaint received, the response made, and any mitigation measures implemented.	**Meets guideline.**
Construction activities do not compromise sites or items having significant archaeological or heritage values.	The closest heritage place to the subject land is the former Mogumber Mission and Cemetery located some 18 km south of the subject land at Mindarra. A Historic Heritage Municipal Inventory listing being Farm, Outbuildings & ruins of School (fmr) of Koojan under the Planning & Development Act 2005 and Moora Local Planning Scheme is located at Koojan some 8 km east of the subject land.	**Meets guideline.**
The storage and use of hazardous materials does not pose an unacceptable safety risk.	Hazardous materials are stored and used in accordance with relevant guidelines and Australian Standards for the storage of hazardous and dangerous goods and spill management.	**Meets guideline.**
Construction phase – Ecology		
Construction activities do not have a significant impact on remnant vegetation and ecological communities. The movement of soil and of soil borne pathogens, weeds, weed seeds and other pests from the construction site is limited by; the installation of appropriate sediment capture and erosion control structures downslope of the site and around stockpiled materials, the regular inspection of stockpiles, drains, sedimentation systems and runoff dispersion areas, and covering any exposed sodic subsoils with topsoil or similar material as soon as practical after earthworks in any affected parts of the site are completed. Construction activities do not impact on essential habitat for threatened or endangered species listed as such in relevant state and territory legislation and regulations. Traffic movements to and from the site are managed to minimise the risk of: — unreasonable noise impacts — excessive dust emissions — dangerous road conditions.	No land clearing is proposed by the Applicant. The absolute minimum area for construction of site works shall only be cleared. Before clearing commences, the limits of clearing may be marked by pegs placed at 25 m intervals around the area to be cleared. The earthworks shall be carried out in a controlled manner in accordance with the recommendations given in Australian Standard AS 3798, *"Guidelines on earthworks for commercial and residential developments".* The proposed development infrastructure and waste utilisation areas are to be sited on previously cleared areas and no native vegetation shall be removed as a result of the proposed development. The Applicant believes that the proposed development shall not impact threatened flora. The proposed development infrastructure and waste utilisation areas are to be sited on previously cleared areas and no native vegetation or mature trees with nest hollows shall be removed as a result of the proposed development. The Applicant believes that adverse impacts to the Carnaby's Cockatoo, White-tailed Short-billed Black Cockatoo are unlikely because of the proposed development.	**Meets guideline.**

A feedlot is constructed so that it does not provide unacceptable shelter and sustenance for pests and feral animals	A stable fly management plan shall be developed as part of the quality assurance program of the proposed development and incorporated into the NFAS manual. Implement a pest management program to control pest animal species already present, using acceptable methods as well as identifying potential pest species, their likely distribution and methods to prevent their spread. Wild dog, fox and vermin pest species populations on the Development site shall be monitored and managed to prevent proliferation and spread. Pest animal control programs shall use the most humane, target specific, cost effective and efficacious techniques available. Mice and rat populations will be mitigated: • by minimising feed wastage and spillage to minimise likelihood of attracting vermin) • implementing a baiting program if the vermin population reaches a nuisance level. Fly breeding sites shall be mitigated using: • Several control methods such as biological, chemical and physical methods following integrated pest management (IPM) principles shall be used. • Best practice sanitation methods such as solid waste management practices (pen cleaning, under-fence cleaning) to minimise fly breeding sites. • Controlling weeds and keeping grass and other vegetation short, particularly around pens, drains, sedimentation systems and holding ponds makes it more difficult for flies to find resting places and reduces the vegetation–manure interface, a preferred breeding substrate for stable flies. • Moist silage provides a suitable substrate for fly breeding. Subsequently, silage spills particularly along the sides of silage pads shall be cleaned up, and the silage pads covered so that the edges are sealed to reduce fly breeding in this area. Composting carcasses shall be covered with manure. Domestic waste shall be managed appropriately and in accordance with any relevant statutory requirements.	**Meets guideline.**
The storage and use of hazardous materials does not pose an unacceptable pollution risk.	Hazardous materials are stored and used in accordance with relevant guidelines and Australian Standards for the storage of hazardous and dangerous goods and spill management.	**Meets guideline.**
Construction phase – Management system		
A site-based environmental management plan is developed and implemented to address all relevant environmental requirements and to allow the feedlot builder, contractors, sub-contractors and employees to fulfill any duty of care and due diligence requirements in respect to environmental matters.	The site preparation and construction works shall commence only after all relevant licenses, permits and approvals have been received and a Construction Environmental Management Plan (CEMP) has been prepared by the Construction Contractor and approved by Koojan Downs Pty Ltd.	**Partially meets guideline.** CEMP is a planned document and not yet drafted to form part of application.
Operational management – Surface water		
The quality of surface waters external to the controlled drainage area and external to utilisation areas is not adversely affected by the onsite utilisation of feedlot wastes. This includes: - the land application of feedlot wastes is made at rates consistent with the ability of soils and crops grown in the onsite utilisation areas to sustainably utilise the applied nutrient, salts and organic matter, under the climatic conditions prevailing at the site; - soil condition is monitored periodically and soil tests are used where there is potential for deterioration of soil condition; - feedlot wastes are not applied to onsite utilisation areas where the applied materials will cause pollution of surface water; - the rate of effluent application is controlled to ensure that runoff does not occur.	There are no drainage features or watercourses mapped on the subject land. The various overland flow paths and drainage lines originating from the upper slopes of the subject land disappear before reaching watercourses. The subject land does not have access to surface water and does not hold and surface water allocations. Holding ponds allows all runoff to be captured with no allowance for irrigation of effluent during winter rainfall (May to October inclusive). The proposed development includes an associated 1,106 ha of cropping land for solid waste and effluent utilisation. Solid wastes generated are applied to an on-site utilisation area. Any solid wastes not utilised on-site are removed off-site. When available, effluent is applied to land via irrigation within a dedicated effluent utilisation area. The Applicant is to finalise its draft Nutrient and Irrigation Management Plan (NIMP) for managing effluent utilisation which includes a site environmental monitoring program and relevant environmental standards. Groundwater monitoring (quantity and quantity) is undertaken as prescribed by the Licence to Take Water conditions.	**Meets guideline.** Formal NIMP is still to be drafted by the Applicant.
The structures containing and controlling runoff from within the controlled drainage area and effluent utilisation area are maintained to ensure their integrity and ongoing compliance with specified design criteria. This includes: - Drains, sedimentation system, holding pond, spill ways, weirs and other flow control structures are cleaned and maintained so that they perform in accordance with their design capabilities; - embankments and drains are cleaned and maintained such that they only overtop in storm events having a 20-year average recurrence interval or less; - embankments and other earthen structures that are part of the controlled drainage area are routinely monitored for structural integrity and protect from erosion; and - any vegetative buffers or other structures designed to help protect surface water are maintained in their intended condition.	Applicant has proposed a schedule for pen/drain cleaning and maintenance. The following general maintenance practices shall be implemented for the holding ponds: • Embankments shall be checked for evidence or indications that erosion has or will take place, wet areas indicating seepage etc.; • All fences shall be maintained in satisfactory condition and livestock proof; • All inlet and outlet pipework, structures and pumps shall be checked regularly to ensure adequate functioning, e.g. flow rates, leaks; • Tree and shrubs on the embankment shall be removed to ensure the technical integrity of the embankment is maintained and prevent drying out of the embankment core; and • Grass cover shall be established and regularly mowed to prevent erosion of embankment slopes and a resting site for flies or habitat for other vermin. The holding ponds shall be desludged when it is apparent that sludge level in the holding pond and degeneration of the effectiveness of treatment. The following maintenance practices shall be implemented:	**Meets guideline.**

	• Sludge levels shall be measured annually; • Sludge levels shall never exceed more than 10% of the holding pond capacity; and • Clay lining of the holding pond shall be checked after each desludging to ensure its structure and integrity has not been damaged or compromised. Any damage to lining will need to be repaired before liquid waste is reintroduced into the holding pond.	
Operational management – Groundwater		
The quality of groundwater in the vicinity of the feedlot is not adversely affected by the operation of the feedlot and the onsite utilization of feedlot wastes. This includes: - the land application of feedlot wastes is made at rates consistent with the ability of soils and crops grown in the utilization area to sustainably utilize the applied nutrients and salts and does not contaminate groundwater; - soil condition is monitored periodically and soil tests are used where there is potential for deterioration of soil condition; - groundwater monitoring is undertaken on an as-required basis; - all liners (clay, synthetic or other) underlying pens, composting pads, burial pits, drains, the sedimentation system and the holding pond are maintained so that they perform in accordance with design permeability criteria; - it is acknowledged that some natural leaching of salts will occur in all situations. However, the application rates for feedlot wastes should not necessitate the routine and specific leaching of salts from the soil profile in order to obtain acceptable crop performance.	The Applicant will draft a Nutrient and Irrigation Management Plan (NIMP) for managing effluent utilisation which includes a site environmental monitoring program and relevant environmental standards. Groundwater monitoring (quantity and quantity) is undertaken as prescribed by the Licence to Take Water conditions. Clay lining of the holding pond shall be checked after each desludging to ensure its structure and integrity has not been damaged or compromised. Any damage to lining will need to be repaired before liquid waste is reintroduced into the holding pond.	**Partially meets guideline.** Formal NIMP is still to be drafted by the Applicant.
The feedlot is operated to prevent or minimise the risk of new salinity outbreaks and any existing outbreaks are not exacerbated.	Clearing of mature vegetation is not required to be cleared for the proposed development, thus minimising any potential impacts from salinity that may result from removal of trees on the upper slopes of the subject land. No salinity management is proposed.	**Partially meets guideline**. No known existing salinity outbreaks.
The storage and use of hazardous and dangerous materials does not pose an unacceptable risk in respect to the pollution of groundwater.	There shall be limited quantities of hazardous materials stored and used on-site during operation. Industry codes of practice, best management practices and regulations apply to the storage, use and disposal of hazardous materials. To minimise the risk of environmental harm from liquid spills and leaks, all hazardous materials required to be stored on-site shall have a spill containment system appropriate for the nature and pollution risk of that liquid in accordance with relevant guidelines and Australian Standards. All spill containment systems shall be routinely inspected to ensure their technical integrity meets the intended requirements. A routine inspection and maintenance program shall be tailored to suit the specific installation. The proposed development shall require limited quantities of hazardous materials during operation. Diesel fuel is the primary hazardous material required on-site. Most of this fuel is used for cropping operations, feed delivery and electricity generation. Due to its rural location, the proposed development shall have its own dedicated diesel fuel storage with a capacity in the order of 68,000L.	**Meets guideline.**
Operational management – Community		
The feedlot is operated so that odour, dust, noise and traffic generated by the development do not unreasonably impact community amenity. This includes: - pen cleaning and surface maintenance is undertaken on a planned basis to ensure that pen surfaces can drain freely, dry quickly following rainfall, but do not become overly dry and cause excessive dust emissions; - spilt and spoilt feed and feedstuffs are regularly removed from around infrastructure; - stocking densities are managed so that they do not cause undue dust emission in dry weather; - dust control measures should be implemented when dust emissions are excessive to minimise the possibility of dust escaping the site; - the loads on vehicles moving feedstuffs etc. onto or off the site are covered during transit; - all mechanical equipment used on site is operated in accordance with the manufacturer's specifications; - vehicle movements and machinery operations within the facility are managed so that noise emissions from the facility do not contravene relevant nuisance criteria at nearby receptors; - dead stock are placed in burial pits or on composting pads , and covered with soil or composting material as soon as practicable after placement; - the timing of manure and effluent applications takes into consideration the potential for dust and spray drift, as well as any associated odour nuisance; - a suitable buffer is applied where manure and effluent applications take place	Cattle pens are proposed to be cleaned at intervals not exceeding 10 weeks. Applicant has proposed schedule for pen and drain cleaning and maintenance. The Applicant proposes that spilt feed / feed residue be cleaned every two days. A stocking density of 18 m^2 per hear (19.2 m^2 per SCU) is proposed. Applicant has proposed that existing vegetation screens along the premises boundary would mitigate dust issues. Vehicle movement along unsealed roads is expected to generate dust but the Applicant feels that due to the separation distance to nearest receptor the risk is minimal. The Applicant does have mitigation measures that include "*dust suppression on unsealed roads, stockpiles and other exposed surfaces*" but does not detail what these would be. The Applicant states that loads on vehicles moving dusty materials onto or off the site will be covered during transit. The vehicles, equipment, machinery used and all facilities will be designed, operated and maintained to control the emission of smoke, dust and fumes The Applicant includes various mitigation measure to reduce noise generation, including equipment selected, operated and maintained to minimise noise impacts and where necessary fitted with silencers and "smart" reversing safety devices. Carcasses are removed from the pens daily and taken to the cattle handling facility processing area for post-mortem or directly to the solid waste stockpile and carcass composting area. Carcasses will be composted in separate windrows to the bulk manure windrows. The Applicant includes details on carcass compost windrow construction and management. Any operations involving the movement of dusty materials such as grain movement, solid waste (manure) turning and spreading shall be timed and managed where possible when materials have adequate moisture content. The Applicant will cease dust generating activities such as pen cleaning, and solid waste (manure, carcass compost, pond sludge) stockpiling, screening and spreading during periods of high wind. The Applicant proposes to allow a buffer where effluent and solid waste (manure, carcass compost, holding pond sludge) applications take place within close proximity to roads, dwellings or other areas likely to be used by the public at that time (the appropriateness of the applied buffer distances is determined having consideration for the qualities of the materials being applied, weather conditions and other environmental factors; as well as the anticipated level of public usage or exposure at those times).	**Meets guideline.**

within close proximity to roads, houses or other areas likely to be used by the public at that time; - a complaints register is kept, including details of the nature of any complaint received, the response made and any mitigation measures implemented.	A complaints register is to be kept, including details of the nature of any complaint received, the response made, and any mitigation measures implemented.	
The storage and use of hazardous and dangerous materials does not pose an unacceptable safety risk.	Hazardous materials are stored and used in accordance with relevant guidelines and Australian Standards for the storage of hazardous and dangerous goods and spill management.	**Meets guideline.**
Operational management – Ecology		
The feedlot is operated so that it does not have a significant impact on remnant vegetation or ecological communities.	The following have been proposed by the Applicant: • Any significant flora and fauna habitat areas required to be protected shall be identified and marked. • Clearing restricted to those areas required for Development's operation and firebreaks. • Induct personnel on biodiversity issues and safeguards • Implement ongoing weed monitoring and management program to remove pest plant species and weeds. Control shall be achieved by regular mowing or herbicide application. Knockdown or residual herbicides (or a combination of the two) shall be used depending on whether the weeds have emerged, the time of year and the weeds present. • Disturbed areas to be rehabilitated will be monitored for effective restoration and rehabilitation. • All habitat trees retained where practicable. • Major drainage lines are to be bridged and loss of riparian vegetation to be minimised. • Waterway crossings for fish passage are maintained. • Implement vehicle hygiene procedures to prevent the introduction of pest plants, spread of pest plants and disease. • Provisions to limit heavy vehicle speeds and for signage along access roads. • Methods and communication tools to monitor road strike and mortality of wildlife. • Aquatic weeds in water storages shall be controlled via mechanical and/or chemical means. Chemical control shall be undertaken with considerable care, considering the identity of the weed, the effect of herbicides on desirable plants, fish and other aquatic life and the eventual use of the water. • Implement a pest management program to control pest animal species already present, using acceptable methods as well as identifying potential pest species, their likely distribution and methods to prevent their spread.	**Meets guideline.**
The storage and use of hazardous materials does not pose an unacceptable pollution risk.	Hazardous materials are stored and used in accordance with relevant guidelines and Australian Standards for the storage of hazardous and dangerous goods and spill management.	**Meets guideline.**
Operational management – Management system		
A management system is developed, implemented and maintained.	The Applicant indicates that the environmental management during the proposed development would be in accordance with an environmental management strategy (EMS). The EMS would contain a suite of environmental management plans (EMPs) which detail the site specific management measures and procedures to be implemented during operation of the proposed development, as specified in this document for mitigating and managing impacts including noise, air quality, biodiversity, heritage, water resources, land resources, social, hazards and risks, bushfire and visual. The EMP's shall include: • An approved National Feedlot Accreditation Scheme (NFAS) manual for the operation of the proposed development arising from NFAS accreditation of the facility; and • A Nutrient and Irrigation Management Plan (NIMP) for managing effluent utilisation which includes a site environmental monitoring program and relevant environmental standards.	**Partially meets guideline.** Applicant provides some details on management systems but the EMS is a planned group of document which did not form part of application.
The management system addresses all relevant environmental requirements and allows the feedlot operator and employees to fulfill any duty of care and due diligence requirements in respect to environmental matters.		**Partially meets guideline.** EMS is a planned group of document which did not form part of application.
MLA 2012a		
Drains are designed such that they can safely carry the peak flow rates resulting from a design storm event with an ARI of 20 years. Flow rates in drains during the 20-year ARI design storm should be greater than 0.5 m/s, but at the same time non-scouring. Catch and main drains should be underlain by at least 300 mm of clay or other suitable compactable soil or a synthetic liner able to provide a design permeability of <1 x 10^{-9} m/s.	The Applicant proposes to locate catch drains along the bottom of each row of beef cattle production, induction and hospital pens. Catch drains will flow directly into the sedimentation basin(s). Catch drains shall be constructed by clearing vegetation and undertaking bulk earthworks to achieve the design geometry. To mitigate the potential for contamination of underground water resources because of leaching of contaminants mm clay or through permeable, underlying soil, a low-permeability barrier shall be constructed on the floor of the drains by underlying a minimum of either 300 other suitable soil, with a hydraulic conductivity of equal to or less than 1 x 10-9 m/s (~ 0.1 mm/day).	**Meets guideline**. Drainage system is indicated to be designed to account for storm event with ARI of 20 years but flow rates in drains is not specifically given.
Sedimentation systems should be designed to cater for the peak flow from a design storm having an ARI of 20 years, when applying runoff coefficients. Sedimentation systems should be designed to have a maximum flow velocity of 0.005	• The sedimentation design volume shall be a minimum of 2,000 m^3, 4,000 m^3 and 5,750 m^3 for sedimentation basin 1, 2 and 3 respectively. • The design specifications for each sedimentation basin include:	**Meets guideline.**

m/s. Flow from the sedimentation system should be regulated by a control weir. A minimum freeboard of 0.9 m should be provided between the weir crest and the crest of the sedimentation system embankment. Sedimentation basins should be free-draining down to bed level, and have a bed slope of at least 0.1% towards the control weir to facilitate that drainage. Sedimentation system should be underlain by at least 300 mm of clay or other suitable compactable soil or by a synthetic liner able to provide a design permeability of <1 x 10^{-9} m/s.	○ cater for the peak flow rate from a design storm having an average recurrence interval of 1 in 20 years; using runoff coefficients of 0.8 from feeding pens, roadways and other hard stand areas and 0.4 for grassed areas within the controlled drainage area; ○ the maximum flow velocity in the sedimentation system of 0.005 m/s; ○ flow from the sedimentation system should be regulated by a control weir; ○ provide embankment freeboard of 0.9 m above the top water level; ○ provide embankment batters of 1V:3H or greater; and ○ the base and embankment of each sedimentation basin shall be underlain by a minimum of either 300 mm clay or other suitable soil with a hydraulic conductivity of equal to or less than 1 x 10^{-9} m/s	
Holding ponds should have sufficient storage capacity so that evaporation ponds spill no more frequently than an average of one in 20 years. The holding pond should have a weir and bywash capable of discharging the peak flow from the controlled drainage area from a 50-year ARI design storm. A minimum freeboard of at least 0.9 m should be provided between the crest of the discharge weir and the crest of the holding pond embankment. The holding pond should be underlain by a minimum of 300 mm clay or other suitable compactable soil, or by a synthetic liner able to provide permeability of <1 x 10^{-9} m/s.	The holding ponds has been designed to capture all rainfall between May to October and has been designed to cater for a 1 in 20 year wet winter. The holding ponds are proposed to have bywash capable of discharging the peak flow from a 50-year ARI design storm. Applicant is proposing a minimum freeboard of 900 mm in the holding ponds. Constructed clay lining is proposed to be 450 mm, laid down in three-150 mm layers.	**Meets guideline.**
Clay liners should have a maximum permeability of 1 x 10^{-9} m/s for distilled water with 1 m of pressure head. Clay liners must be of sufficient depth so that the integrity of the structure is maintained throughout the general working of the feedlot.	Applicant has provided information on proposed clay liners.	**Meets guideline.**
Maximum pen cleaning interval is 13 weeks.	Applicant is proposing to clean the pens at maximum interval of 10 weeks.	**Meets guideline.**
Separation distance guidelines for dust and odour management (S-factor calculation)	Applicant has identified 20 receptors within 20 km of the proposed development. Applicant has undertaken S-factor calculations for separation distance to receptors. Available distance from proposed development to identified receptors appear to be adequate.	**Meets guideline.**
To protect both human and animals from potential pathogen transfer, stock cannot be grazed on pastures for up to three weeks after effluent application.	Stock is not going to be grazed on pasture that has been irrigated in the last three weeks.	**Meets guideline.**

Appendix 3: Summary of public comments

Summary of public comments	DWER response
Stakeholder comment that cattle feedlot is an incompatible land use with the surrounding tourism businesses.	DWER has assessed the risk of emissions and discharges from the construction and operation of the facility on nearby sensitive receptors.
Stakeholder concern that operations at the proposed location are likely to result in damage and/or contamination of shallow water aquifers.	Applicant and additional regulatory controls regarding the management of effluent will be required in the works approval and subsequent licence.
Stakeholder concern that operations at the proposed location are likely to cause loss of amenity and value to surrounding properties.	DWER has assessed emissions and discharges from the construction and operation of the proposed cattle feedlot (see section 9) with Applicant and additional regulatory controls conditioned in the works approval and subsequent licence (see section 10).
Stakeholder concerns about odour. Comment included that “foul smells from other intensive animal feedlots in the area have hung over the area for weeks”.	DWER has assessed the risk of fugitive odour from the construction and operation of the proposed cattle feedlot on nearby sensitive receptors in this decision report, with Applicant and additional regulatory controls conditioned in the works approval and subsequent licence to minimise impacts to nearby receptors.
Stakeholder concern that the cattle feedlot may result in high levels of flies and that may impact amenity and value to surrounding properties.	This is regulated by the Department of Health and local government authority.
Stakeholder concern that the cattle feedlot operations cause traffic issues on the road.	Traffic issues are managed by Main Roads and/or the local government authority.
Stakeholder concerns that the proposed cattle feedlot is not suitably located.	The suitability of the location of the cattle feedlot was considered under the planning approval. DWER has assessed the impact of emissions and discharges from the premises at the proposed location on nearby sensitive receptors.
Stakeholder concerns that the maps of the cattle feedlot facility and immediate adjacent area were poor quality and outdated.	The maps of the premises, provided by the Applicant, were sourced from Google Earth in September 2018. Site plans show the proposed development in adequate detail for a review to be conducted. A side-by-side comparison of the maps provided by the Applicant and the map provided by the stakeholder show that the same relevant receptors have been identified.
Stakeholder concern over the risk of fire following four fires that have originated from open areas of Koojan Downs.	Concerns over fire risk are managed by the local government authority. Applicant has included a section on fire management as part of the application but is not a risk that was considered in this Decision Report.

Other comments from stakeholders not related to DWER’s Works Approval process, such as comments on the Local Government planning and development application process, were not considered and are not included as part of this decision report.

Appendix 4: Summary of applicant's comments on risk assessment and draft conditions

Condition / section	Summary of Applicant comment	DWER response
DR 4.5.5 Effluent irrigation and application rates and DR 10.2 Licence controls 1(b)	The Applicant wishes to have the flexibility to graze cattle in the effluent or solid waste utilisation areas. The management of nutrients in the effluent utilisation and solid waste utilisation areas will be managed in accordance with the site-specific NIMP. The respective management plans shall be complemented by a detailed nutrient balance for soils and crops in the utilisation areas to demonstrate that nutrients that are applied match nutrient removal. The nutrient mass balance shall be based on results of soil, plant tissue and waste analysis with results presented in the annual monitoring report.	The Applicant included a sample 'cropping information and nutrient calculation' spreadsheet with their response, showing how grazing and cut & cart harvesting can be recorded and reported on. The Applicant has indicated that any grazing component can be factored in through their NIMP and soil/groundwater testing will provide assurance that nutrient loading isn't beyond the scope of the soil to absorb it. The works approval and subsequent licence specifies that soil monitoring strategy and soil monitoring program be developed during the time limited operation phase along with the draft NIMP. Monitoring of ground water, soil and soil moisture is conditioned in the works approval and will commence prior to irrigation or application of solid waste on the premises. Nutrient loading within the soil will be monitored and indications of limit being exceeded will be identified early. The Applicant has committed to following the guidelines related to grazing of cattle on land that has been irrigated with effluent as specified in MLA 2012a. The Applicant is to provide its final NIMP and other supporting scientific information to demonstrate an acceptable stocking rate for grazing cattle to manage the risk of groundwater impacts. The Delegated Officer has provisioned for future licence conditions in respect of this activity (refer to section 10.2), subject to consideration of that information
DR 6.2 Monitoring of discharge to groundwater	Reference is made to monitoring of groundwater depth and modelling through MEDLI. The Applicant advises that MEDLI has been used to size the capacity of the effluent holding ponds and was not used to monitor or model groundwater depth.	The Delegated Officer accepts this was a typographic error and has amended the section to reflect that monitoring and modelling of groundwater depth was done by hydrogeological consultants and not through MEDLI.
DR 8.4 Groundwater and water sources	The Applicant submitted evidence that the water table in 10 to 20 metres below ground level and therefore hydrostatic uplift pressure from groundwater shall not adversely affect the proper functioning of the compacted clay liner of the holding ponds. No comment was made but a clarification of the evidence presented in this section may be appropriate to ensure structure and tone of the decision report and works approval match.	The Applicant included additional local bore results and clarified previous depth-to-groundwater evidence they had submitted during the assessment phase of their project. The Delegated Officer has attempted to clarify and expand on the Applicants submission in section 8.4. With the removal of the requirement for underdrainage the Applicant agreed to an extra monitoring bores to be installed at each holding pond (total of four at Stage 1 and a total of six at Stage 2). The Applicant has provided a site layout showing the placement of the proposed monitoring bore network which the Delegated Officer has accepted.
DR 9. Risk assessment Table 14: *Identification of emissions, pathways and receptors during operations*	Reference is made to "cattle and weaner pens" where the Applicant is not planning to have weaner pens onsite. The Applicant suggested changing this terminology to "cattle production pens and hospital and induction pens".	The Delegated Officer accepts this was a typographic error and has amended this section.
DR 9. Risk assessment Table 14: *Identification of emissions, pathways and receptors during operations*	Two references are made to a "silt trap and evaporation pond". The Applicant suggests that these terms are replaced with "effluent holding ponds and sedimentation basin" to match the terminology used elsewhere in the decision report and works approval.	The Delegated Officer accepts this was a typographic error and has amended this section.
DR 9.4.5 Applicant controls Table 18: *Applicant proposed control for containment of wastewater and leachate* Sedimentation basin including outlet weir, pipes and spill drain	The Applicant wishes to clarify that a 200 mm thick reinforced concrete slab is not proposed to be constructed as the base of each sedimentation pond. Rather each sedimentation pond shall have an earthen base and constructed clay liner as shown in Figure 18 of the works approval application. The control outlet weir was the only portion of the drainage system that was to be underlain with 200 mm of concrete.	The Delegated Officer accepts this change. The intent was not to condition the entire sedimentation basin to be concrete lined. This control is proposed to be split into two separate conditions, with one stipulating that a 200 mm concrete slab required for the control outlet weir only, and that the sedimentation basin to have a clay liner able to provide a design permeability of <1 x 10^{-9} m/s.
DR 9.4.5 Applicant controls Table 18: *Applicant proposed control for containment of wastewater and leachate* Solid waste stockpile and composting area	Typographic error where surface area of solid waste stockpile incorrectly given as 60,800 m^2 instead of the proposed 60,000 m^2.	The Delegated Officer accepts that this is a typographic error and the area for the solid waste stockpile has been corrected to 60,000 m^2.
DR 10.2 Licence controls 2(c)	The Applicant requests that there be no restriction on the time of year to apply effluent to the effluent irrigation area. The Applicant would like the application of effluent to the irrigation area to be based on climate, soil and crop conditions prevailing at the time and results of groundwater quality and soil nutrient monitoring. The Applicant seeks to have the opportunity to irrigate effluent onto the effluent utilisation area during May to October period.	The Delegated Officer had regards to the Applicant's comments and has removed this from the list of preliminary conditions outlined in section 10.2 for the future licence. However, the department will have regard to the final NIMP and other sources of updated information prior to determining the final licence conditions.
WA Assessed production capacity - Category 1: cattle feedlot	Request that assessed production capacity be expressed in the form of SCU and stocking density rather than number-of-head of cattle, which may vary depending on several factors; including days on feed, number of lots turned over per year.	*Draft Guidelines - Prescribed premises categories* allows intensive piggeries to consider the maximum number of pigs using Standard Pig Units (SPU). While a similar stipulation isn't given for Category 1 cattle feedlots, the Delegated Officer has included both the animal head number to reflect the category requirements, and also the SCU equivalent.
WA Assessed production capacity - Category 23: animal feed manufacturing	Request that the animal feed manufacturing threshold be increased from 185,990 tonnes per year to 320,000 tonnes per year. The concept design of the proposed steam flaking system had not been finalised at the time of lodgment of the application to DWER. The concept design has progressed to a development design for tendering purposes and is proposed to have milling of grain rate of up to 40 tonnes per hour. For 24-hour production this equates to 350,400 tonnes of grain able to be processed per year. The Applicant is canvassing opportunities' to utilise the full design capacity of the feed mill.Whilst 24-hour processing of grain is unlikely due to safety considerations the feed mill may operate for 16-hours a day. The feed manufacturing facility may therefore process 320,000	The separation distance from feed mill to nearest separation receptor is about 2,250 m. The grain processing system shall be equipped with dust control systems and no additional odour or dust emission are expected to be generated with the increase in production capacity. The feed preparation process does not generate any wastewater or solid waste streams. The Delegated Officer determined that increasing the production capacity of the animal feed manufacturing was unlikely to alter the assessed risk profile and accepted the change.

Condition / section	Summary of Applicant comment	DWER response
	tonnes of feed per year.	
WA 1. Infrastructure and equipment Table 1: *Infrastructure design and constructions* Feedlot - feeding pens, holding pens, etc.	The Applicant requests clarification on the required thickness of clay liner for pens, catch drains and main drains. The works approval application and National Feedlot Guidelines state 300 mm compacted clay liner will be installed in these areas.	To ensure consistency across the project and conditions within the instrument the Delegated Officer has amended this condition to read: "Pen, catch drains and main drains should be underlain by at least 300 mm of clay or other suitable compactable soil or a synthetic liner able to provide a design permeability of <1 x 10^{-9} m/s."
WA 1. Infrastructure and equipment Table 1: *Infrastructure design and constructions* Feedlot - feeding pens, holding pens, etc.	The Applicant requests that any reference to the length of the water troughs be removed. The reasoning for this is given, that the length of water trough has not been agreed at this stage.	The Delegated Officer agrees that reference to water trough length is too prescriptive and setting a condition this specific does not improve the quality of the instrument. Furthermore the instrument does not become less effective when the set length of 5.1 metres is removed. The Delegated Officer has amended the condition to read: "Prefabricated concrete water troughs of suitable length will be placed at the required location along the dividing fence between each pen, situated towards the rain end of each pen."
WA 1. Infrastructure and equipment Table 1: *Infrastructure design and constructions* Sedimentation basin, including outlet weir, pipes and spill drain	The Applicant wishes to clarify that a 200 mm thick reinforced concrete slab is not proposed to be constructed on the base of each sedimentation pond. Rather each sedimentation pond shall have an earthen base and constructed clay liner as shown in Figure 18 of the works approval application.	The Delegated Officer accepts this change. The intent was not to stipulate the sedimentation basin be concrete lined. This condition is proposed to be split into separate conditions, one specifying that a 200 mm concrete slab is required for the control outlet weir only, and another that the sedimentation basin have a clay liner able to provide a design permeability of <1 x 10^{-9} m/s.
WA 1. Infrastructure and equipment Table 1: *Infrastructure design and constructions* Holding ponds	The Applicant is requesting that the development is not conditioned with an underdrainage system beneath the compacted clay liner for holding ponds.The Applicant submitted evidence that the water table is 10 to 20 metres below ground level and it is their conclusion that hydrostatic uplift pressure from groundwater shall not adversely affect the proper functioning of the compacted clay liner of the holding ponds. The placement of a drainage system beneath the compacted clay liner of the holding ponds also presents technical challenges in its construction and operation due to the location of the development in the landscape. Employing underground drainage would require a system of relief wells with pumping equipment for dewatering.	The evidence submitted by the Applicant in response to the draft instrument was reviewed by hydrogeologists at DWER and DPIRD in consultation with the Applicant's hydrogeologist. The Delegated Officer is satisfied with the assessed profile of risks to groundwater and that a higher degree of regulatory control is required to manage impacts through design of infrastructure and its future operation. This includes the management of waste disposal areas. However, the Delegated Officer had regard to all information and argument as to the proposed requirement for an underdrainage system beneath the hold pond clay liner. The Delegated Officer agreed to remove this requirement on the basis that: • The ponds will have an additional thickness of engineered compacted clay; • Inputs and outputs to the ponds will be monitored and the Applicant will install and monitor site specific pan evaporation rates; • The Applicant will use monitoring data to prepare and report on water balances to identify potential unexplained water losses to identify potential seepage; • The Applicant agreed to an additional groundwater monitoring bore for ponds.
WA 1. Infrastructure and equipment Table 1: *Infrastructure design and constructions* Solid waste stockpile and composting area	Clarification is required on the area of the solid waste stockpile and composting area. The Works Approval gives the surface area of 60,800 m^2 while the decision report and Applicant application indicate 60,000 m^2.	The Delegated Officer accepts that this is a typographic error in the Works Approval Table 1 and therefore the area for the solid waste stockpile has been corrected to 60,000 m^2.
WA 1. Infrastructure and equipment Table 2*: Infrastructure requirements - groundwater monitoring bores*	Table 2 of the draft works approval presents a groundwater monitoring network of 25 monitoring bores. The Applicant feels that given the 30 metre thickness of the underlying Kardinya Shale and the impact of the Koojan Downs bore field, the recommendation is that the need for additional bores in the project be limited to one each feedlot holding pen complex (2), one per irrigation area (3) and one per effluent pond (3) being an additional eight (8) monitoring bores. The Applicant has already constructed seven (7) deep groundwater monitoring bores around the Koojan Down boundary and effluent irrigation area and with the additional planned monitoring bores, gives a total of fifteen (15) monitoring bores for the development.	The Delegated Officer proposed a preliminary monitoring program in the absence of a monitoring program from the Applicant. The Delegated Officer was conservative in the initial approach. On review of the Applicant's revised monitoring program, the Delegated Officer accepted the Applicant's proposed alterations with the exception that an additional bore will be required for each pond.
WA 11. Time limited operation - specified actions	The Applicant seeks confirmation that their understanding that a soil monitoring strategy is required to be submitted to the CEO 30 calendar days prior to the completion of time limited operations (day 150) or 30 calendar days prior to an environmental licence being granted or 30 calendar days prior to the expiry date of the works approval in 2025.	The Delegated Officer confirms that the Applicant's understanding regarding the timing of a submission of a soil monitoring strategy is correct.
WA 13. Time limited operation - reporting	The Applicant seeks confirmation that their understanding that a report on time limited operations is required to be submitted to the CEO 30 calendar days prior to the completion of time limited operations (day 150) or 30 calendar days prior to an environmental licence being granted or 30 calendar days prior to the expiry date of the works approval in 2025.	The Delegated Officer confirms that the Applicant's understanding regarding the timing of a submission of a report on the time limited operations is correct.

Attachment 1: Granted Works Approval W6330/2019/1