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999 Head Cattle Feedlot at 'Horseshoe'

STATEMENT OF ENVIRONMENTAL EFFECTS

Dobikin Pastoral Co Pty Ltd

'Horseshoe & Stud Park', 690 Millie Road, Bellata NSW 2397

September 2020

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Prepared by: SMK Consultants
39 Frome Street, Moree, NSW 2400

September 2020

DOCUMENT CONTROL

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Proponent	Dobikin Pastoral Co Pty Ltd.
Project Reference	20-17
Report Number	20-17 – SoEE
Prepared for	Rob Vickery 'Horseshoe & Stud Park', 690 Millie Road, Bellata NSW 2397 Ph: 0428 937 412 rsvickery@bigpond.com
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0	August 2020	Marie Duffy (SMK Consultants)	Draft to Client
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1 Executive Summary

Applicant:	Rob Vickery T/A Dobikin Pastoral Co. "Horseshoe & Stud Park" 690 Millie Road Bellata NSW 2397
Owner:	Dobikin Pastoral Co Pty Ltd
Land involved:	"Horseshoe & Stud Park" 690 Millie Road Bellata NSW 2397 Feedlot: Lot 29 in Deposited Plan 753941 Effluent Irrigation Area: Lot 29 in Deposited Plan 753941
Local Government Authority:	Narrabri Shire Council
Zoning:	RU1 – Primary Production under the Narrabri LEP 2012

1.1 Description of Proposal

The applicant is applying for approval to develop a cattle feedlot with a capacity of up to 999 head. The property is known as "Horseshoe & Stud Park" (Horseshoe) and is located approximately 43 kilometres south of the township of Moree and 52 kilometres north of the township of Narrabri, on the Millie Road in the Narrabri Shire. Horseshoe currently supports a grazing and cropping enterprise, which includes supplementary feeding of cattle.

The proposal involves the conversion of two existing cattle pens, which have been utilised as drought feeding containment pens during the past 2-years of drought. These feedlot pens will have a design capacity for 999 head of cattle at a maximum pen density of 19 sq.m per head. A sediment and effluent pond will also be constructed to the south of the feedlot pens to capture and store all run-off generated within the proposed development footprint.

The feedlot will utilise existing fencing infrastructure and feed bunks. An existing feedmill, grain storage silos, silage pits machinery and machinery sheds, on-site water storages, cattle yards for processing of incoming and outgoing cattle, and existing cropping areas on Horseshoe for manure and effluent recycling will form part of the proposed operation.

The feedlot will be designed, constructed and managed in accordance with the standards described in The National Guidelines for Beef Cattle Feedlots in Australia 3rd Edition (Meat and Livestock Australia, 2012). The Guidelines provide extensive guidance on the setup and operation of cattle feedlots, including procedures and guidelines for:

- Environmental protection and community amenity, including recommended separation distances for feedlot pens, pen clean-out requirements, and clean-up of spilled or spoiled feed to prevent odour generation or pest infestation;
- Feeding system management;
- Biosecurity and animal health; and
- Supply chain management.

The development proposal meets all recommended separation distances between the development site and sensitive receptors. Noise, odour and dust generated by the feedlot will be managed to minimise impact on the existing environment, land use or community amenity of the surrounding area. The preferential siting of the feedlot within an area which has already been heavily modified by human activities means the development will require only minor disturbance to a previously disturbed habitat (existing cattle pens, a paddock utilised as a containment pen and a cultivated paddock). The potential impacts of this disturbance on flora and fauna are considered negligible.

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1 Introduction

This Statement of Environmental Effects (SoEE) has been prepared to accompany a Development Application to the Narrabri Shire Council for a proposed 999 head cattle feedlot on the property "Horseshoe", located in Bellata. The SoEE has been prepared on behalf of the Proponent, Rob Vickery T/A Dobikin Pastoral Co.

1.2 Proponent Details

The property is operated as a family farming enterprise. The contact person for the proposed development is Rob Vickery.

Table 1: Proponent Details

Proponent	**Dobikin Pastoral Pty Ltd**
Contact Name	Rob Vickery
Address	"Dobikin", 559 Millie Road
	Bellata NSW 2397
	0428 937 412
Email	rsvickery@bigpond.com

1.3 Authors and Guidelines

SMK Consultants have over 30-years of experience in preparing planning applications, layouts and construction of cattle and sheep Feedlots. This experience is incorporated in the design and assessment of the proposed development. The persons involved in the preparation of this Statement of Environmental Effects and its appendices are:

- **Marie Duffy** B.Sc. (Hons) M.Sc.
- **Hayley Bouliopoulos** B.Sc. Env.
- **Peter Taylor** B.Sc. MEIANZ

The following reference documents have been used in the preparation of the design and supporting documents for the proposed feedlot at Horseshoe. The documents provide best practice methods for operation and management:

- Assessment and Management of Odour from Stationary Sources in NSW – Technical Framework (DEC 2006a); referred to as the **NSW Odour Assessment Framework**
- Assessment and Management of Odour from Stationary Sources in NSW – Technical Notes (DEC 2006b); referred to as the **NSW Odour Assessment Notes**
- National Guidelines for Beef Cattle Feedlots in Australia 3rd Edition, Meat & Livestock Australia, 2012
- National Beef Cattle Feedlot Environmental Code of Practice 2nd Edition, Meat & Livestock Australia, 2012

2 Site Analysis

2.1 Title Description and Land Tenure

The land titles and their descriptions are set out in the following table.

Table 2: Site Details and Title Description

Parameter	Description
Address	'Horseshoe & Stud Park' 690 Millie Road Bellata NSW 2397
Land Parcel Type	Freehold
Lot and Plan Number: Feedlot	Lot 29 DP 753941
Owners	Dobikin Pastoral Co Pty Ltd
Nearest Town	Moree
Area of Property	1,405 Ha (approx.)
Local Government Area	Narrabri Shire Council
Current Land Use	Cattle and Crop production
Land Use Zoning	RU1 - Primary Production

2.2 Locality

The proposed feedlot would be developed on the property "Horseshoe & Stud Park", which is located approximately 43 kilometres south of the township of Moree and 52 kilometres north of the township of Narrabri, on the Millie Road in the Narrabri Shire. The feedlot site and effluent pond will be sited on Lot 29 in Deposited Plan 753941. A locality plan presenting an aerial image of the site is presented as Figure 1.

Several cultivation paddocks are located within the same Lot as that of the proposal (Lot 24 in DP 753941). Approximately 10 Ha of cultivated land have been designated for opportunity irrigation of effluent. The property extends over paddocks to the north of Millie Road. Most of the property is under cultivation and these cultivated areas will be utilised for manure disposal. This will include Lot 2 in DP 1238135, Lot 29 in DP 753964, and Lots 24 and 28 in DP 753941. The majority of Lot 2 in DP 1238135 to the north of the property retains open woodland vegetation and is utilised as grazing country.

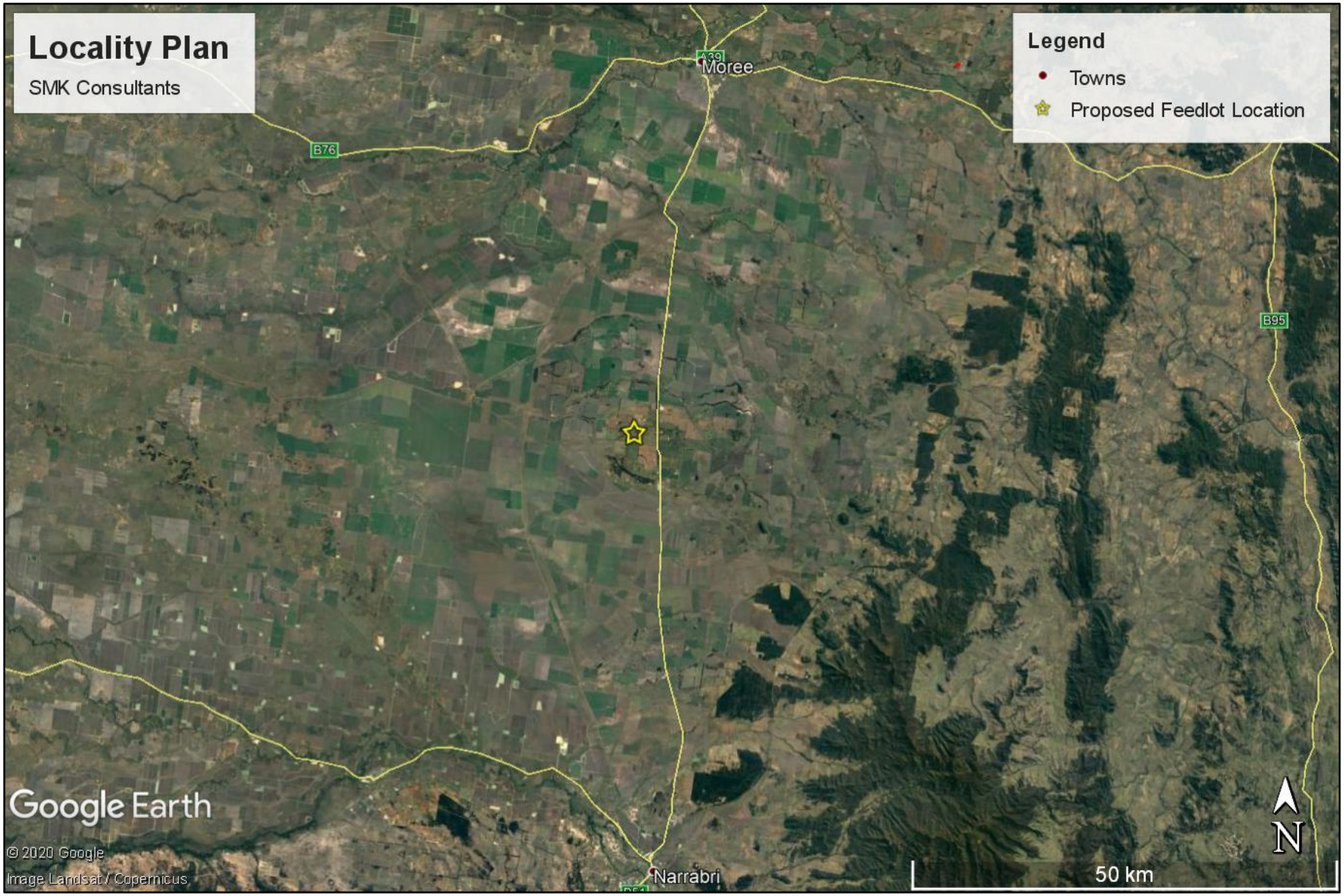

Figure 1: Locality Plan

2.3 Property Description

The property Horseshoe & Stud Park is located north-east of the village of Bellata to the east of the Newell Highway. It extends over approximately 1,405 Ha of gently undulating terrain. The property has several ironstone ridges on which remnant vegetation has been retained and it is traversed in an east-west direction by Tookey Creek. Relative to surrounding properties, Horseshoe has retained higher levels of remnant vegetation, including vegetation corridors along paddock edges throughout the property, along Tookey Creek, and in particular throughout one of the Lots in the northern section of the property. This Lot is used as grazing land, with the cleared sections of the property being utilised for dryland crop production. The land is zoned as RU1 Primary Production under the *Narrabri Local Environment Plan 2012* (the LEP).

Horseshoe supports grazing and opportunity feeding of cattle, in addition to crop production. Crops are grown on rotation and include a mixture of winter cereals and pulses, including forage sorghum, barley, wheat, oats, faba beans and chickpeas. Improvements on the property includes sheds, fencing, silage pits and several stock dams. The proposed feedlot site is currently utilised for opportunity feeding and temporary containment of cattle.

2.4 Surrounding Land Uses

The region surrounding the development is primarily agricultural and used for grazing and crop production. All properties directly adjacent to and in the vicinity of Horseshoe are also zoned RU1 – Primary Production under the Narrabri LEP and therefore the potential for additional subdivision and construction of additional residences is considered limited. As a result, the development will not be out of character for the surrounding area.

The closest neighbour is located approximately 2.2 kilometres north-east of the feedlot site. The neighbouring property 'Wilga' has an existing cattle feedlot with a maximum capacity of 5,000 head. The feedlot is located approximately 3.1 kilometres west-north-west of the proposed Horseshoe Feedlot.

A strip of Crown-owned land north of Millie Road retains the largest area of remnant vegetation in the locality, extending from the Newell Highway to the western section of Horseshoe, with a width varying between 100 – 800 metres. Remnant vegetation has largely been cleared from properties north of Horseshoe, with areas of open woodland and scrub being mostly confined to riparian corridors, ridges and paddock boundaries. Land to south, in the locality between Bellata and Edgeroi, has been extensively cleared for agricultural production and retains minimal vegetation.

There are several National Parks, zoned E1 – Natural Parks and Reserves in the Narrabri LEP, in the greater region, including Moema National Park and Mount Kaputar National Park to the south-west. The Kirramingly Nature Reserve, situated over 14 kilometres north-west of the site, is the closest E1 zoned land to the development.

The village of Bellata is located approximately 7 kilometres south-east of the property. Bellata is a small village with a population of 350 people as per 2016 census data. The closest town is Moree, which is situated approximately 43 kilometres north of Horseshoe and has a population of 9,311 people (ABS 2016). The main economic activity in the region is agriculture.

2.5 Services and Utilities

The feedlot site is accessible via Millie Road (SR1), a minor road connecting the Newell Highway (SH17) and the Merrywinebone Road. Millie Road is a two-lane sealed and unsealed road; it is sealed over a distance of 20 kilometres west from its point of intersection with the Newell Highway. West of this point, the road is classified as a major unsealed road on the Narrabri Shire Council Roads and Locality Map.

It is expected that traffic generated to and from the feedlot will travel approximately 6.8 kilometres east along Millie Road to access the Newell Highway. The Newell Highway is a national highway which provides the major road link between south-eastern Queensland and Victoria, via central NSW. Traffic generated by the development may travel northwards along this road to reach regional abattoirs situated in south QLD and in a southerly direction towards Tamworth. Other abattoirs (e.g. Wingham Beef Exports in Wingham) in the region will be accessed via Tamworth. Stock feed will be obtained from the wider Bellata region including properties adjoining Horseshoe.

The expected travel route described above is within an approved area for both B-Doubles and Road Trains, as per the NSW Combined Higher Class Limits and Restricted Access Vehicle mapping.

The property has access to mains power and the feedmill is operated by a three-phase generator. The property has a existing dwellings and a number of sheds. Landline and mobile telephone facilities are available onsite. Water for the development will be sourced from an existing harvestable rights water.

3 The Development Proposal

3.1 Objectives of the Development

The primary objective of the development is to establish an AUS-MEAT Accredited cattle feedlotting operation, allowing cattle sold from the feedlot to obtain premium prices for grain fed cattle.

3.2 Proposal Outline

The Proponent intends to develop a 999-head cattle feedlot on Horseshoe Station. The process will firstly involve obtaining Council approval, construction of the facility and then accreditation of the facility to sell cattle as grain fed cattle with an AUS-MEAT accreditation number. The development would involve the conversion of three existing drought feeding pens into an equivalent number of feedlot pens, in conjunction with the construction of an effluent management system (catch drains, sediment pond and effluent pond). The pens will have a design stocking rate of 19m^2/head when the facility is full. The general aim is to operate the site with an 80% or higher occupancy rate.

The Feedlot will utilise existing infrastructure to operate and maintain the feedlot including cattle handling facilities, access roads, silos, silage pits, machinery and machinery sheds. The feedlot will utilise internal farm roads. The internal roads are gravelled and will provide all weather access between the site and Horton Road.

By-products from the feedlot will be managed appropriately. Effluent will be primarily disposed of via evaporation, with a minor amount being utilised to irrigate cultivation paddocks on an opportune basis. Manure will be applied, at sustainable rates, on cropland within Horseshoe. Manure that cannot be utilised on the property will be transported off site to other properties in the region.

3.2.1 Feedlot Capacity

The Feedlot will have a maximum design capacity of 999 head of cattle. At 999-head stocking density will be 19 m^2/head within the feedlot pens. This is considered within the average industry range of between 10 and 20 m^2/head.

Cattle will be fed for an average of 120 days at the feedlot, resulting in a maximum cattle turnover of 2,997 cattle/year. Cattle will weigh approximately 350kg upon entering the feedlot and 500kg upon exit. No cattle will be bred on-farm, with all animals imported to the feedlot from properties in the surrounding locality, the New England region and southern NSW, as well as southern Queensland and Victoria. The feedlot is expected to operate at an average occupancy of 80-percent allowing for variation in cattle purchases and pen cleaning requirements. At 80-percent occupancy, annual throughput will be in the order of 2,398 head.

Cattle produced at the feedlot will have a range of markets. These markets include other larger feedlots where the cattle would continue being fed, specialist butchers for premium feedlot beef and abattoirs in the wider region including Wingham Beef Exports in Wingham and Teys Australia in Brisbane. No

specific breed or size of cattle is preferred. The breed and size will vary with market prices and availability.

3.2.2 Feedlot Plan

The development would utilise 2 existing cattle pens, cattle handling facilities, feed mill, silos and grain storage sheds, machinery and machinery sheds, and an internal farm road. The existing pens have varying sizes and have been historically utilised as containment pens and supplementary feeding pens for cattle that are bred on farm.

Development of the feedlot to guideline requirements will involve the construction of the following:

- Sedimentation basin for settlement of manure washed from the pens
- Effluent pond to allow for effluent capture
- Installation of additional feed bunks and construction of a feed road north of Pen 5
- Establishment of a controlled drainage area via the installation of catch drains and earthen embankments along the southern and western boundaries of the proposed development.

Figure presents an aerial image of the property showing the proposed feedlot, farm dam and effluent storage pond location as well as the manure/effluent disposal areas.

Figure 3 presents a preliminary layout of the pens and pond system. The pens have a natural average slope of 3% which drains to the south-west.

An existing gravelled feed road, located east of Pen 2 and west and north of Pen 5, will be utilised to service the pens.

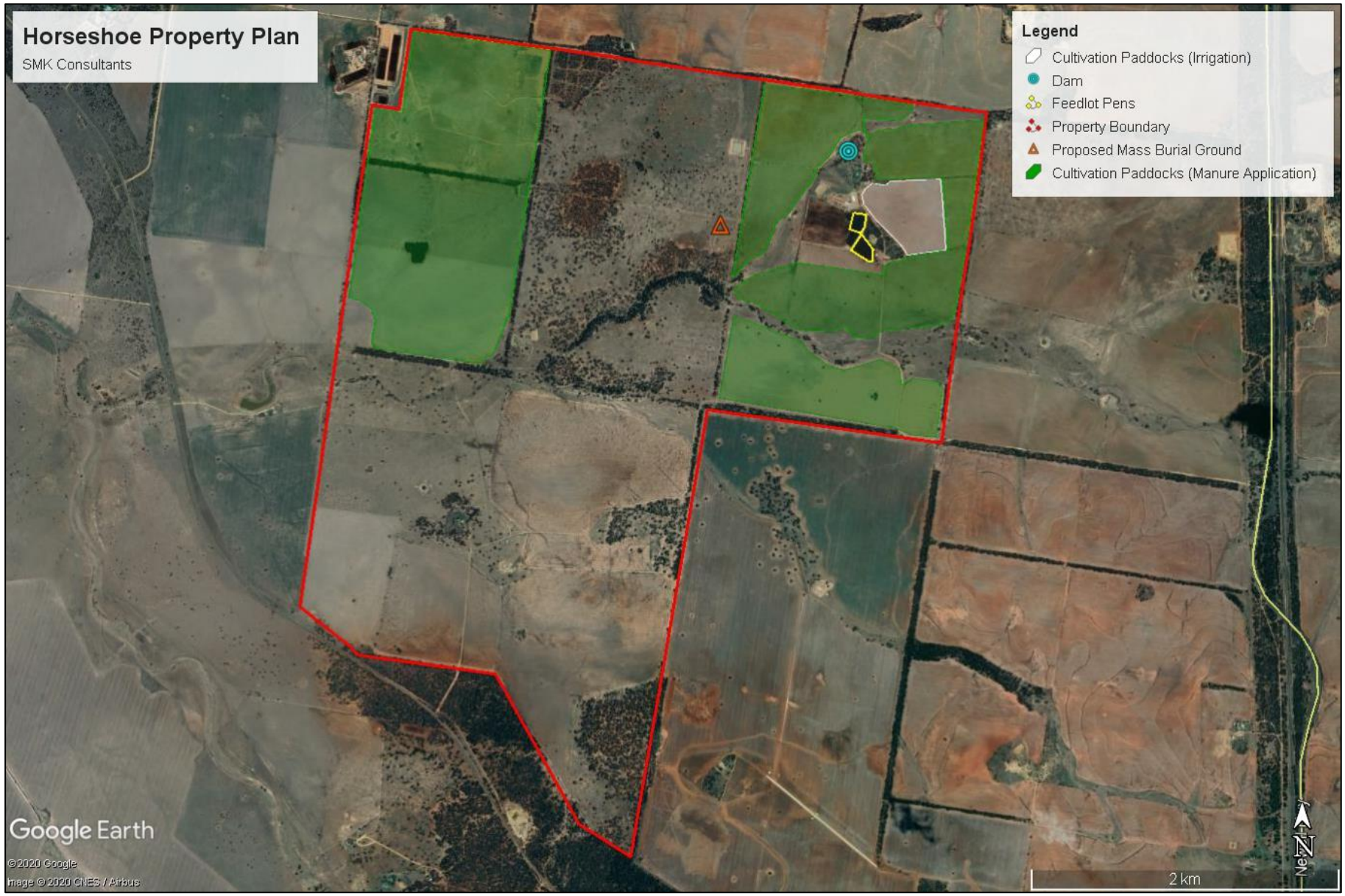

Figure 2: Horseshoe – Property Plan showing Proposed Development Site Layout

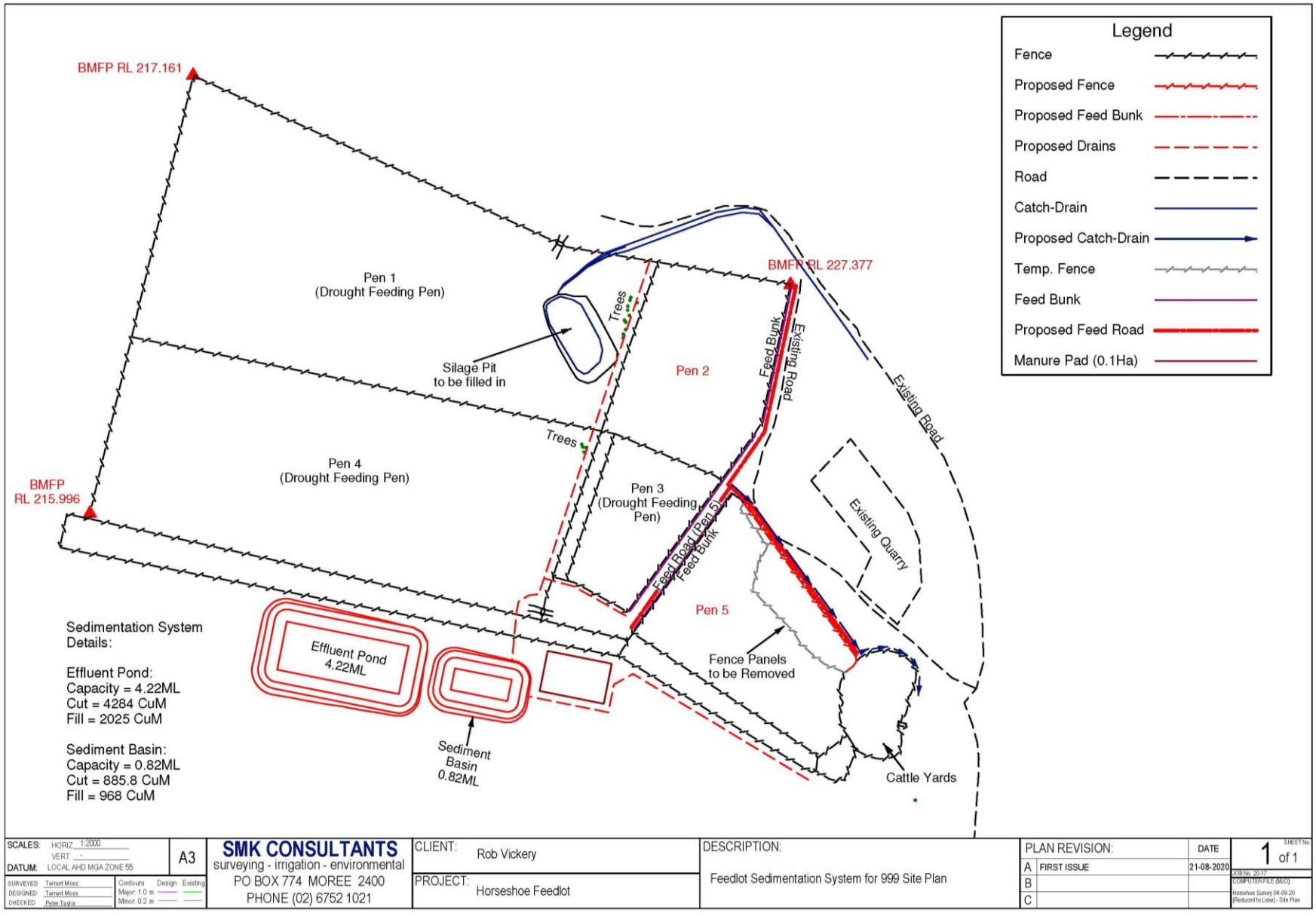

Figure 3: Proposed Site Plan. Pens 2 and 5 are proposed feedlot pens. Pens 1,3 and 4 will continue to be utilised as temporary containment pens.

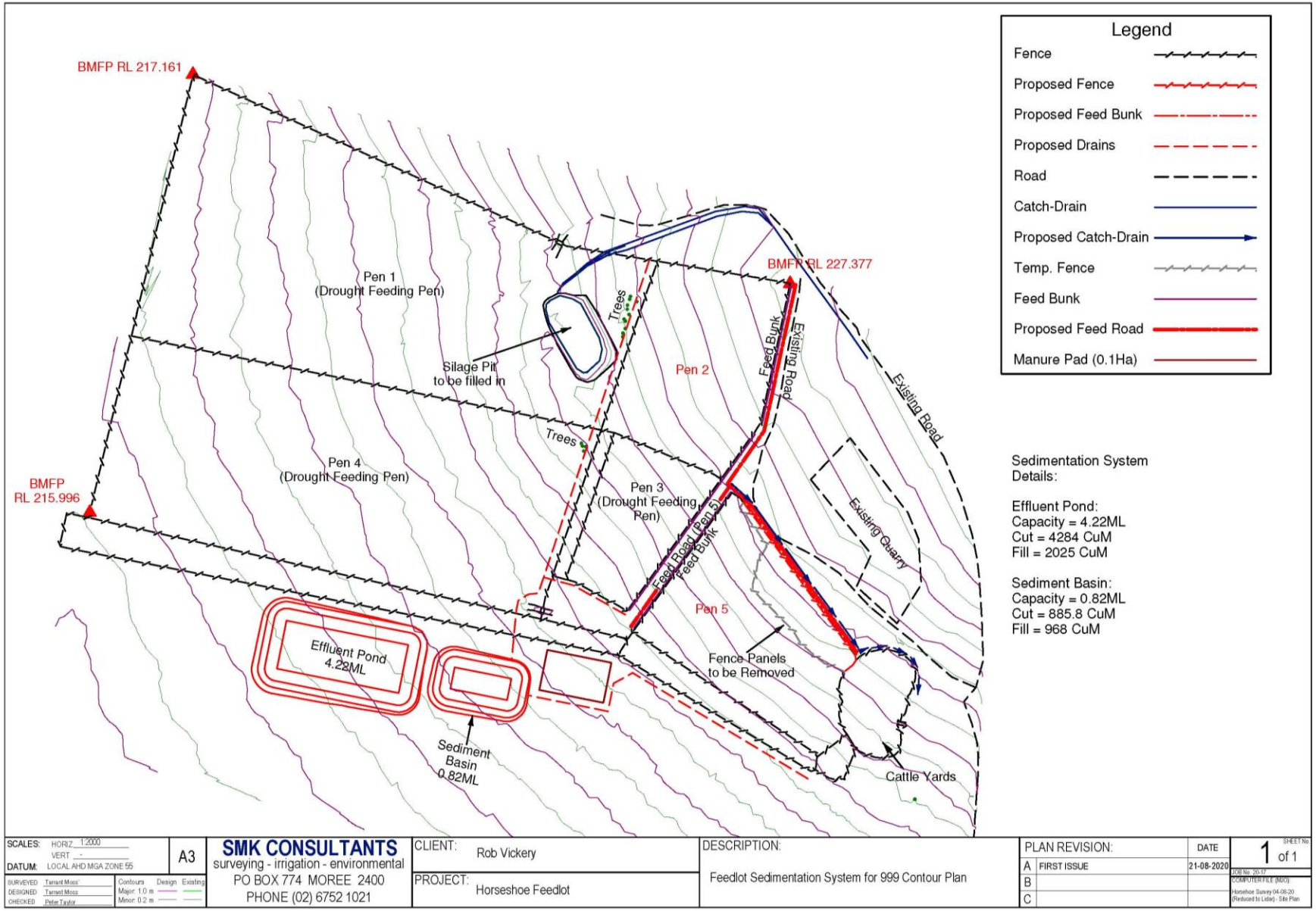

Figure 4: Proposed Site Plan showing 0.5m Contours

3.2.3 Feedlot Construction

The proposal entails the conversion of existing drought feeding pens to feedlot pens. These pens drain to the south-west and a sediment and holding pond system will be constructed downslope of the pens to capture any run-off generated within the proposed development area. Construction works will therefore involve grading of drains into the sediment ponds, the sediment pond construction, an overflow structure into the holding pond and construction of the holding pond. This work will be undertaken by a dozer to shape the storages and drains.

The natural slope within the pens is approximately 3%. This is considered as sufficient to provide appropriate internal runoff and therefore no earthworks are required within the proposed feedlot pens.

3.2.3.1 Controlled Drainage Area

The controlled drainage area (CDA) is the area of land where waste will be collected and stored. The CDA encompasses the entire feedlot complex, including the:

- Feedlot pens;
- Drains;
- Sediment and effluent holding ponds;
- Roads; and
- Manure storage area.

At present, catch drains along the north of the proposed development partially divert potential run-on away from the proposed feedlot. It is noted, however, that the proposal is adjacent to the crest of a ridge, and therefore run-on is expected to be minimal. Clean water diversion bunds will also be strategically placed north of the proposed Pen 5 to direct remaining uncontaminated run-on away from the feedlot complex. This clean runoff will be directed to the east of the proposed feedlot complex.

At present, there is no catch drain system as the site footprint consists of drought feeding and temporary containment pens. To establish the site as a feedlot, a drainage collection system is required so that runoff is collected in an effluent holding and settling system.

The development involves constructing a drain along the western and southern boundaries of the Controlled Drainage Area, downslope of the proposed development. These drains will collect runoff from the pens and direct this to the proposed sediment pond.

3.2.3.2 Pens

The two pens existing pens have varying dimensions, with Pens 2 and 5 measuring 10,184m^2 and 7,930m^2 respectively. The northern boundary of the existing Pen 5 is not linear, and the pen boundary

will be extended northwards in order for the boundary to be linear. This will result in approximately 970m^2 of additional pen space. The total feedlot pen area will therefore be 19,084m^2.

The existing feed bunks are located along the eastern edge of Pen 2 and the western edge of Pen 5. Additional feed bunks will be installed along the northern edge of Pen 5 in order to meet guideline requirements and achieve an average feed bunk space of 250 mm per head. The applicant intends to use cement bunker feeders to feed the cattle; these will be provisioned once each day with a ration, hay and/or silage. Each pen will be fitted with a water trough with a pressurized float valve system. The system will form part of the existing overall farm watering system which is based from an existing dam pump which will supply water directly to the feedlot.

The Applicant has the option of installing additional fencing within both of these pens to create several smaller pens in future, if desired. The *National Guidelines for Beef Cattle Feedlots in Australia* (MLA 2012) recommend a minimum stocking density of 11 m^2/head and maximum of up to 25 m^2/head. The proposed design will allow each pen to have an average stocking density of 19m^2/head.

The feedlot pens are located on a sloped area with an average grade of 3%. This is within feedlot guideline requirements of between 2 and 5% pen slope. The existing pen surface will therefore be retained.

The base of the pens consists of an impermeable layer of gravelly clay covered with a manure pad up to 50mm in depth. The pen area has a natural slope and therefore no earthworks are required to shape the individual pens. The pen surfaces will be maintained to reduce manure load to the drainage system, with pen cleaning interval not to exceed 13 weeks.

3.2.3.3 Sedimentation Basins

Effluent runoff from within the CDA will gravitate via the catch drain into a sedimentation basin. Both the sediment basin and effluent pond will be constructed in a cultivated paddock to the south west of the proposed feedlot site. The intended design function of the sedimentation basin is to reduce the velocity of contaminated effluent to allow settling of suspended solids (manure) before entering the effluent holding pond. The settled sediments can then be collected and combined with manure scrapings for disposal offsite.

Sedimentation basins are typically wide and shallow storages having a designed top water level (TWL) less than 1.2 m. The base of the basin will slope gently (approximately 0.1%) towards a control weir that regulates discharge from the basin into the effluent pond. Control weirs typically consist of a concrete base and horizontal timber slats that can be removed for cleaning purposes (see Figure 5). After each runoff event, the sedimentation basin will drain completely (down to bed level).

The sediment pond capacity has a design requirement to capture a peak flow event from a 1 in 20-year runoff event. Appendix 1 includes the design calculations for the effluent management system, including the sedimentation basin. The sediment basin will require a minimum volume of 0.82 ML.

A weir structure is required between the sediment pond and the holding pond. The purpose of the weir is to slow the flow of liquid effluent and allow manure to settle in the sediment pond. The following image provides a simple layout for a weir structure.

Figure 5: Typical sediment weir between sediment and effluent ponds

3.2.3.4 Effluent Pond

The sedimentation system will discharge its effluent to the holding pond. The holding pond is designed to capture and store the normal runoff from the CDA. Water in the effluent pond will be subject to microbial degradation (principally anaerobic) on the entrained organic matter. A portion of any mineralised nitrogen may be lost to volatilisation and denitrification processes, and over time some water will be lost to evaporation. The system as proposed will include use of the effluent for irrigation of crops. The option is available to irrigate if enough effluent is available in a wet season. The potential area of irrigation is minimal due to the small catchment within the CDA.

The effluent pond is to be excavated into the sloped area and spoil from the excavation will provide a surround bank. The embankment will provide a freeboard of approximately 1m above the bywash level. The pond has a minimum capacity to store 4.22 ML and has been sized to ensure that the spill frequency of the pond is less than one spill every 20 years, in accordance with the National Feedlot Guidelines. The pond will bywash on the western side, across a cultivated area. Bywash will spill out at natural surface level and will dissipate across the vegetation.

The effluent pond is being constructed near an existing stock dam. The stock dam had been excavated to a depth of 2m or more. An inspection of the soil material in the base of the dam identified clay material. The Proponent has provided anecdotal evidence that the dam does not leak. The clay available in this dam is likely to meet the requirement to seal the proposed dam if gravel or rock is encountered at the site on which the sediment and effluent ponds are located. The proposed effluent (and sediment) ponds are required to be sealed to a permeability of less than 1 x 10^{-9} m/s. (<0.01 m/d) either via suitable clays or through a plastic liner. This will need to be demonstrated as part of the construction certificate.

The proponent intends to utilise the effluent on a primary area of approximately 10 Ha. A reserve area of 10 Ha of irrigation is also available in the event of a large run-off event, and the southern section of the property also contains extensive cultivated paddocks (>50 Ha) which could be irrigated with effluent is required. An excess of area is therefore available for disposal of the effluent. The proponent intends to actively use the effluent when it is available to ensure that evaporation losses are kept to a minimum. The effluent will provide a nutrient rich soil additive.

3.2.4 Feedlot Operation

3.2.4.1 Induction Procedures

Cattle will be transported to the cattle yards located adjacent to the Feedlot site. These facilities are existing infrastructure utilise for handling of all stock on the northern part of the property. The cattle will be assessed individually on arrival for:

- Traceability
- Health and Welfare
- Performance

When livestock first arrive, they will be held at the holding pens within the cattle yards and kept separated from the general population and processed in quarantine to ensure that no diseases are introduced to the feedlot. Details from the National Livestock Identification System (NLIS) devices should be recorded and verified. Livestock may also be tagged to assist livestock management within the feedlot.

During induction, livestock will be weighed, and this weight would be recorded. They will be treated for internal and external parasites and vaccinated against clostridial diseases and infectious diseases, such as bovine respiratory disease, while held in quarantine.

Upon arrival, livestock will be provided with clean water and fresh hay. They will then be gradually introduced to the feedlot ration whilst in quarantine. This will allow the cattle to settle after being

trucked to the site and allow any initial issues to be assessed. Once processed, the cattle will be transferred to the production pens. The cattle will be grouped based on sex, weight, size and target market.

3.2.4.2 Water Requirements and Supply

The feedlot cattle are predicted to require up to 55 litres/head/day of good low saline water, with consumption up to 65 litres/head/day in the summer months. In addition to water for stock, water is also required for additional purposes including, but not limited to:

- dust suppression
- feed processing
- cattle wash down
- general cleaning

Total Number of Cattle:	= 999 head
Daily Water Requirement:	= 60 L
Annual Water Requirement:	= 999 x 60 L x 365
	= 21,878,100 L
	= 21.9 ML

This is based on the feedlot operating at 100% capacity throughout the year.

The National Feedlot Guidelines state that there should be sufficient water storage on site to supply the equivalent volume of 48 hours' peak (summer) water supply for the feedlot at full capacity. The purpose of this storage is to ensure short-term emergency water supply to cattle in the event of temporary failure of water sources. Assuming a summer water consumption of 65/litres/day per head for 999 head for two days, the feedlot is required to have sufficient storage capacity for a minimum of 130,000 litres of water (0.13ML). This water would be stored in tanks that would gravity feed water to the water troughs within the pens.

The property has an area of approximately 1,400 Ha, which includes a harvestable rights entitlement of 84 ML. A copy of the harvestable rights calculation is presented in Appendix 2. A harvestable rights dam with a capacity of 24 ML has been developed and connected via a piped water scheme to the cattle yards and existing drought feeding pens. The harvestable rights dam is located north of the proposed feedlot site and farm homestead, and intercepts water from a second order stream. This will be the primary supply source for the water requirements for the Feedlot. It is noted that dams constructed under harvestable rights in minor watercourses do not require licencing under the *Water Management Act 2000*.

The property also holds a Stock and Domestic Licence (90 WA 832459) under basic landholder rights. This licence allows the extraction of water from the Surat Groundwater Source on Lot 29 in DP753941. In the event of extended dry conditions where water resources are limited, the feedlot capacity would be limited by the availability of water supply. Should animal welfare become a concern due to due to limited water resources, water would be provisioned to the feedlot using basic landholder rights as an emergency measure and on a short-term basis, until cattle in the feedlot were sold off.

The option for the Applicant to purchase existing groundwater entitlements at a later date, for the purpose of industrial use, is also available, to improve the reliability of water supply to the feedlot. Water used on site will be maintained at a suitable quality for the feedlot as per the Livestock Drinking Water Guidelines (Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 3, 2000). The maximum total dissolved solids concentration for Feedlot cattle is 4,000 mg/L. This is equivalent to an electrical conductivity of 6.25 dS/m.

3.2.4.3 Waste Disposal

3.2.4.3.1 Manure Generation, Management and Disposal

The following calculations approximate the annual mass of manure (dry and wet weight) that would be generated at the feedlot over the course of one year when operating at maximum capacity.

Solid Waste Production

The total number of cattle:	= 999 head
Solid waste production per SCU/year:	= 1 tonne
Scaling factor for head (av. weight 425kg):	= 0.71
Solid waste production per head/year:	= 0.71 tonne
Manure production:	= 999 x 0.71 t/ yr
	= 709 t/ yr

The National Guidelines for Beef Cattle Feedlots in Australia includes the nutrient concentrations of manure for the major nutrients:

- Nitrogen (N) 2%
- Phosphorus (P) 0.8%
- Potassium (K) 2%

Based on the above concentrations the following nutrient mass in manure for 999 head of cattle was calculated:

- Nitrogen = 0.02 x 709 t
  = 14.18 tonnes of N

- Phosphorus = 0.008 x 709 t
  = 5.68 tonnes of P
- Potassium = 0.02 x 709 t
  = 14.18 tonnes of K

Manure is to be treated as a valuable by-product of feedlot operations. Manure removed from the feedlot will be spread on surrounding paddocks and incorporated in cultivations fields as a soil improver. Manure storage is best undertaken using long windrows rather than large piles. Manure windrows are typically constructed by forming manure into a long pile with a triangular cross-section. Windrows are more manageable, less likely to catch on fire, and enable manure to dry out. The apex and sloping sides of the windrows promote water shedding and prevent manure from becoming too wet, which can assist in odour reduction.

Required Area

Avg. stockpiled manure bulk density: = 0.6 t/m^3

Volume of manure requiring stockpiling = 709 t / 0.6 t/m^3

= 1,181.7 m^3

The manure will be stockpiled at the Feedlot until it has been composted and is ready for field application. The compost windrows will be shaped like long triangular prisms to shed rainfall. The base width of windrows on site will equal approximately 5 metres, while windrow height will be roughly equal to 2.5 metres. The average surface area of the face of the windrows will be 6.25 m^2. It is recommended that windrows be placed 5 metres apart to allow for machinery access. An example of windrow layout is shown in Figure 6.

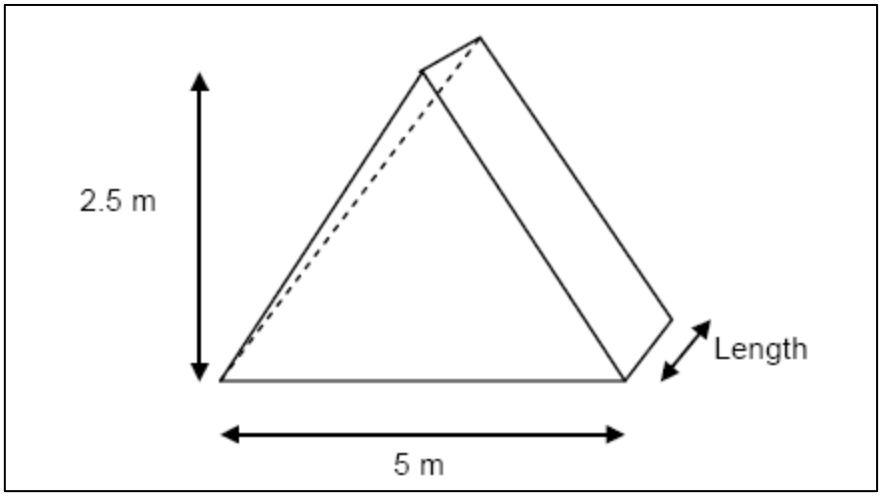

Figure 6: Example Windrow Layout

Annual Windrow length:	1,181.7 m^3 / 6.25 m^2	= 189.1 m
Annual Surface Area required:	1.189.1 m x 5 m	= 945 m^2 (0.09 ha)

The total area of the manure stockpile / carcass compost areas shown in Figure 3 is 0.1 ha. Hence, the proposed manure stockpile / carcass composting area provides sufficient space to stockpile manure and also sufficient area to compost carcasses. The manure windrows will be laid out to provide machinery access between each windrow.

Manure Application to 413 Ha Cropping area

An area of 413 Ha of cultivation has been designated within Horseshoe which can be used to recycle manure scraped from the feedlot pens. Manure management will consist of scraping the manure from the pens, stockpiling on the manure pad within the CDA and then applying the manure to fields prior to planting. The manure will provide a source of organic matter, nutrient and soil microbes to improve crop production on the farm. Any excess manure would be sold to adjoining neighbours.

The following table identifies the primary nutrient generated from a 999 head feedlot and the cropping requirements to utilise/uptake this nutrient if it is applied over time. The manure will firstly be stockpiled and allowed to dry for the purpose of improving spreading capabilities. Manure is generally applied every several years, subject to soil nutrient test results and modelling. Feedlot manure takes three or more years to break down in the soil and release the nutrients.

Table 3: Nutrient Production and Cropping Area Requirements for 999 head Feedlot based on 709 tonnes of manure produced on an annual basis.

Nutrient	Average concentration in manure	Average nutrient production tonnes
N	2 %	14.18
P	0.8 %	5.68
K	2 %	14.18

The following table presents average nutrient removal rates for a range of crops.

Table 4: Nutrient Removal Rates for Wheat, Sorghum and Corn

	Wheat	Grain Sorghum	Corn silage
Yield grain or forage (dry matter) (t/ha)	2.5	3	15
Protein content	12%	10%	10%
Nitrogen (kg/t)	20	16	16
Removal of Nitrogen (kg/ha)	50	48	240
Phosphorus (kg/t)	3.4	3.2	2.5
Removal of Phosphorus (kg/ha)	8.5	10	38
Potassium (kg/t)	4.5	4.5	7
Removal of Potassium (kg/ha)	11	13	100

(Source: Dr Peter Wylie)

The following table provides nutrient uptake rates for these crops.

Table 5: Nutrient Uptake Rates for Sorghum, Corn and Wheat

Crop	Yield (dry matter) T/Ha	413 Ha Yield (tonnes)	Nutrient Removed t/ Year off 413 Ha		
			N	P	K
Wheat	2.5	1,033	20.7	3.5	4.5
Grain Sorghum	3	1,239	19.8	4.1	5.4
Corn Silage	20	8,260	99	15.6	41.3
Nutrient produced at Horseshoe feedlot			139.5	23.2	51.2

The above calculations show that cropping will need to incorporate a corn silage crop in the crop rotation to harvest the nutrient applied in manure. The silage would be required by the feedlot as a valuable feed commodity. If silage is grown every 2 or 3 years on the paddocks available, a sustainable nutrient balance can be achieved.

It is noted that feedlot manure releases nutrient very slowly over a period of more than 3-years. The benefits of manure include the large volume of organic matter which breaks down over a much shorter period.

Manure will generally be spread at a rate of 3 to 5 tonne per Ha during application events. Additional areas are available on Horseshoe for manure use. Manure is a highly sought-after commodity for

regional cropping enterprises. The option of moving some or all manure off-farm remains available to the feedlot if conditions are not suitable for crop production.

Various management and mitigation rules will need to be adopted for manure application. The primary rules involve:

- Manure is to be incorporated in the soil shortly after application (e.g. application prior to planting operation)
- Manure is not to be applied within 50m of a defined watercourse or waterway to avoid direct contamination of the water
- Manure is not to be applied within 50m of a boundary fence
- Manure to be applied in relatively calm conditions and not during strong wind where potential odour could impact adjoining residences

The following plan presents the general locality of the cultivation fields on which manure (and effluent) will be applied.

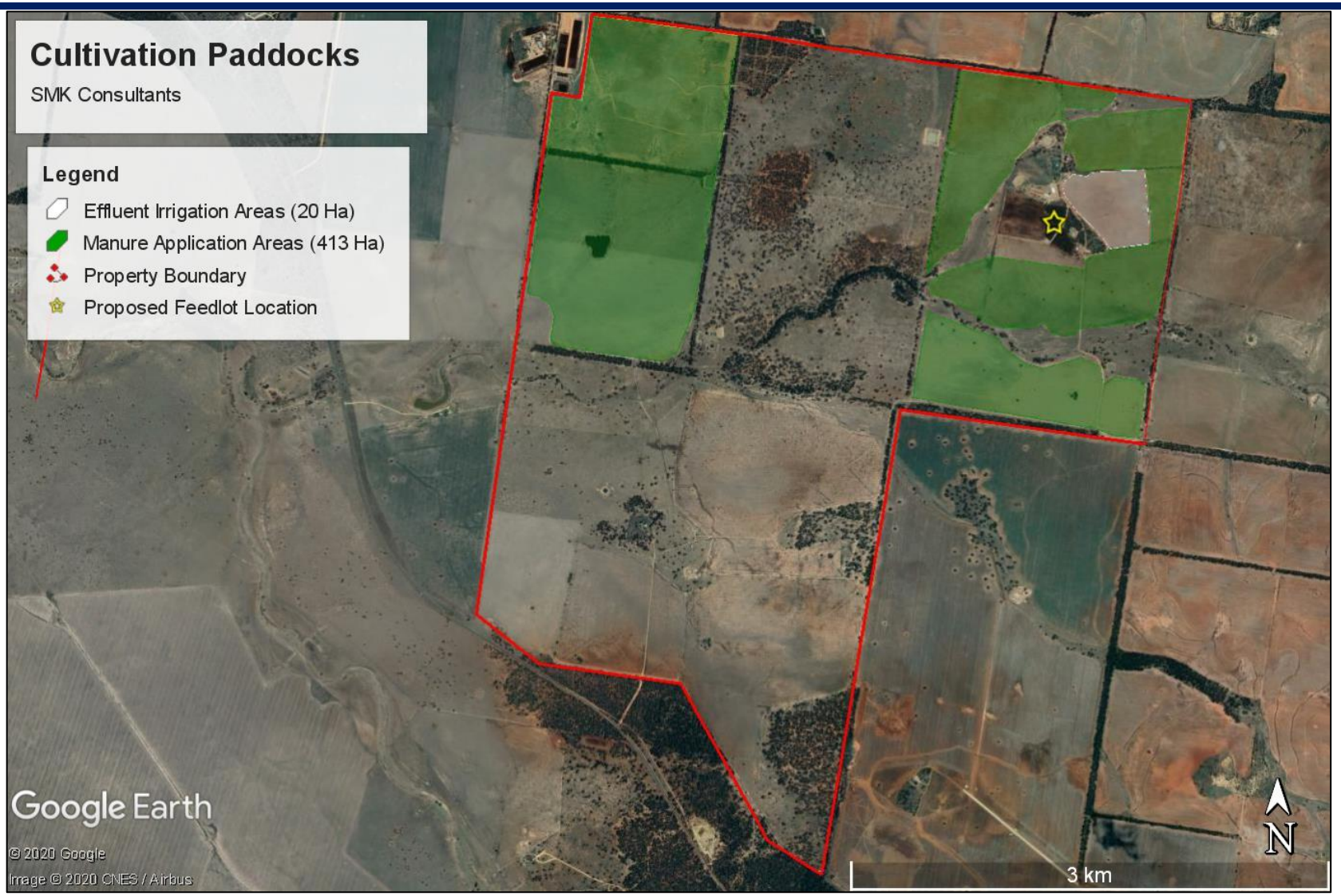

Figure 7: Proposed Effluent and Manure Application Areas in relation to the Proposed Development and Property Boundary

3.2.4.3.2 Carcasses

Low cattle mortality rates are expected to occur at Horseshoe, as a result of high standard of feedlot management and regular checking of cattle including veterinary observation where required. Expected mortality rates will be extremely minor and generally occur as a result of cattle being put-down as a result of an injury. Such cattle would be butchered and used on-farm. If a mortality rate of 0.1% is applied out of a maximum turnover, there will be a requirement to dispose of approximately 3 carcasses per year. This is considered a small source of waste with minimal potential to result in environmental harm.

Carcasses will be disposed of appropriately through burial in soil with clay subsoil, to minimise the risk of spread of disease from the decomposing carcass and leaching of nutrients from the carcass into groundwater. The burial site would be located on existing grazing land within Lot 2 in DP 1238135. In the event of a mass death, a pit will be constructed adjacent to the burial site within the grazed area to the west of the feedlot. In the event of a mass death, the site of the pit would be GPS located and mapped for farm records. The pit will be sited so that it is constructed with a 1m depth of clay below and around the disposal area. Management would assess the cause of the deaths in conjunction with the Vet engaged to assist the Feedlot. If concern is raised as a result the cause of the deaths, Local Land Services and other relevant bodies will be notified.

3.2.4.4 Feed Storage and Usage

Stock feed will generally comprise of a mixture of cotton seed (10% of feed), straw (10% of feed), balanced grains and other feed supplements as required. Grain, forage and some hay are produced on-farm. All other cattle feed will be imported onto the site. Feed preparation will occur on site using a mobile feed mixer.

For design purposes, the NSW Department of Primary Industries recommends feedlot cattle consume an average of 3% of their liveweight per day. Assuming an average of 425 kg per head, each animal would consume approximately 12.75 kg of ration each day. At maximum capacity, the feedlot would need to secure a supply of approximately 12.75 tonnes of feed/day, or approximately 4,650 tonnes/year. It is unlikely that the feedlot would be operating at maximum capacity for the duration of a year.

The feedlot would need to store approximately 3-weeks of ration to ensure feed is always available. The on-farm storage would therefore be in the order of 267 tonnes of grain and hay for when the feedlot is operating at maximum capacity. It is noted that there is sufficient existing silo capacity on site at present (290 tonne).

Animal welfare guidelines recommend a requirement for between 150 mm and 600 mm of bunk width per head. The feedlot pens will provide an average trough space of approximately 320mm per head.

3.2.4.5 Employment

Throughout construction, the proposed development will provide work for local contractors for effluent pond construction and installation of additional facilities including fencing. Upon completion of construction (capacity of 999 head), the operation and management of the completed feedlot will likely require an equivalent workforce of 2 permanent staff members, in addition to casual employees/contractors as required. The main tasks likely to occur during these times include feed preparation and distribution, cattle handling, induction and dispatch, pen cleaning and manure management. The proposal will not result in additional full-time employment in the area as there are currently 2 full-time staff members on the property.

Additional employment will be generated for truck drivers, service providers and suppliers of cattle and crops. These positions would be considered as existing employment opportunities in the local area.

3.2.4.6 Hours of Operation

The standard hours of operation for the feedlot will be 7am to 5pm, 7 days per week. Some vehicle movements may occur outside normal operating hours (e.g. in summer, it is desirable to transport cattle either at night or in the early hours of the morning for animal welfare reasons). The feedlot will therefore require the flexibility to allow strategic vehicle movements outside of the normal operating hours. This would be considered similar to existing stock operations on the property. Grain deliveries and feed movements onsite would generally be restricted between the hours of 7 am and 5 pm, Monday to Friday with only minor exceptions for weekends during local harvest times.

Construction activities will be limited to 7am to 6pm Monday to Friday, and 7am to 1pm on Saturday. There will be no significant noise generating construction activities on Sundays or public holidays. It is noted that farmers and farm contractors generally work on a 7-day basis until the work is done.

3.2.4.7 Traffic and Access

The traffic generated by the Feedlot will include heavy-vehicle traffic carrying cattle and stockfeed in, cattle out, and light vehicles transporting employees, visitors and service personnel. Table 6 outlines the anticipated numbers of heavy-vehicle movements that will be generated by the proposed feedlot operation if the feedlot operates at maximum capacity throughout the year. It should be noted that this is considered unlikely; these calculations therefore present the 'worst case' traffic generation scenario for the feedlot. Actual traffic generation is anticipated to be less than the figures provided in Table 6.

Additional assumptions made include the following:

- A movement is considered one-way (i.e. A truck entering and leaving is considered 2 movements);
- Feed ration consumption will be approximately 12.75 kg per head per day;

- Approximately 45% of the feed ration will be produced onsite. The remainder will be imported. Therefore, at full capacity, approximately 2,090 tonnes of grain and other feed supplements will be delivered to the feedlot annually;
- No cattle will be bred on site;
- Cattle will be transported in a combination of Dual Deck B-Doubles (with a maximum length of 18.8m and capacity of 55 tonne) (50%) and Dual Deck 2 Trailer Road Trains (with a maximum length of 36.5m and capacity of 72 tonne) (50%);
- The number of animals per truck is based on guidelines set out in the "Australian Animals Welfare Standards and Guidelines: Land Transport of Livestock".
- Cattle will weigh approximately 350kg upon entering the feedlot and 500kg upon exit;
- Some seasonal variations will occur.

Table 6: Predicted Heavy Vehicle Movements

Traffic Movements – Horseshoe	
Maximum Occupancy (100%)	
Cattle Processed Annually	2,997
Cattle Truck Movements	55.6 Annually
	1.1 Weekly
	0.15 Daily
Feed Truck Movements	82.1 Annually
	1.6 Weekly
	0.22 Daily
Total Truck Movements	137.7 Annually
	2.6 Weekly
	0.38 Daily
Expected Occupancy (80%)	
Cattle Processed Annually	2,397
Cattle Truck Movements	44.5 Annually
	0.9 Weekly
	0.12 Daily
Feed Truck Movements	52.3 Annually
	1.0 Weekly
	0.14 Daily
Total Truck Movements	96.7 Annually
	1.9 Weekly
	0.26 Daily

It is predicted that the Feedlot, when operating at maximum capacity (100%) will produce, on average, 0.38 truck movements per day and approximately 2.6 truck movements per week, based on one truck in or out being counted as one truck movement. Therefore, at full capacity the total number of trucks

is equivalent to approximately 5 trucks a week. The majority of trucks would enter and leave the site with a load and therefore the actual number of truck movements to and from the site will be half of the above figures. The potential traffic generation capacity of the proposed development is therefore considered minimal. It is also noted that the proposed feedlot will likely operate at 80% capacity throughout the year, such that the above figures, which are based on 100% capacity, are conservative estimates.

During grain harvest periods, the Feedlot would generally receive additional grain which would be stored in grain silos. This would result in a short-term traffic peak of grain trucks. These truck trips would involve existing truck movements on the Shire roads which would be diverted to the Feedlot site. Furthermore, the property currently generates between one and two trucks per week to support current operations. The net change in local heavy traffic moving to and from the feedlot may be in the order of one truck (two truck movements) per week.

It is proposed that traffic will enter/exit Horseshoe & Stud Park via Millie Road, off the Newell Highway. The proposed route is classified as an Approved Area for B-Doubles and Road Trains, as identified in Restricted Access Vehicles (RAV) mapping provided by the NSW Roads and Maritime Services (RMS). Heavy vehicle traffic in the region is generally seasonal. Peak truck traffic periods are associated with crop harvest periods. Throughout the remainder of the year, truck traffic generally consists of stock haulage trucks.

Sight distances from the feedlot entrance onto Millie Road are over 200m to the south-east (Figure 8) and over 150m to the north-west (Figure 9). These sight distances are considered sufficient. The access road from Millie Road to Horseshoe & Stud Park (included as Figure 10) is an existing gravel road. The point of intersection has been sealed and the access point is overall considered suitable for use for the Feedlot.

Figure 8: South-East Sight Distance Along Millie Road

Figure 9: North-West Sight Distance Along Millie Road

Figure 10: Access Road from Millie Road into Horseshoe & Stud Park

3.2.4.8 Fire Management Strategy

There will be no flammable chemicals (fuel) stored near the Feedlot complex. There is an existing shed located north of the proposed Feedlot complex. Fuel and chemicals will be stored in this area. The fuel is stored in appropriate facilities with approved separation buffers and fire control facilities (fire extinguishers).

All chemicals (including veterinary chemicals) used at the facility are stored appropriately in compliant containment facilities. Chemicals with specific storage requirements (such as vaccines and other veterinary chemicals), are stored in accordance with label specifications. The majority of these chemicals are considered non-flammable.

The Rural Fire Service will be contacted in the event of a fire. Staff will fight the fire if it is reasonably safe to do so. If initial firefighting attempts are unsuccessful, or too dangerous, all staff would be evacuated to a safe area and the cattle let out of the pens into the surrounding paddocks.

3.2.4.9 Vermin and Disease Control Measures

Fly, mice and rat populations will be managed primarily through the Feedlot management schedule. (i.e. minimise feed wastage and spillage to reduce the likelihood of attracting vermin). If the vermin population reaches a nuisance level the Feedlot will implement a baiting program. The program would include placement of fly baits to manage bush flies and other baits around the milling area to manage outbreaks of mice.

Other disease control measures will be managed through the implementation of appropriate vaccination programs, workplace health and safety regulations and compliance with the National Feedlot Accreditation Scheme.

3.2.4.10 Emergency Animal Disease and Mass Mortality Contingency Plans

In the event of an Emergency Animal Disease (EAD) outbreak the Australian Veterinary Emergency Plan (AUSVETPLAN) Enterprise for Beef Cattle Feedlots will be invoked. The Feedlot will be required to:

- Quarantine the premises and/or control movements;
- Destroy and dispose of infected and exposed susceptible animals;
- Decontaminate infected premises;
- Conduct surveillance of susceptible animals; and
- Restrict certain activities.

If the EAD is deemed to be low risk, it may be mitigated through:

- Vaccination;
- Vector or wild animal control; and
- Treatment of affected animals.

Personnel at the Feedlot will call the NSW DPI 24-hour Emergency Animal Disease Hotline on 1800 675 888 to notify the authorities of any notifiable diseases. In the event of a mass death, the AUSVETPLAN Operational Manual – Disposal will be invoked. Feedlot staff would excavate an appropriate pit according to the scale of the deaths. The cattle would be buried and covered by 1m of clay once an investigation is completed to determine the cause of the deaths. Management must advise the relevant authorities of a mass death event.

4 Statutory Matters

4.1 Permissibility

The development proposal is considered Local Development under Part 4 of the *Environmental Planning and Assessment Act, 1979.* The proposal therefore requires development consent from the Narrabri Shire Council as the determining authority.

The development is not considered Designated Development as the proposal does not exceed the maximum capacity threshold of 1,000 head. Cattle feedlots that do not exceed 1,000 head of cattle do not require an Environment Protection Licence under the POEO Act 1997. The proposal therefore does not require any additional approvals or licences.

The proposed development is considered compatible with the objectives of the site's RU1 – Primary Production zoning, and permissible, with development consent, under the provisions of the Narrabri Local Environmental Plan 2012 (LEP). Concurrence is not required from any other authority before the development may lawfully be carried out.

Do any policy statements from Federal or State Governments have relevance?

The Federal and State Government policies relevant to this proposal are discussed in detail within this report. Main policies applicable to this application are State Environmental Planning Policies (SEPPs).

Are there any relevant planning studies or strategies?

No.

Is there any management plan, planning guidelines or advisory document that is relevant?

No.

4.2 Federal Legislation

4.2.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places defined in the EPBC Act as Matters of National Environmental Significance (MNES). The EPBC Act provides guidelines for a self-assessment process to determine whether a development needs referral to the Federal Department of Environment, Water, Heritage and the Arts (DEWHA) in Canberra.

If a development requires referral to the Commonwealth Minister for the Environment for actions on Commonwealth land the Minister would consider whether the proposal would create a significant impact on matters of national environmental significance, which include:

- World Heritage Properties;
- Ramsar Wetlands;
- Nationally threatened species and communities;
- Migratory species protected under international agreements;
- The commonwealth marine environment; and
- Nuclear actions.

The proposed development was considered under the guidelines prepared for assessment under the EPBC Act. The proposed development area extends over approximately 4.8 Ha and the subject land has been heavily modified by its previous and current use as drought feeding pens and cultivation paddocks. The trees and shrubs remaining within the proposed Feedlot pens are in poor condition and will likely die in the long-term, regardless of the proposal outcome. The proposed development footprint is not considered to constitute important or core habitat for any identified threatened species or communities and, consequently, the proposal is not deemed to have any adverse impacts on these species/communities. The *Matters of National Environmental Significance: Assessment of Significance* is attached as Appendix 3. Furthermore, this report includes an assessment of measures designed to protect the environment, promote the conservation and ecologically sustainable use of natural resources, promote biodiversity conservation and provide for the protection and conservation of heritage.

It is considered that the proposed development would not cause a significant additional impact on any of the abovementioned MNES and therefore it has been concluded that the proposal does not need to be referred to the Federal Minister for the Environment.

4.3 State Legislation

4.3.1 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* came into effect in August 2017 and replaced the *Threatened Species Conservation Act 1995*. The BC Act outlines requirements in relation to the listing of threatened species, biodiversity impact assessment, offsetting and related offences. The assessment of biodiversity values on land and the impacts of activities on those biodiversity values are to be carried out in accordance with the Biodiversity Assessment Method (BAM). The objective of the BAM is to adopt a standard approach that will result in no net loss of biodiversity in NSW.

The Act also outlines the Biodiversity Offset Scheme (BOS). Development that is subject to the BOS scheme includes development needing consent under Part 4 of the EP&A Act (excluding complying development), activities under Part 5 of the EP&A Act, State significant development and State significant infrastructure.

Where development or an activity is, “likely to significantly affect threatened species”, a Biodiversity Development Assessment Report (BDAR) must be prepared and consent authorities are required to

consider the likely impact of the proposed development on biodiversity values before granting approval.

The threshold test of whether development or an activity is "likely to significantly affect threatened species" (and therefore whether a BDAR is required) is reached if:

- the BOS Threshold is met;
- the development is carried out in a declared area of outstanding biodiversity value; and
- the test in section 7.3 of the BC Act is met.

The proposed development is to be located on land which has either been developed for agricultural use. The Feedlot footprint currently consists of existing cattle pens utilised for drought feeding (feedlot pens and drainage system) and of a cultivated paddock (sediment and effluent ponds).

The land on which the feedlot pens are sited historically consisted of Bimble Box woodland with an understorey of Wilga shrubs. The utilisation of this land for temporary drought feeding over the last number of years has resulted in the demise of approximately 80% of tree and shrub cover, and of all ground cover with the exception of a commonly occurring species, Common Mallow. The remaining trees and shrubs are currently in poor condition. Native vegetation in the proposed Feedlot pens will not be directly impacted (i.e. cleared or felled) as part of the proposed development. However, the operation of the Feedlot will likely result in increases in soil nutrient concentration and salinity, resulting from deposition of manure and urine by cattle livestock over the lifetime of the proposed project. These changes in the soil are likely to lead to the death of the remaining trees over time. This is likely to occur regardless of the proposal outcome as the pens would otherwise continue to be utilised for drought feeding and temporary containment of cattle.

The subject lot was assessed using the online Biodiversity Offsets Scheme Entry Tool, which determines whether any proposed clearing would be above or below the area thresholds or lies within an area mapped as having high biodiversity value. The BOS Threshold, equivalent to 1 Ha, will not be exceeded as clearing will be limited to four or five trees, three of which are already dead, in order to facilitate the construction of drains on the western edge of the proposal. Trees within the proposed feedlot pens will be retained as valuable assets in creating shade and providing scratch posts for cattle.

The proposed development site is not located within a declared area of outstanding biodiversity value.

Proponents are also required to carry out a 'test of significance' for all development proposals that do not exceed the Biodiversity Offset Scheme Threshold. The required test of significance (as outlined in Section 7.3 of the BC Act) has also been included in Appendix 4.

Overall, it was determined that the proposal is not likely to significantly affect threatened species, and that further assessment under the BAM and the preparation of a BDAR is not required.

4.3.2 National Parks and Wildlife Act 1974

The proposal has been prepared in accordance with the requirements of this Act. There are no national parks, nature reserves, regional parks, state conservation areas, historic sites, karst conservation areas or Aboriginal areas within the subject area. The closest protected area to the development site, Kirramingly Nature Reserve, located approximately 12.5 kilometres north east of the development site, is sufficiently removed from the development such that it will not be impacted by the development.

A preliminary assessment of cultural heritage was undertaken and included elsewhere in this report. An inspection of the subject site was conducted in accordance with Due Diligence methodologies to assess the potential impact of the proposed development on any items or sites of cultural significance. No sites of cultural significance were observed within the footprint of the proposed development site.

Given the site's history of disturbance and agricultural land use it was concluded that places, objects and features of significance were unlikely to be discovered within the subject site. It is possible that items or places of significance may exist in the surrounding region, in areas of land which have not been cleared or significantly disturbed for agricultural production; these localities will not be impacted by the proposed development.

These considerations protect the objectives of the Act.

4.3.3 The Heritage Act 1977

The objects of this Act are as follows:

a) to promote an understanding of the State's heritage,
b) to encourage the conservation of the State's heritage,
c) to provide for the identification and registration of items of State heritage significance,
d) to provide for the interim protection of items of State heritage significance,
e) to encourage the adaptive reuse of items of State heritage significance,
f) to constitute the Heritage Council of New South Wales and confer on it functions relating to the State's heritage,
g) to assist owners with the conservation of items of State heritage significance.

4.3.3.1 Comment

There are no known non-indigenous heritage items identified within or near the development site.

4.3.4 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* provides the framework for NSW Planning Legislation. Under this Act, local councils prepare Local Environmental Plans (LEPs) that specify planning controls for specific parcels of land. The Act also provides for State Environmental Planning Policies (SEPPs). The applicable SEPPs have been discussed in detail within this report. This SoEE has been prepared in accordance with the requirements of this Act. It provides an environmental impact

assessment and details of how the feedlot will be developed and operated to protect the environment, the community and provide for ecologically sustainable development.

4.3.4.1 Development Contribution

Part 7, Division 7.1, Subdivision 3 (previously Section 94) of the *Environmental Planning and Assessment Act 1979*, enables Council to levy contributions from developers for the provision of public amenities and services required as a consequence of development.

Under the provisions of the *Environmental Planning and Assessment Act 1979*, Council may include a condition of consent that details the following:

- Require land to be dedicated free of cost; or
- The payment of a monetary contribution,
- Or both.

In applying such contributions, the Council must be fair and reasonable, and as such the contributions levied on development with the Narrabri Shire are limited to essential or baseline works.

The proposed development is for a construction of a Feedlot. The traffic generation potential of the proposed development has been calculated and is presented within this report. These estimations should be utilised when calculating the appropriate development contribution fee.

4.3.5 Rural Fires Act 1997

The *Rural Fires Act 1997* provides the framework for the prevention and management of bush fires on rural land within NSW. Under Section 63 of the Act: "(2) It is the duty of the owner or occupier of land to take the notified steps (if any) and any other practicable steps to prevent the occurrence of bush fires on, and to minimise the danger of the spread of a bush fire on or from, that land."

The subject site is located on a low ironstone ridge while the surrounding locality consists of flat topography. The subject site itself supports dead standing trees, and the land adjacent to the subject site to the north, west and south has been entirely cleared and consists of cropland and containment pens and farmyards, while the land to the east consists of disjunct open woodland. The wider locality has been heavily cleared to facilitate cropping with remaining areas of open woodland remaining predominantly on ridges, along watercourse corridors and on crown land.

The NSW Planning and Environment Property Report tool has not identified the subject site or any part of the property as Bushfire Prone Land. The development does not involve the erection of any buildings or dwellings as classified under the Building Code of Australia. Nevertheless, the Proponent will aim to keep a cleared area around the feedlot. In the event of a fire, a network of internal all-weather roads will provide access to and around the feedlot for firefighting. Water from on-site storages will provide an adequate supply for fire-fighting purposes.

4.3.6 Protection of the Environment Operations Act 1997

Under the *Protection of the Environment Operations Act 1997*, it is an offence to cause water, air, noise or land pollution. The proposal is below the applicable threshold "capacity to accommodate more than 1,000 head of cattle at any time" included in Clause 22 Schedule 1. Therefore, the proposed development does not require a licence under the POEO Act. However, specific recommendations for environmental protection are included within this report.

4.3.7 Water Management Act 2000

The objects of the *Water Management Act 2000* are to provide for the sustainable and integrated management of the water sources of the State for the benefit of both present and future generations. The objects of this Act were considered throughout the planning and design phases of this development. Feedlots require a secure and reliable water supply to operate. The Proponent intends to utilise harvestable rights water to obtain the water supply required for the proposed development. The existing dam north of the proposed Feedlot will be utilised as the primary water supply to the feedlot. In future, the Applicant may choose to purchase existing groundwater allocations to increase water supply reliability during dry periods. This would be a separate application to the current proposal and would be assessed by Water NSW.

The effluent storages to be built as part of the Feedlot are considered permissible under the Act as they will be capturing effluent runoff.

The watercourses and groundwater in the vicinity of the property will be protected through rigorous design and management practices, including good effluent and manure reuse and disposal methods. Appropriate buffers are to be maintained in order to minimise the risk of stream pollution.

4.4 State Environmental Planning Policies and Development Codes

The following table presents a summary and comment on State Environmental Planning Policies and development code relevance to the proposed development.

Table 7: State Environmental Planning Policies and Development Codes

SEPP No. & Codes	Title	Relevance
No. 1	Development Standards	Not Relevant
No. 19	Bushland in Urban Areas	Not Relevant
No. 21	Caravan Parks	Not Relevant
No. 33	Hazardous & Offensive Development	Refer to following section for Hazardous & Offensive Development
No. 36	Manufactured Home Estates	Not Relevant
No. 47	Moore Park Showground	Not Relevant
No. 50	Canal Estate Development	Not Relevant

SEPP No. & Codes	Title	Relevance
No. 55	Remediation of Land	Refer to following section for Remediation of Land Review
No. 64	Advertising and Signage	Not Relevant
No. 65	Design Quality of Residential Apartment Development	Not Relevant
	Affordable Rental Housing 2009	Not Relevant
	Building Sustainability Index: BASIX 2004	Not Relevant
	Exempt and Complying Development Codes 2008	Not Relevant
	Housing for Seniors or People with a Disability 2004	Not Relevant
	State Significant Precincts 2005	Not Relevant
	Infrastructure 2007	Refer to Section for Infrastructure Review
	Kosciuszko National Park – Alpine Resorts 2007	Not Relevant
	Mining, Petroleum Production and Extractive Industries 2007	Not Relevant
	State and Regional Development 2011	Not Relevant
	Concurrences 2018	Not Relevant
	Education Establishments and Child Care Facilities 2017	Not Relevant
	State Environmental Planning Policy (Coastal Management) 2018	Not Relevant
	Primary Production and Rural Development 2019	Refer to following section for Primary Production and Rural Development Review
	Koala Habitat Protection 2019	Refer to following section for Koala Habitat Protection

4.4.1 State Environmental Planning Policy No. 33 – Hazardous and Offensive Developments

SEPP No 33 applies to proposals falling under the definition of *'potentially hazardous industry'* or '*potentially offensive industry'*. Under SEPP No 33 the permissibility of industrial proposals is linked to safety and pollution control performance. The SEPP aims to ensure the merit of proposals are properly assessed before being determined. It aims to ensure that developments can only proceed if they are suitably sited and can demonstrate that they will be built and operated with an adequate level of safety.

This SoEE demonstrates that the proposed feedlot is suitably sited. The main waste products from the Feedlot are manure and effluent. Manure will sustainably used as a valuable alternative to inorganic fertilizers on cropping areas within the property. Effluent may on occasion be disposed of by irrigation at sustainable rates on existing cropland on the property, with the remaining effluent to be disposed of by evaporation from the surface of the holding pond.

The feedlot will not produce hazardous waste products. While all feedlots produce some odour, this will be minimised through good design and management. Additional protection is provided through separation distances between the site, the closest residences and other areas with sensitive land uses.

Hence, nuisance odours are not expected at nearby residences or other surrounding areas with sensitive land uses.

4.4.2 State Environmental Planning Policy No. 55 (SEPP 55) – Remediation of Land

The proposed development site is currently utilised for opportunity feeding of cattle and crop production with a history of agricultural use. It is unlikely that historical use of the site would have resulted in contamination. During an inspection of the property no evidence of visible contamination from current or past practices was identified. Further, the subject land is not identified as being potentially contaminated and is therefore considered to be suitable for the intended use. It was accordingly determined that no further investigation under SEPP 55 was required.

4.4.3 State Environmental Planning Policy (Infrastructure) 2007

This SoEE has addressed the main policy aim to facilitate the effective delivery of infrastructure across the state and does not require any additional provision of services. The proposal is for a small-scale cattle feedlot and the proposed volume and frequency of traffic generated by the development is considered insignificant.

This policy is not applicable to the development proposal.

4.4.4 State Environmental Planning Policy (Primary Production and Rural Development) 2019

The Shire supports the use of land for cattle feedlots within zone RU1 - Primary Production under the *Narrabri Local Environmental Plan 2012.* This development does not include the erection of any buildings or dwellings, or subdivision of land. The proposed development is for a small-scale cattle feedlot and as such is considered unlikely to have a significant impact on existing or future land use of adjoining land.

Part 4 of this planning policy addresses certain types development relating to livestock industries which may be carried out with or without development consent. None of the clauses in this section of the policy apply to the proposed development. The proposed feedlot requires development consent under the *Narrabri Local Environmental Plan 2012* (LEP), as addressed in Section 4.5.

4.4.5 State Environmental Planning Policy (Koala Habitat Protection) 2019

The *State Environmental Planning Policy (Koala Habitat Protection) 2019* was introduced on March 1, 2020. It replaces the *State Environmental Planning Policy 44 – Koala Habitat Protection 1995* and has been updated and improved to increase the level of protection of koala habitat within NSW. SEPP (Koala Habitat Protection) 2019 seeks to address the declining status of koalas in NSW through better conservation and management of koala habitat as part of the planning and assessment process. The overarching aim of the SEPP is to "… *encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline*."

The definition of core Koala habitat is specified in clause 4 of the SEPP, and is defined as:

a) *An area of land where koalas are present, or*
b) *An area of land –*
    i. *Which has been assessed by a suitable qualified and experienced person in accordance with the Guideline as being highly suitable koala habitat,* ***and***
    ii. *Where koalas have been recorded as being present in the previous 18 years.*

Narrabri Shire is located within the Northwest Slopes Koala Management Area. The NSW Department of Planning, Industry and the Environment's online mapping tool was searched to determine if the site area contained areas identified as koala habitat. The subject site and surrounding area are shown in relation to the Koala Development Application Map layer, in Figure 11.

A consideration of existing records spanning the previous 18 years (3 koala generations) is required to determine if any koala records exist for the area. A site area is considered to contain habitat that meets the definition of core koala habitat, provided the site contains highly suitable koala habitat and where a record or records exist within the last 18 years, within 5 kilometres of the site (for Darling Riverine Plains, Far West, North West Slopes, Riverina and Northern Tablelands KMA's). This distanced reflects the estimated median home range of koalas within inland locations. The results of a BioNet Atlas search for Koala records within 10 kilometres of the proposed development area was undertaken on the 24th of August 2020. The search did not yield any Koala records. It is therefore considered that the subject site and Lot 29 on DP753941 are not considered 'core Koala habitat' as per the definition provided under the Koala Habitat Protection SEPP. It is therefore concluded that no further assessment is required under the SEPP.

The site was nevertheless assessed for its potential to provide Koala habitat during the site inspection. Both the subject site and the area of open woodland to the east of the subject site are dominated by Bimble Box, which is listed as a Koala feed tree species in Schedule 2 of the SEPP. It is however noted that the majority of trees within the subject site are either dead or are in decline due to increased salt and nutrient concentrations in the soil (as a result of the containment of cattle). The trees within the subject site are therefore not considered to offer potential or core Koala habitat. Furthermore, while the Bimble Box woodland to the east of the subject site comprises healthy Bimble Box trees, the area of woodland is small (approximately 3 Ha) and is also disjunct and fragmented by an access road and small quarry. This woodland is at distance (at least 600m) from similar and contiguous open woodland within the property, with cleared, cultivated land present between both patches of woodland. Given the extent of habitat disturbance, human activity in the area and the lack of connecting corridors, the Bimble Box woodland in the direct vicinity of the proposed feedlot is considered unlikely to be utilised by Koalas that may be present in the locality.

Advice provided by the proponent indicates that the current owners have never sighted Koala on the property. If Koala were present on the property, they would be predicted to occur in areas of

contiguous woodland with corridor connections between areas of preferred feed trees. This would include most local watercourse corridors and woodland retained along the edge of paddocks within the property.

Overall, the proposed development is considered unlikely to have a significant adverse impact on the core Koala habitat in the locality of the proposed development.

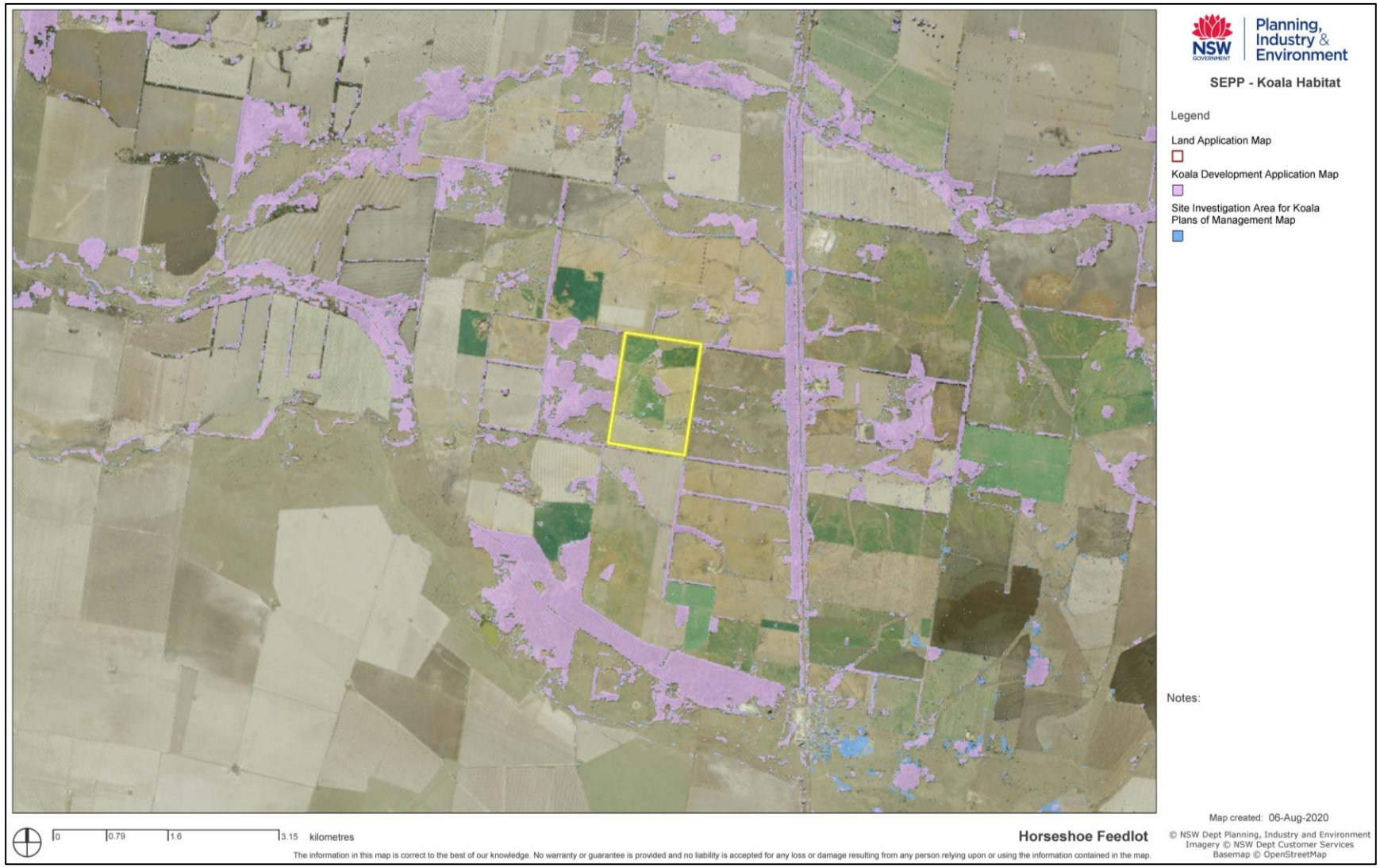

Figure 11: Koala Habitat Map in the vicinity of the proposed development as per the Koala Development Application Map.

4.5 Local Environmental Plan

The Narrabri Shire is a local government area in the northern region of New South Wales. The Narrabri Local Environmental Plan 2012 (LEP) is the current local government planning policy for the Shire. The framework of the LEP is derived from the *Environmental Planning and Assessment Act 1979*. Horseshoe & Stud Park is located within Zone RU1 – Primary Production of the Narrabri Shire.

4.5.1 Land Use Definition

The proposed "feedlot", as intended for this development, is defined in the LEP as a "confined or restricted area that is operated on a commercial basis to rear and fatten cattle, fed (wholly or substantially) on prepared and manufactured feed, for the purpose of meat production or fibre products, but does not include a poultry farm, dairy or piggery".

This type of development is permissible with consent from council within land zoned as RU1: Primary Production. Use of land for a feedlot according to the LEP is included as "intensive livestock agriculture". This type of agriculture is defined as the *"keeping or breeding, for commercial purposes, of cattle, poultry, pigs, goats, horses or other livestock that are fed wholly or substantially on externally-sourced feed*". Furthermore, the land use as intended for the proposed Feedlot is compatible with existing land uses in the surrounding area.

The intended land use, as defined in the LEP as intensive livestock agriculture, is a permissible land use, with development consent, within the RU1 – Primary Production zone.

4.5.2 Zone RU1 – Primary Production

The LEP states that the objectives of the zone are:

- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.
- To encourage diversity in primary industry enterprises and systems appropriate for the area. To minimise the fragmentation and alienation of resource lands.
- To minimise conflict between land uses within this zone and land uses within adjoining zones.
- To allow for non-agricultural land uses that will not restrict the use of other land for agricultural purposes.

The development of a cattle feedlot, as intensive livestock agriculture, is permissible with consent from Council within Zone RU1 – Primary Production. The proposal is for an agricultural land use that will sustain efficient and effective agricultural production potential. The development will encourage diversity in primary industry operations at the property without restricting the use of surrounding land for other agricultural purposes. The protection of natural resources and places has been fully taken into consideration in the planning for this development. The utilisation of the land for agricultural purposes will minimise fragmentation and alienation. The proposal is not considered to conflict with adjoining land uses. The proposal is likely to enhance the potential of surrounding grazing enterprises.

The proposed development is therefore considered to be both compatible and consistent with the surrounding land uses and would be considered to satisfactorily meet the objectives of the RU1 Primary Production Zone.

4.5.3 Heritage Conservation

Part 5, Clause 5.10 of the LEP deals with heritage items and heritage conservation areas. The objectives of this clause are as follows:

a) To conserve the environmental heritage of Narrabri,
b) To conserve the heritage significance of heritage items and heritage conservation areas, including associated fabric, settings and views,
c) To conserve archaeological sites,
d) To conserve Aboriginal objects and Aboriginal places of heritage significance.

The proposal is not in the immediate vicinity of any heritage items in accordance with Council's Local Environmental Plan or under State or Federal legislation.

'Dobikin Homestead', located on the property 'Dobikin' Lots 22 and 23 in Deposited Plan 753964, is listed as an environmental heritage site of local significance (Item No. I009) in the Narrabri Shire LEP. The property, located approximately 5 kilometres south-west of the proposed feedlot site, is owned by the Applicant's family and will not be impacted by the establishment and operation of the proposed development.

4.5.4 Bushfire Hazard Reduction

Section 5.11 of the LEP deals with land that is considered bushfire prone and may require bushfire hazard reduction work. Bushfire hazard reduction work authorised by the *Rural Fires Act 1997* may be carried out on any land without development consent.

Bushfire hazard reduction work includes the following:

a) the establishment or maintenance of firebreak on land, and
b) the controlled application of appropriate fire regimes or other means for the reduction or modification of available fuels within a predetermined area to mitigate against the spread of a bushfire,

But, does not include construction of a track, trail or road.

The subject site is not classified as bushfire prone land on the relevant mapping (Figure 12). The risk of bushfire within the subject site is therefore considered minimal. Some reduction work will nevertheless be undertaken to minimise the bushfire hazard to the development. The proposal will be free of readily flammable materials; these will be stored according to accordance with relevant regulations in sheds to the north of the proposed development. An 11 m firebreak will be maintained, to the extent that it is practicable without undertaking vegetation clearance, around the development footprint. All

weather roads will provide access for firefighting in and around the feedlot and water from on-site storages will provide an adequate supply for fire-fighting purposes.

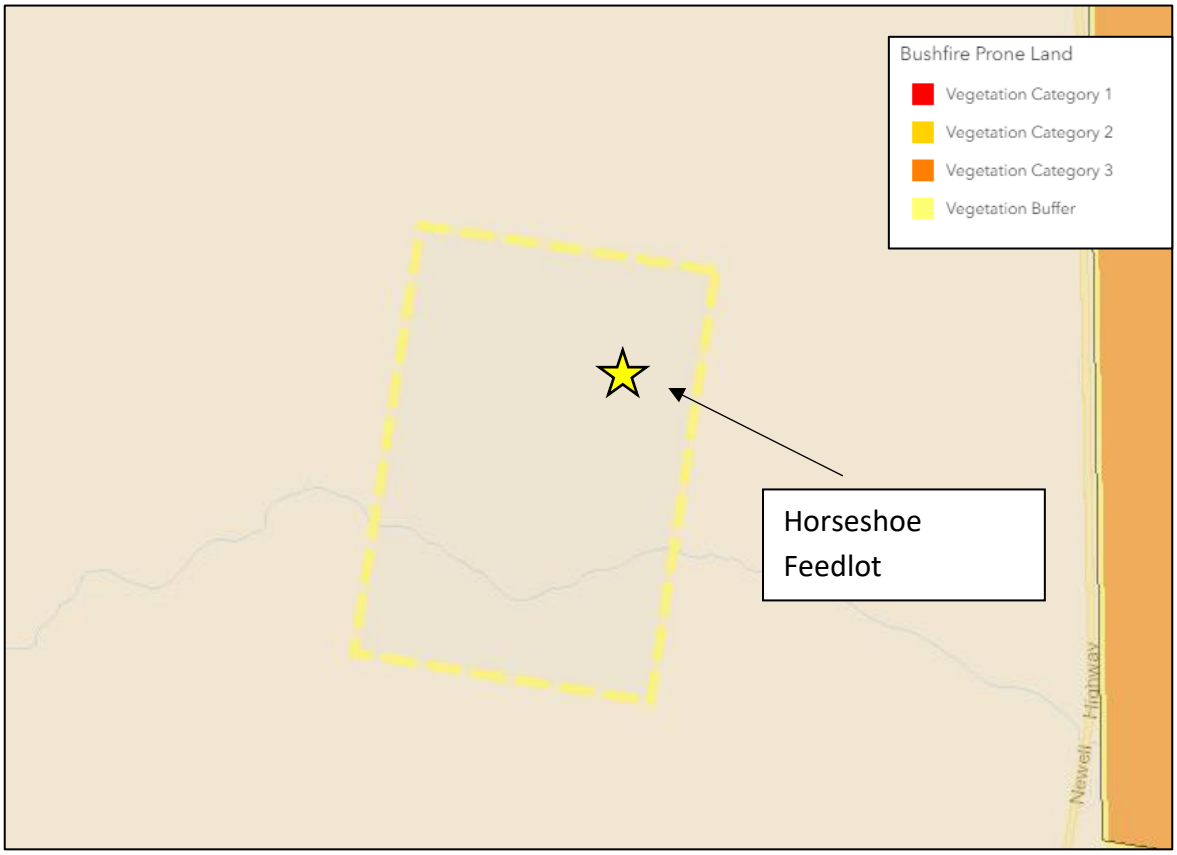

Figure 12: Bushfire Prone Land within Lot 29/DP753941 and in the Vicinity of the Proposal

4.5.5 Earthworks

Part 6, Clause 6.1 of the LEP deals with development requiring earthworks. The objective of this clause is to ensure that earthworks for which development consent is required will not have a detrimental impact on environmental functions and processes, neighboring uses, cultural or heritage items or features of the surrounding land. Development consent is required for earthworks unless:

a) the earthworks are exempt development under this Plan or another applicable environmental planning instrument, or
b) the earthworks are ancillary to development that is permitted without consent under this Plan or to development for which development consent has been given.

Before granting development consent for earthworks (or for development involving ancillary earthworks), the consent authority must consider the following matters:

a) the likely disruption of, or any detrimental effect on, drainage patterns and soil stability in the locality of the development,
b) the effect of the proposed development on the likely future use or redevelopment of the land,
c) the quality of the fill or the soil to be excavated, or both,

d) the effect of the proposed development on the existing and likely amenity of adjoining properties,
e) the source of any fill material and the destination of any excavated material,
f) the likelihood of disturbing relics,
g) the proximity to, and potential for adverse impacts on any watercourse drinking water catchment or environmentally sensitive area,
h) Any appropriate measures proposed to avoid, minimise or mitigate of the development.

Ancillary earthworks will be required for construction of the proposed drainage system and sediment and effluent ponds to achieve appropriate design standards. The natural pen slope is approximately 3%, which is considered ideal, therefore no earthworks will be carried out within the proposed feedlot pens. Earthworks will mostly be carried out on an existing cleared areas of land which are bare of vegetation, and will therefore not have a detrimental impact on environmental functions and processes, neighboring uses, cultural or heritage items or features of the surrounding land.

4.6 Development Control Plan

No Development Control Plan is applicable within Narrabri Shire Local Government Area.

4.7 Section 7.11 Development Contribution Plan

The 'Narrabri Shire Section 7.11 Contributions Plan 2016' is relevant to this proposal. This plan was developed to ensure the operation of traffic generating development does not adversely impact on local roads and allow Council to assess the demand for road maintenance, repair and reconstruction arising from traffic generating development. Section 7.11 (previously Section 94) of the *Environmental Planning and Assessment Act, 1979* enables Council to levy contributions from developers for the provision of public amenities and services required as a consequence of development.

The proposed development entails the construction of a Feedlot. This is considered a traffic generating development under the Section 7.11 Development Contribution Plan for Narrabri Shire. Under the provisions of the *Environmental Planning and Assessment Act, 1979,* Council may include a condition of consent that details the following:

- Require land to be dedicated free of cost;
- Require money to be contributed for works and facilities to be provided in the future;
- Require money to be contributed towards the cost of works in kind, in satisfaction of Section 7.11 requirements; or
- Require or accept a combination of any of the above.

It is expected that contribution payments may be required as a result of this proposal for works and maintenance as a traffic generating development. It is noted that in applying Section 7.11 contributions the Council must be fair and reasonable, and as such the contributions levied on development within the Narrabri Shire are limited to essential or baseline works.

4.8 Development Application and Licence Requirements

4.8.1 Development Assessment

Under the *Environmental Planning and Assessment Act 1979*, local Councils / Shires prepare Local Environmental Plans (LEPs) that specify planning controls for specific parcels of land. The subject land is zoned RU1 - Primary Production. The operation of a cattle feedlot in RU1 represents a permissible land use of Intensive Livestock Agriculture. Consent from the Narrabri Shire Council is required to develop the proposed 999 head cattle feedlot.

4.8.2 Licences Required

The proposed development is for a 999 head cattle feedlot. Once development approval is given by the consent authority, Narrabri Shire Council, no other licences are required.

The Proponent intends to seek accreditation with the AUS-MEAT Accreditation Scheme. This accreditation scheme is a non-government accreditation and therefore does not trigger the provisions of integrated development.

5 Description of Site

5.1 Meteorological and Climatic Data

Horseshoe Station is situated in northern NSW at an elevation of approximately 230m ASL. The climate is best described as temperate.

Rainfall data is based on Bureau of Meteorology (BOM) information for Narrabri West Post Office Station (Station No. 053030), which is the closest recording station to the property with comprehensive rainfall datasets (from 1891-2018).

Table 8: Narrabri Rainfall Statistics (Station No. 053030, Dataset from 1891-2018)

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	82.9	61.1	60.0	38.1	46.7	49.0	45.2	39.9	40.8	51.4	60.3	75.7	658.5
Lowest	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	2.9	297.8
10th %ile	10.2	8.8	2.8	0.0	1.3	12.8	6.4	3.5	3.3	9.8	8.3	18.2	466.3
Median	60.2	48.4	47.1	20.2	32.8	39.6	38.0	31.6	30.5	48.7	59.4	62.7	661.2
90th %ile	210.4	140.2	137.8	87.5	105.1	92.2	92.2	94.1	96.6	97.6	112.2	155.8	899.2
Highest	307.0	220.0	227.6	210.6	196.4	240.6	159.6	159.9	141.6	211.1	204.3	284.2	1012.1

Rainfall in the area is variable with monthly averages ranging from approximately 38mm in winter to 83mm in summer. The wettest months of the year are November to February. Based on an annual average evaporation of approximately 2,000mm (Figure 13) and an annual average rainfall of 658mm, the site generally has a moisture deficit on an annualised basis of >1,300mm.

Temperature data was also sourced from Narrabri West Post Office Station, which is the closest recording site to the feedlot with comprehensive temperature datasets (1962-2002). Overall, the site has the potential to experience considerable climate variability, with summer average maximum temperatures over 33°C and with maximum recorded temperatures above 43°C, through to winter average minimum temperatures around 4°C, with temperatures below -5°C being recorded.

Table 9: Climate statistics for Narrabri (Station No. 053030, Dataset 1962-2002)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean max temp (°C)	33.8	33.2	31.2	27.3	22.5	18.7	18.0	19.8	23.4	27.1	30.1	33.0
Mean min temp (°C)	19.3	19.1	16.4	11.9	8.3	5.2	3.7	4.6	7.6	11.7	14.8	17.7
Highest recorded temperature (°C)	43.4	42.3	40.6	37.2	31.3	26.9	26.7	32.1	36.6	40.7	43.0	43.3
Lowest recorded temperature (°C)	10.6	7.8	5.6	0.7	-2.2	-5.6	-4.4	-3.9	-1.7	-0.6	3.9	6.0

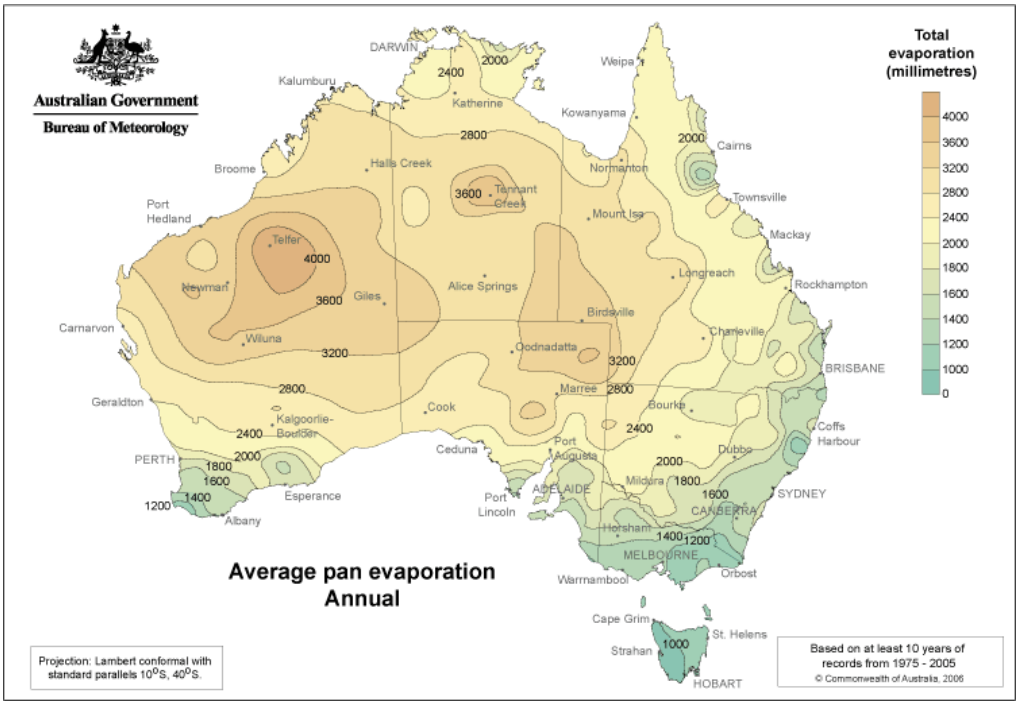

Figure 13: Annual Average Evaporation in Australia

Wind data was sourced from BOM information available for Narrabri West Post Office Station (Station No. 053030). The average wind speed and direction for the area varies according to the season and time of day. Annual average wind data is depicted in Figure 14.

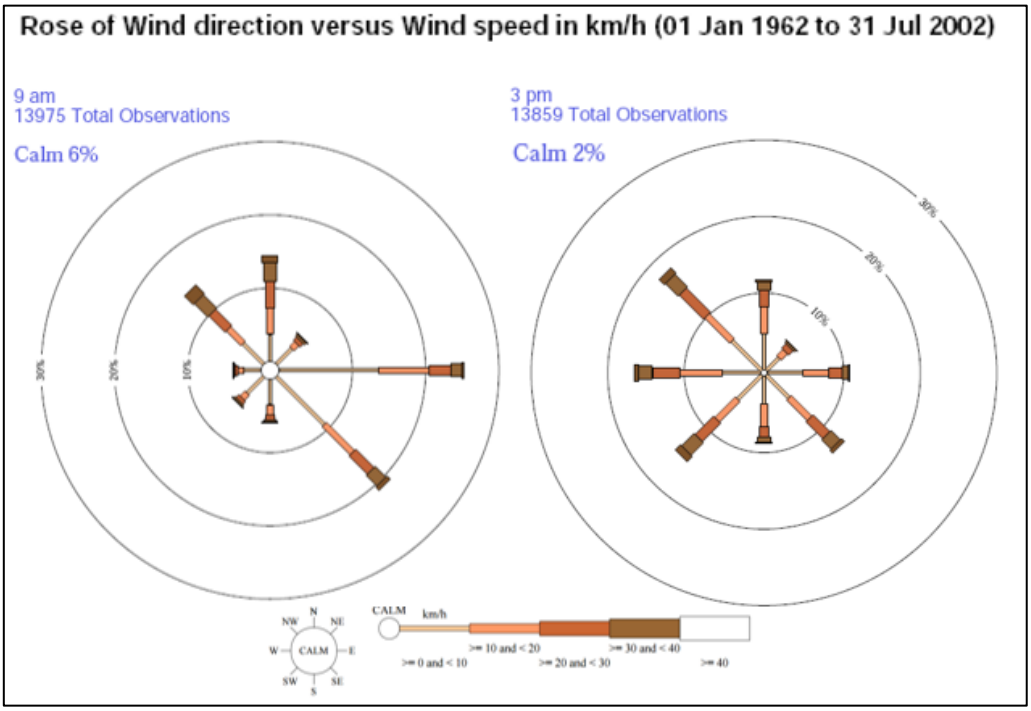

Figure 24: Wind Roses for Narrabri West Post Office. Source: BoM Data 1962-2002

5.1.1 Design Storm IFD Data

The Bureau of Meteorology website provided Rainfall Intensity-Frequency-Duration (IFD) data for storm events at the proposed development site. A 1 in 20-year storm event with a 24-hour duration produces 122mm of rainfall in total. A 1 in 100-year storm event with a 1-hour storm duration produces 64.7mm of rainfall.

5.2 Geology and Topography

The property is located on an ironstone ridge approximately 43km south of the township of Moree. The subject site is located north of Tookey creek. The site is located at approximately 230m ASL, on gently sloping south-facing terrain with an average gradient of 1.9%. The site is not mapped as flood prone land on the NSW Planning Portal (OEH 2019).

Geological mapping of the region surrounding the subject site has been accessed using the NSW Department of Planning and Environment (Resources and Geoscience) online mapping tool. The online mapping tool presents a 1:250,000 scale geological map that has been compiled from numerous geological maps and regional geological synthesis datasets from the Geological Survey of NSW and Geoscience Australia. The map represents a simplified, generalised description of geological characteristics of New South Wales. From this, the geology of the region surrounding the proposed development site is outlined in Figure 15. Table 10 provides a description of the geological formations present within the area. Survey results indicate that the subject site is located atop of poorly sorted colluvium from the quaternary period (mapped as Cz_c in Figure 15). This is a very localised rock unit with a limited distribution in the region.

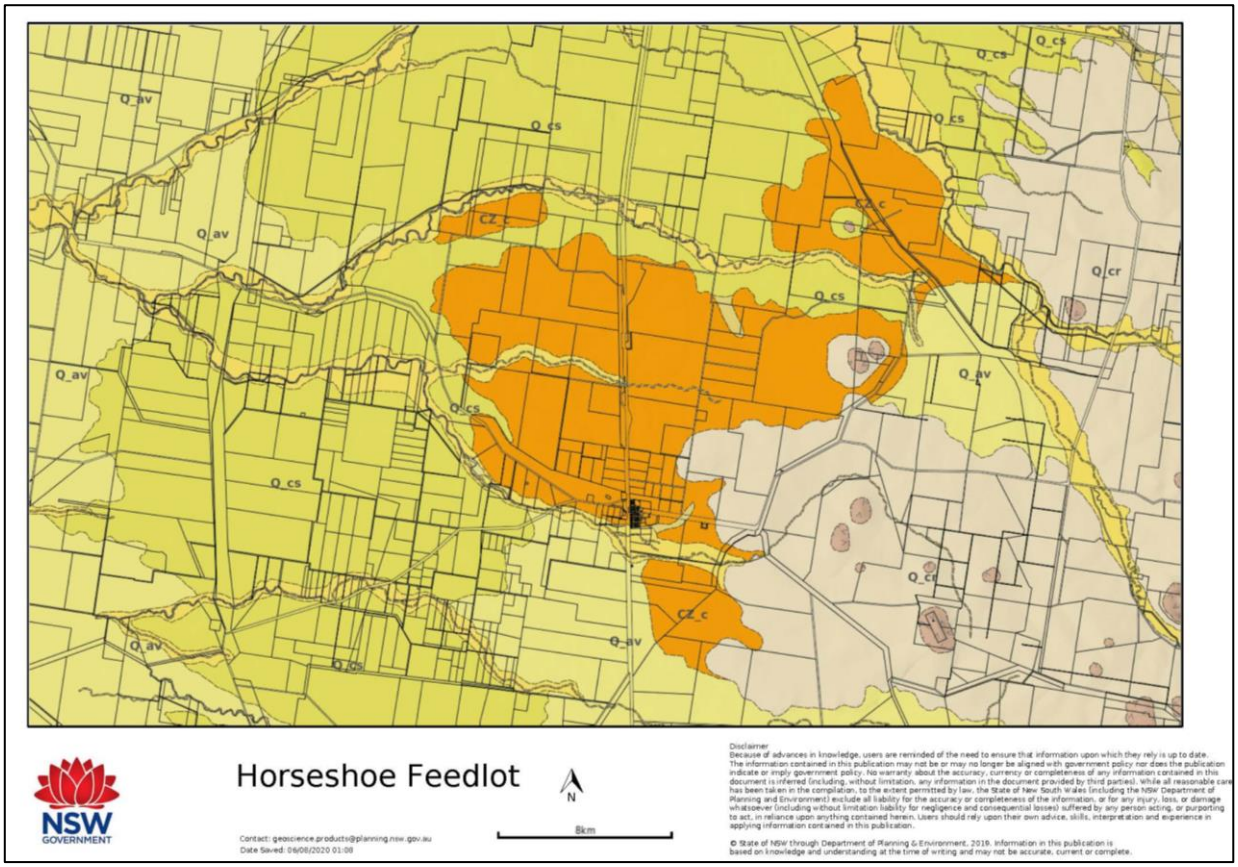

Figure 15: Geology of Locality (Source: MinView, 2020).

Table 10: Legend for Figure 14

Abbreviation	Name	Age	Description
CZ_c	Colluvium	Quaternary	Poorly sorted, weakly cemented to unconsolidated colluvial lenses of polymictic conglomerate with medium-to very coarse-grained sand matrix. Interspersed with unconsolidated clayey and silty sand layers, variously modified by pedogenesis.
Q_cs	Colluvial sheetwash	Quaternary	Unconsolidated surficial lag deposits of rounded to sub-angular pebble- to cobble-sized (usually) polymictic clasts derived from underlying or adjacent upslope parent material; surficial sheet flow removes fine-grained material.
Q_av	Alluvial valley deposits	Quaternary	Silt, clay, (fluvially deposited) lithic to quartz-lithic sand, gravel.
Q_cr	Colluvial and residual deposits	Quaternary	Undifferentiated colluvial and residual deposits.
Q_m_m	Marra Creek Formation - meander plain facies	Holocene	Unconsolidated dark to pale grey and pale yellow-grey clayey silt.

Publicly available bore data was examined for groundwater bores in the vicinity of the proposed development (Figure 16; Table 11). Bore logs indicate the locality is characterised by deep clay soils,

underlain by shale bedrock. There are localised water-bearing fractured shale deposits, with groundwater encountered at a minimum depth of 50m below ground level.

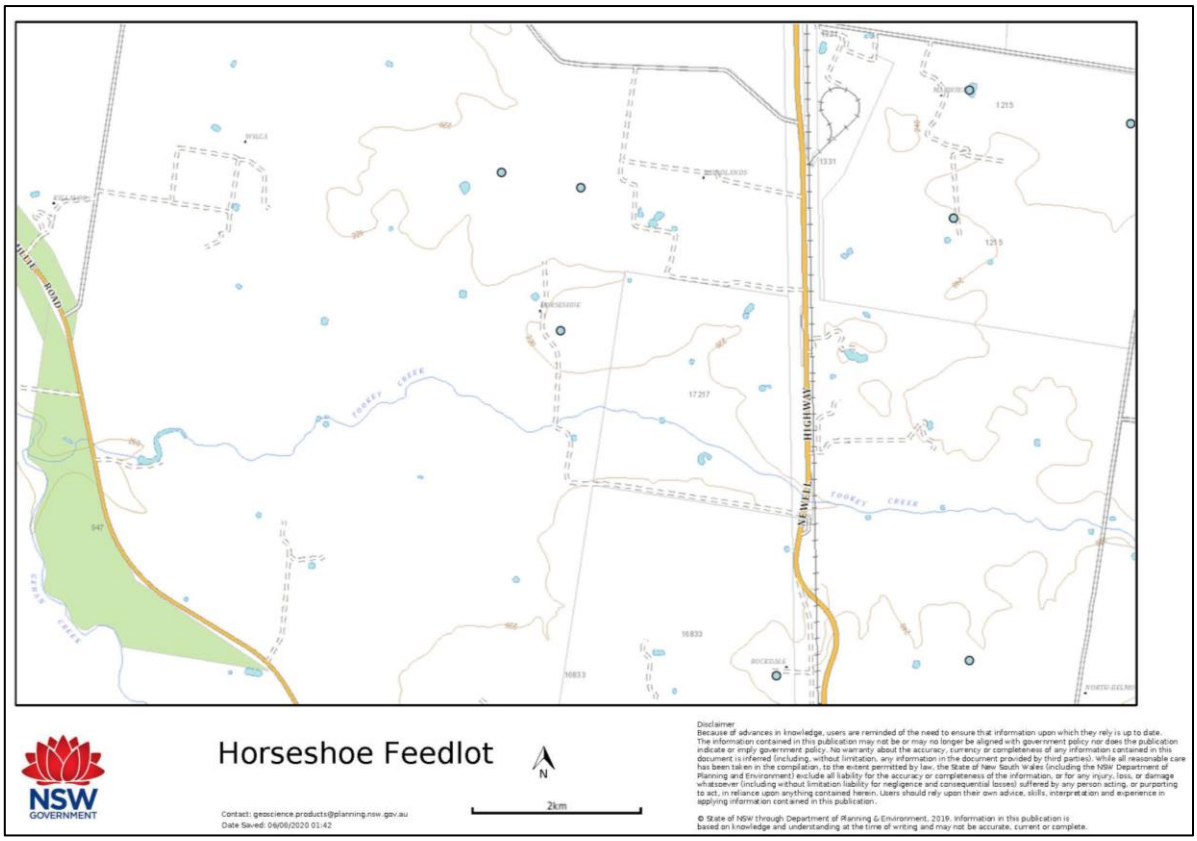

Figure 16: Groundwater Bores Present Near Feedlot Site (MinView 2020)

Table 11: Public Bore Log Data

Bore ID	Depth of Bore (m)	Dominant Soil Texture	Soil Depth (m)	Bedrock	Depth to WBZ *(m)
GW970914 (Horseshoe)	445.50	White Clay	27.00	Shale	429.00
GW001976	N/A	N/A	N/A	N/A	N/A
GW001995	211.53	Clay Gravel	24.38	Shale	373.00
GW013783	108.51	Clay	15.85	Shale	50.20
GW018904	105.76	Sand	24.38	Shale	59.40
GW050783	N/A	N/A	N/A	N/A	N/A
GW010881	299.31	Red Gravelly Soil	25.90	Shale	71.30
GW005517	339.24	Clay	27.43	Shale	273.10

*WBZ = Water Bearing Zone

5.3 Soils

The feedlot site is located on reddish-brown silty clay with gravel and small rock fragments on the surface. Soils are derived from polymictic conglomerate including sandstone. Coarse rock fragments, including quartz and jasper as well as gravel are commonly found on top of, and within, the soil profiles within the region. No rock outcrops are present within the development area. Soils in the fields to be

used for manure spreading are similar to the feedlot soils. Surface soils consist of mostly brown and grey clays considered as productive agricultural soils, which are reported to have low salinity and no sodicity.

The controlled drainage area and sedimentation system will be underlain by a minimum of 300mm of suitable clay or other compactable material to meet the required standards. Once the pond system is ready for final trim work, excavations will be required to check the soil layer beneath the floor of the ponds to ensure that a minimum of 300mm of clay remains in place.

5.4 Land Capability and Biophysical Strategic Agricultural Land

The NSW OEH eSPADE soil and land information mapping has mapped the subject site with the land and soil capability Class 3 – High capability land, as shown in Figure 17. Class 3 Land is defined as 'Land (which) has moderate limitations and is capable of sustaining high-impact land uses, such as cropping with cultivation, using more intensive, readily available and widely accepted management practices. However, careful management of limitations is required for cropping and intensive grazing to avoid land and environmental degradation.'

It is noted that the containment pens were established as temporary drought feeding pens as a result of a lengthy, severe drought in 2018. Due to the existing infrastructure already installed at this location, this is considered the most appropriate location for the establishment of a feedlot.

The subject site is not identified as Biophysical Strategic Agricultural Land (BSAL), as per the NSW's central resource for Sharing and Enabling Data (SEED data portal).

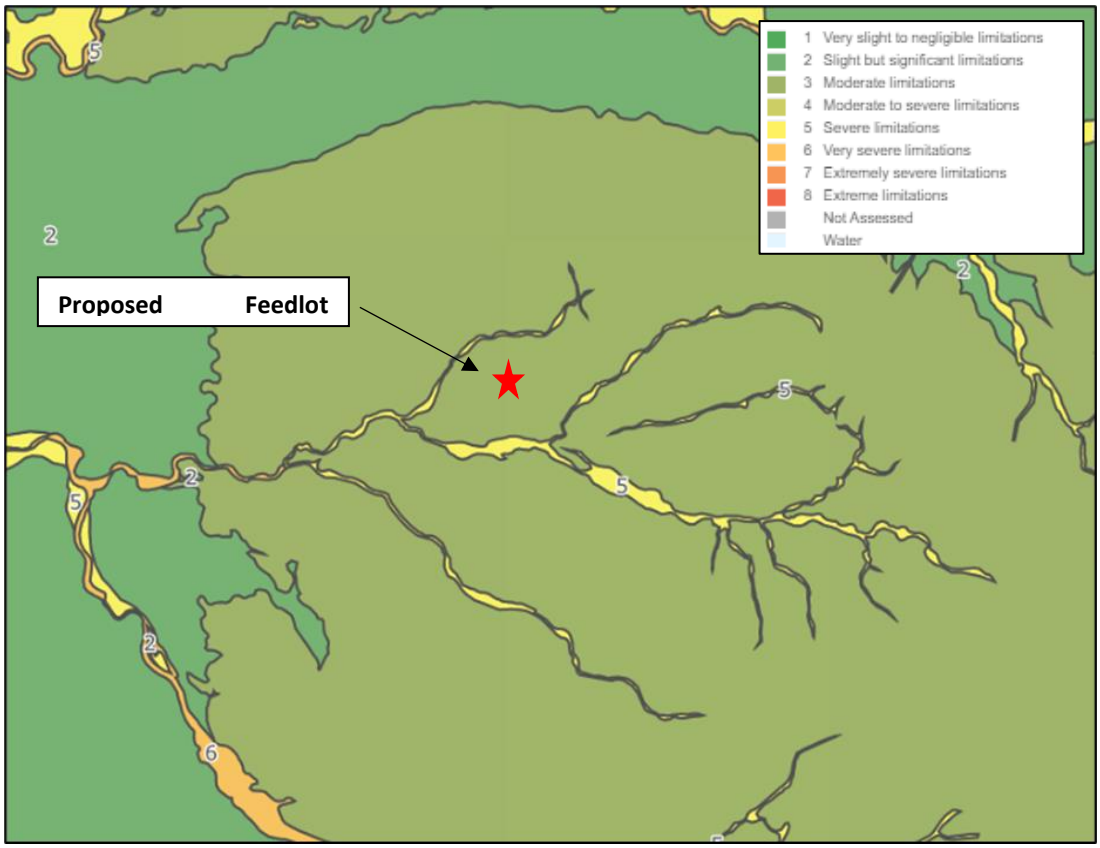

Figure 17: Land Capability Mapping eSPADE (NSW OEH 2020)

5.5 Site Hydrology and Water Quality

5.5.1 Surface Water

The closest surface waterbody is an ephemeral first order stream located approximately 500m west of the proposed feedlot pen location. A small network of streams is also located to the north-east of the proposed development site. These form a second order stream on which a farm dam has been constructed approximately 370m of the proposed feedlot pen. This is a harvestable rights dam which will be used as a water supply source to provide drinking water for cattle within the feedlot pens.

The site is also located approximately 6 kilometres north-west of the source of Tookey Creek, in the central section of the Gwydir River catchment. Tookey Creek is an ephemeral stream, which traverses Lot 29/DP753941 in an east-west direction approximately 700m south of the proposed development site. Tookey Creek merges with Gehan Creek approximately 5 kilometres west of the property. Gehan Creek then forms a confluence with Waterloo Creek, which terminates in a small floodplain wetland approximately 43 kilometres west-north-west of the proposal site.

The feedlot site will be located within a controlled drainage area, which will capture surface water runoff from the feedlot site and divert clean surface water from the surrounding environment away from the feedlot. This is considered to protect surface water quality within the region, by minimising

the risk of runoff of surface water containing high nutrient loads from the feedlot into natural waterways.

NSW Feedlot Guidelines provides the following statement in relation to watercourses and the location of feedlots and related feedlotting activity:
"The location of pens and associated infrastructure, manure stockpiles, sedimentation basins and holding ponds should not be in flood prone areas unless adequate safeguards are incorporated. Special provisions may be required where effluent and manure utilisation areas and terminal ponds are located within flood prone areas. A reasonable buffer should be provided between the feedlot complex (including effluent and manure utilisation areas) and streams, rivers and other water courses. The separation distance chosen should be a function of the intervening topography, other site-specific factors and the management practices employed by the feedlot operation."

The provisions included in the design of Horseshoe feedlot have included designing the effluent storage system for a 90-percentile wet year and utilisation of the effluent on a 10 Ha irrigation area. An additional 10 Ha is available to apply the effluent in a period of frequent runoff events. Such periods would result in high soil moisture levels and enable the proponent to grow a more extended area of forage type crops for harvest and storage for the feedlot ration. The availability of (a minimum of) twice the irrigation area provides a safeguard to avoid any loss of effluent from bywash events.

The calculation for a design 24-hour rainfall event identifies a pond capacity of 0.82 ML. The holding pond capacity for the annual water balance requires a pond capacity of 4.22 ML. On this basis, the potential for an intense rainfall event to cause an overflow of the pond presents a low risk.

A 50m buffer will be maintained between manure and effluent utilisation areas and surface watercourses including Tookey Creek. The proposed feedlot development is located on a ridge and is therefore considered flood free. Ponds will be sealed with a clay that meets the minimum permeability requirement of 1 x 10^{-9} m/s and therefore it is considered unlikely that seepage would occur from the pond to the creek.

These design provisions are considered sufficient to avoid contamination of the adjoining Tookey Creek.

5.5.2 Groundwater

The site is located atop of porous rock aquifers, within the Gunnedah Oxley Basin within the Gwydir Water Management Area.

The Gunnedah-Oxley Basin MDB Groundwater Source extends over an outcrop area of 1,128,000 Ha and a subcrop area of 2,860,000 Ha. It is covered by the *Water Sharing Plan for the NSW Murray Darling Basin Porous Rock Groundwater Sources* (*2011*). The NSW Murray Darling Basin (MDB) porous rock groundwater sources are located within the NSW portion of the MDB. In general, the plan area includes

all porous rock groundwater sources that are not included in other water sharing plans. Total average annual recharge within the Gunnedah-Oxley Basin MDB Groundwater Source is estimated at 414,558 ML with 214,665 ML (just over 50%) protected for environmental use and 199,893 ML defined as the long-term average annual extraction limit. The level of connection between surface and groundwater is considered to be low to moderate in the Gunnedah-Oxley MDB and the travel time between surface and groundwater is estimated to be years to decades.

As discussed above, publicly available bore data was examined for groundwater bores in the vicinity of the proposed development. Bore logs indicate spatial variation depth to water bearing zones, with a minimum depth of 59m below ground level. Water bearing zones were encountered within porous bedrock. A bore (GW970914) located on the property 'Horseshoe' did not encounter water until a depth of 429m. It is therefore considered unlikely that effluent generated by the proposed feedlot would enter porous rock aquifers in the area.

Groundwater dependent ecosystems (GDE's) are defined as ecosystems which have their species composition and their natural ecological processes determined by groundwater (ARMCANZ & ANZECC, 1996). The Bureau of Meteorology's Atlas of Groundwater Dependent Ecosystems was also searched to identify ecosystems near the proposed development with potential for groundwater interaction. The Atlas identified the Gehan Creek, which is in part fed by Tookey Creek, as having moderate potential for groundwater interaction (based on national assessment) (Figure 18). The Bimble Box woodland to the east of the feedlot is assessed as having low potential for groundwater connectivity (based on regional assessment) (Figure 19).

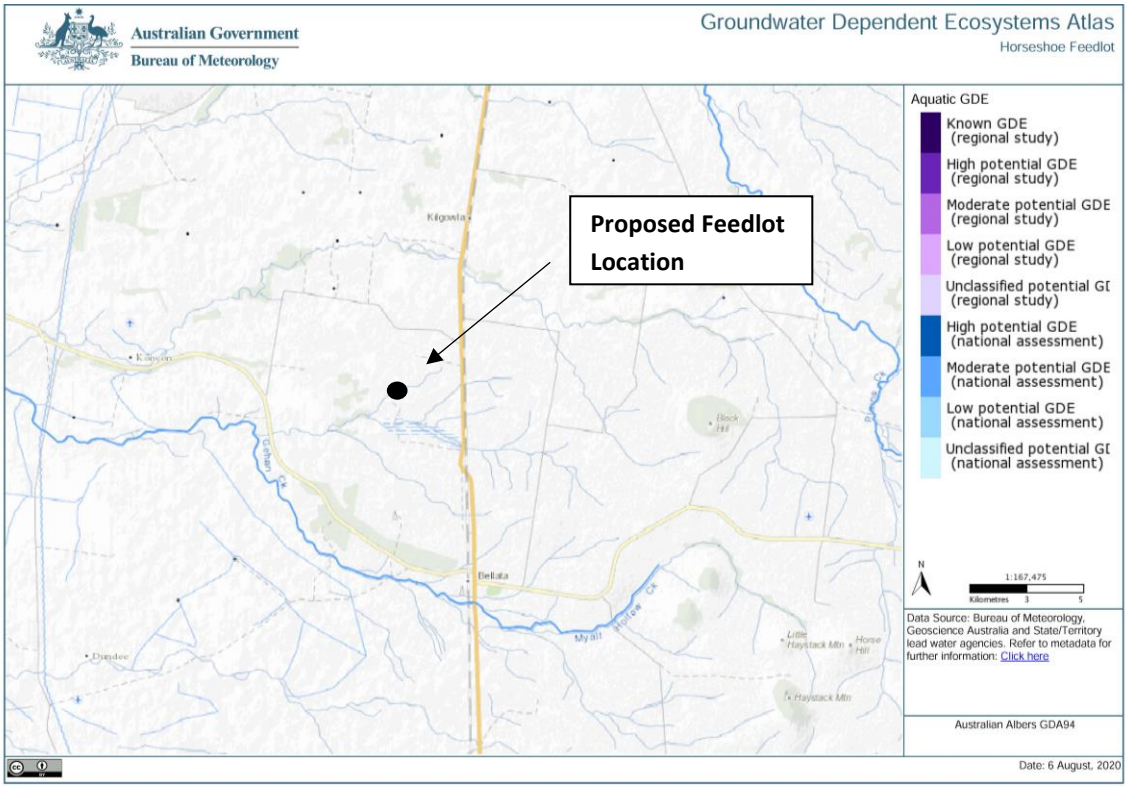

Figure 38: Groundwater Dependent Ecosystems Atlas – Aquatic

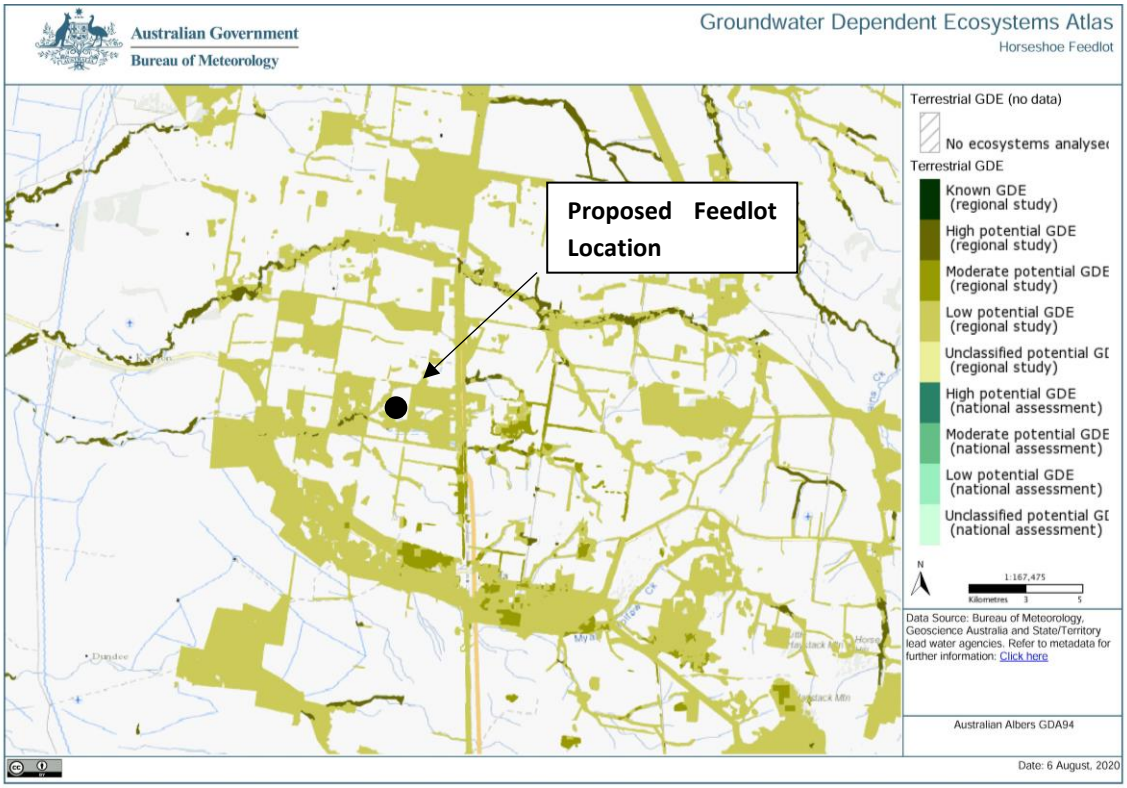

Figure 49: Groundwater Dependent Ecosystems Atlas – Terrestrial

5.6 Noise

The background sound level in rural areas is characteristically low, and often variable. Typically, ambient levels are in the range of 25 to 45 dBA. However, seasonal factors, both natural (e.g. cicada, frog or bird activity) and anthropogenic (e.g. harvesting, pesticide spraying, or other seasonal farming operations) may ordinarily produce higher background levels. In contrast, factors such as night-time inversion layers and low wind speeds, which may be more pronounced in rural areas, may also act to increase propagation or decrease attenuation in these areas.

Development of the feedlot will include use of existing equipment that is currently being used to drought feed cattle. This includes a tractor and a small milling system. The other source of noise will involve several trucks per week. This is considered similar to existing truck movements and therefore minimal additional truck noise would be generated.

In view that no additional significant noise emissions are anticipated, the potential for additional noise impact for the site is considered minimal. If noise is generated, it would be of short duration and usually involve equipment that is already operated on this site. The closest receptor is a rural dwelling ('Woodlands') situated 2,260m north-east of the proposal site.

5.7 Fauna and Flora

5.7.1 Flora

The proposed feedlot site is located on a ridge which naturally supports open Bimble-Box woodland with an understorey of Wilga. The feedlot has been sited in an area which has been utilised for temporary containment and drought feeding of cattle since 2018. Fencing infrastructure and feed bunks have been installed to facilitate drought feeding. The deposition of cattle manure and urine over recent years has resulted in the severe decline and/or death of the trees and shrubs within the feedlot pens. Approximately 20% of Bimble Box trees are still alive but will die within a short time-frame. The only ground cover species noted within the pens was Common Mallow (*Malva neglecta*). Many of the trees within the pens have follows of varying sizes and up to approximately 20cm.

The proposed sediment and effluent ponds are sited within an area of dry cropland, which contained Forage Sorghum (*Sorghum bicolor*) stubble at the time of inspection. The Controlled Drainage Area (CDA) to the east of the proposed feedlot pens will extend into neighbouring temporary containment pens which have for the most part been cleared of native vegetation. The construction of the cattle laneway and earthen bank to define the CDA at this location will result in the limited clearing (maximum of 5) of living and dead standing immature trees.

The feedlot surrounds are dominated by cleared cultivated land. A fragmented patch of Bimble Box open woodland occurs adjacent to and north/east of the proposed feedlot pens, extending over approximately 3 Ha.

The community composition of this open woodland is consistent with 'PCT 56 – Poplar Box – Belah woodland on clay-loam soils on alluvial plains in north-central NSW'. The canopy layer is dominated by Bimble Box/Poplar Box (*Eucalyptus populnea*) with occasional White Cypress Pine (*Callitris glaucophylla*). No Belah (*Casuarina cristata*) was present within this patch, however Belah is present in combination with these two species throughout the remainder of the property. A sparse shrub layer was heavily dominated by Wilga (*Geijera parviflora*), with Warrior Bush (*Apophyllum anomalum*) recorded as rare. The groundcover layer was mid-dense with identified grass species including Stinkgrass (*Eragrostis cillianensis*), Rough spear grass (*Austrostipa scabra*), Curly Windmill-grass (*Enteropogon acicularis*). The chenopod species Climbing Saltbush (*Einadia nutans*) and Galvanised Burr (*Sclerolaena birchii*) were recorded as rare and occasional, respectively. Identified forbs include Common Mallow, Native Geranium (*Geranium solanderi*), Black Nightshade (*Solanum nigrum*), Field Mustard (*Brassica rapa*), Common Purslane (*Portulaca oleracea*), New Zealand Spinach (*Tetragonia tetragonoides*), and Paddy Melon (*Cucumis myriocarpus*). Weeds identified onsite include Mexican Poppy (*Argemone mexicana*) and Common Prickly Pear (*Opuntia stricta*) which is recorded as rare in the study area. It is noted that Common Prickly Pear is listed as a Weed of National Significance (WoNS). No Endangered Ecological Community (EEC) was recorded within or adjacent to the subject site.

The proposed feedlot will be located on land which been severely degraded by agricultural activities. The footprint of the proposed pens is dominated by dead standing trees and shrubs as a result of existing pens and the history of opportunity feeding at this location, whereas the sediment and effluent ponds are sited on land which is cultivated and currently supports crop stubble. The proposed works will result in the clearing of approximately four trees to facilitate the installation of drains west of the proposed feedlot. No other clearing will take place.

In its current disturbed state, the proposal site does not constitute important habitat for identified species. The study area contains a mixture of similar and higher quality habitat, i.e. cultivated land and areas of healthy open woodland. At the regional scale, extensive areas of remnant vegetation, are located to the south and west of the study area. These areas of remnant vegetation, in addition to water-based habitat associated with creeks in the locality, are likely to serve as significant remnant vegetation for a variety of threatened species and are considered the preferred habitat for vulnerable species over the study area.

Figures 20-22 show the habitat present within and around the proposed development. Overall, the potential impact of the proposed development upon native flora and fauna is considered minimal. Detailed assessments of potential impacts are presented in Appendix 3 and Appendix 4.

Figure 20: Dead Standing Trees within Proposed Feedlot Pen No. 2

Figure 21: Proposed Pen 5 Expansion Area (with Feed Bunks Showing New Pen Boundary)

Figure 22: Existing Bimble Box Woodland East of the Proposed Development

5.7.2 Fauna

A number of commonly occurring bird species were observed during the site assessment, including Galah (*Eolophus roseicapilla*), Red-rumped parrot (*Psephotus haematonotus*), corvids and pigeons. No other species or signs of mammal use were recorded during the site assessment.

6 Environmental Considerations

6.1 Land Use Conflict

The proposed development is consistent with the zoning for the lot. Horseshoe is in a rural zoned part of the Narrabri Shire and is surrounded by grazing and cultivation properties. It is therefore considered that the risk of land use conflict is minimal.

6.1.1 Neighbouring development

The surrounding area is zoned as RU1 and therefore the potential for additional subdivision and construction of additional residences is considered limited. The region is predominantly utilised for agriculture including crop production and beef cattle production.

6.1.2 Proximity to Receptors

The general principle adopted for selection of the feedlot site is summarised in the following excerpt*: Feedlots should be sited so as not to cause unreasonable interference with the comfortable enjoyment of life and property off-site or with off-site commercial activity* (ARMCANZ, 1997). Accordingly, feedlots should be separated from sensitive receptors by a sufficient distance to limit any adverse impacts resulting from odour, dust, noise or aesthetic considerations to an acceptable level.

Figure 23 presents an aerial image locating the closest individual receptors to the Feedlot complex. Table 12 outlines the available separation distances between the identified receptors and the proposed feedlot.

The closest receptor is a rural secondary residence which is separated from the proposed development site by cleared cropland, with a small patches of open woodland. The proposed development allows for a separation distance of approximately 2,260 metres to the nearest receptor.

The closest village to the proposed development (Bellata) is located over 6.5 km from the feedlot site. It is therefore considered that the development will not impact upon any townships with regards to local amenity.

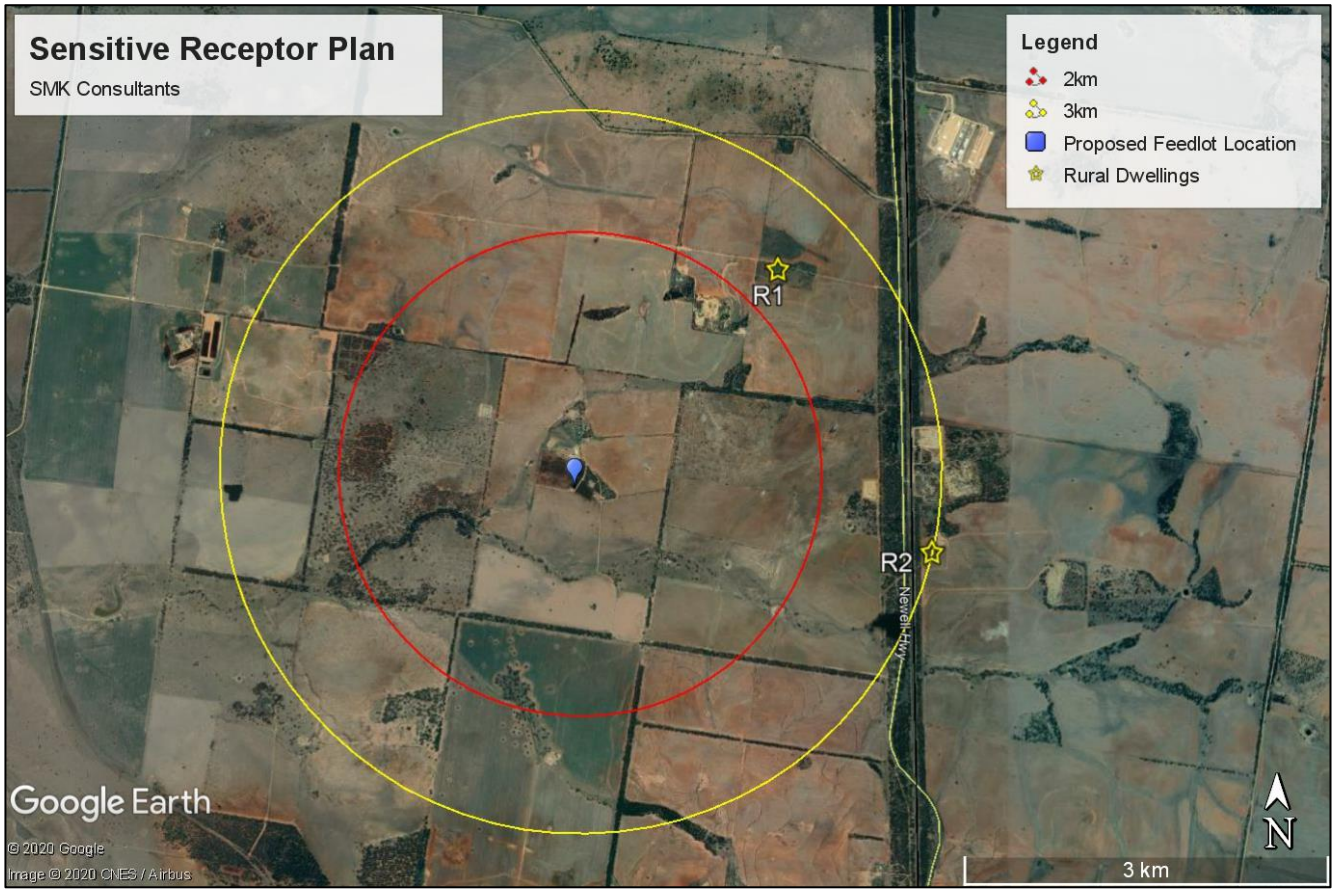

Figure 23: Closest Identified Sensitive Receptors

Table 12: Available Separation Distances to Sensitive Receptors from the Proposed Feedlot

Receptor	Receptor Type	Direction	Distance (m)
Woodlands	Rural Dwelling	NE	2,260
N/A	Rural Dwelling	ESE	2,870

A Level 1 Odour Assessment has been prepared for the proposed development and is included as Appendix 6. The assessment concludes that the feedlot site is adequately separated from the closest receptors to prevent adverse odour, dust and noise impacts from the operation of the feedlot, if management standards are consistent with the recommendations.

6.2 Visual Amenity

Due to the distance of the feedlot from nearby roads and retained trees on the property and its surroundings, the proposed feedlot will be hidden from view. The feedlot will not be visible from any roads, villages or townships.

6.3 Natural Hazards

The land is not subject to geological hazard such as volcanism, earthquake, or soil instability such as subsidence slip or mass movement.

6.3.1 Flood Liability

The subject site lies within approximately 500m of Tookey Creek, an ephemeral stream, at its closest point. It is situated on sloping ground at an elevation ranging from 223m-232m ASL, approximately 10-20m above that of the banks of Tookey Creek (212m). The proposed feedlot is sited on the crest of an ironstone ridge and is therefore not subject to local run-off. The Proponent's family have occupied the property for several generations and have indicated that the site is flood free. In the absence of detailed flood mapping, local historical observations are considered acceptable in determining potential flood height and the site is thus considered flood-free.

6.3.2 Bushfire Hazard

The NSW Planning and Environment Property Report tool has not identified the subject site or any section of the property as Bushfire Prone Land. The closest area identified as Bushfire Prone Land (Vegetation Category 2) is a patch of remnant vegetation approximately 2 kilometres to the east of the proposed development and east of Newell Highway.

The subject site supports dead standing trees and is located west of and adjacent to a small disjunct area of open woodland. Extensive areas of cleared, agricultural cropping land extend beyond this area of woodland and in all other directions from the proposed Feedlot. The risk of bushfire within the subject site is therefore considered minimal. No further assessment is required under Section 4.14 of the EP&A Act or in accordance with Planning for Bush Fire Protection 2019 (PBP).

6.3.3 Land Management

Some land areas will be assigned to a controlled drainage area for the feedlot complex. This land will be substantially modified with topsoils and subsoils being stripped from them and the areas made impervious to water. Wastewater will either be primarily disposed of via evaporation with a minor amount being utilised for irrigation on the property. Grassed embankments should be constructed to hold the structure firm and alleviate erosion issues as required.

6.4 Water Resources

6.4.1 Surface Water

Contamination of surface water may lead to toxic effects on the aquatic and riparian ecosystems downstream. This means that water quality should be maintained at a healthy level as much as possible upstream.

During construction, soil erosion is a risk once topsoil and / or groundcover is removed. Eroded soil poses a risk to surface waters (turbidity and nutrients). To overcome this risk, construction contractors will need to submit appropriate construction management plans to the Proponent to ensure that site runoff is managed during the earthworks phase.

During operations of the feedlot, the main potential source of surface water contamination is likely to be from offsite runoff during high rainfall events in the wet season, as the nearest creek is located downhill of the feedlot site. The risk of this runoff occurring will be mitigated by constructing a Controlled Drainage Area (CDA) around the feedlot site to capture polluted runoff.

Once the operation phase begins, the water from the CDA will enter the drainage system due to the design and topography of the site. Rainfall runoff will flow out of the back of the pens into a catch drain. The drain will be designed to carry the effluent to an effluent pond. The proposed pond system has been designed in accordance with guidelines for feedlots in NSW and Australia.

Due to the capacity of the drainage system, it is unlikely that the site will have an impact on surface water quality during operation, except if annual rainfall exceeds a 90th percentile rainfall year. This process would ensure that any such releases would occur when appropriate dilution of the wastes can occur and no concentrated waste enters local watercourse systems.

The following key points form the basic mitigation measures aimed at avoiding potential contamination of surface waters outside of the CDA:

- The proposed development of the feedlot complex is not located in a flood prone area - - the feedlot complex is sited on a flood free location.
- The proposed feedlot complex is to be enclosed within a CDA with appropriate diversion banks installed to divert clean water away from the Feedlot site.
- The storage of feedlot by-products is to be undertaken in accordance with appropriate management actions to avoid surface runoff of effluent;
- The reuse of effluent will occur within sustainable limits on site. Excess effluent will be disposed of via evaporation and irrigation. Manure will be re-use on the property at sustainable rates;
- Recommended buffer zones around native vegetation and stream areas are to be maintained; and
- The storage and use of hazardous and dangerous materials are to occur in accordance with relevant legislation to ensure spillages are contained.

The effluent pond has been sized for irrigation application on a 10 Ha area, but an additional 10 Ha, at a minimum, is available if the volume of water collected in the pond cannot be fully applied on the 10 Ha due to ongoing rainfall. This additional area of irrigation is included as a precautionary measure to minimise the potential for the effluent pond to bywash and enter the Tookey creek system near the feedlot.

6.4.2 Groundwater

The potential risk to groundwater from the proposed development would occur as a result of leaching contaminants through the soil to below-ground aquifers. The feedlot is sited on a ridge, and shallow aquifers are uncommon in the surrounding locality with groundwater tables being a minimum of 59m below ground. The subsoil in the area is considered impermeable. Furthermore, the design of the

feedlot includes an impermeable clay lining of pens, manure stockpile pad, sediment basin and holding pond that will decrease the risk of contamination of groundwater via the soil.

The proposed feedlot is unlikely to have any adverse impacts on the quality of groundwater or potential GDE's based on the following:

- The completed feedlot complex is to be located on compacted soil to a minimum depth of 300mm to an impermeability of less than 1 x 10^{-9} m/s.
- Given the small scale of the development and existing impermeable attributes of the clay subsoil, it is unlikely the proposal will have an adverse effect on groundwater recharge.
- Shallow aquifers are uncommon in the locality and typical groundwater tables are a minimum of 59m below ground. The subsoil in the area is considered impermeable. It is therefore considered unlikely that any potentially contaminated seepage could have an effect on the water quality of underlying or adjoining groundwater systems.
- Tookey Creek, located approximately 500m from the subject site, is considered to have a moderate potential for interaction with groundwater. To protect groundwater resources, it is therefore important that contaminated runoff from the feedlot site will not enter the creek. This will be controlled by maintaining the feedlot within a controlled drainage area, to capture runoff from the site and divert clean surface water away from the feedlot.
- The feedlot complex is not sited in a salinity hazard area, nor is the area prone to risk or salinity. The proposed design will minimise the risk of new salinity outbreaks.
- The storage and use of hazardous materials does not pose an unacceptable risk to the pollution of groundwater.

Given the suitability and existing characteristics of the site it is unlikely that the proposed development will have any potential impacts on the surrounding habitat, groundwater levels or connectivity between groundwater sources. Accordingly, there is no potentially significant threat to GDE's within the vicinity of the site.

6.5 Flora and Fauna

The footprint of the proposed feedlot will be located on an area of highly disturbed agricultural land, currently used for opportunity feeding of cattle. There are numerous trees (in poor condition and/or standing dead trees) within the site as the existing pens are sited in an area which was previously open woodland, however these will all be retained. The construction of the cattle laneway and of a bank to create the Controlled Drainage Area will result in the clearance of up to 4 immature trees, which are dead or desiccated as a result of ongoing drought conditions.

Open grassy woodland, dominated by Bimble Box trees with an understorey of Wilga shrubs, is located adjacent to and east of the proposed development. This is in small in size, spatially isolated and in moderate condition. The woodland will not be modified or cleared as part of the proposed works. The remainder of the land surrounding the proposed development consists of cultivated paddocks,

farmyards and temporary containment pens. These areas have low habitat values as they have been subject to considerable disturbance and alteration over time.

The proposed development has the potential to impact upon surrounding environments through the runoff of surface water containing high nutrient/sediment loads into surrounding environments, and surface water/groundwater systems. The proposal incorporates a suite of environmental measures, to protect the surrounding environment from environmental degradation:

- Construction of catch drains as required which will direct clean water around feedlot;
- Construction of a controlled drainage area which will capture all effluent water;
- Manure and effluent to be re-used on site at sustainable rates on existing cropping areas; and
- Construction of feedlot infrastructure on soils of low permeability to minimise the risk of groundwater contamination.

These measures will protect the surrounding environment from environmental degradation. Therefore, the proposed development will not impact upon the environmental values of habitat in the locality of the proposed development.

An 'Assessment of Significance' under the EPBC Act and a 'Test of Significance' under the BC Act have been conducted and are presented in Appendix 3 and Appendix 4, respectively. These assessments consider potential threatened species, populations and ecological communities which may be present within the locality of the development site, and assess the potential impacts of the development upon these species. The results of the assessments are that the development is unlikely to impact upon threatened species/populations/communities.

6.5.1 Weed Management

Weeds will be managed in accordance with the following principles:

- Stabilisation measures must be planned to optimise establishment of a healthy groundcover devoid of weeds.
- All machinery, equipment and vehicles brought onto a property must be free of soil, seed or plant material. All soil and organic matter should be removed, including under the vehicle and in the cabin or trays.

6.6 Cultural Heritage

6.6.1 Aboriginal Cultural Heritage

The proposed development and subject site were assessed in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW, 2010). In order to follow the guidelines, a due diligence assessment process was undertaken. This process involved the following steps:

- AHIMS Register Search – a search of the AHIMS to ascertain if there are any known sites within or adjacent to the subject area;
- Assessment of Landscape – assess the study area for the presence, nature and level of disturbance of landscape features that may contain heritage sites;
- Desktop Assessment and Visual Inspection – Physically inspect the proposed development site for artefacts or signs of aboriginal presence;
- If any aboriginal objects are located, further assessment required in conjunction with an archaeologist and the Local Aboriginal community representatives; and
- If disturbance to the area is considerable and no presence of aboriginal artefacts or other signs, a standard summary of the work is to be prepared and the development can proceed subject to approvals.

A search of the AHIMS was conducted to identify registered (known) Aboriginal sites or declared Aboriginal places within or in the vicinity of the subject area, Lot 29 in Deposited Plan 753941 with a buffer of 1,000 metres. The search revealed zero (0) recorded Aboriginal sites, objects or places to have been recorded for the site. A copy of the search results has been included in Appendix 5.

Given the subject site's distance from permanent water sources, it is unlikely that artefacts such as camp sites or scarred trees would be present in the area. The closest named waterbody is the Tookey Creek, which is a minor creek with intermittent flow. The majority of the trees in the study area are less than 100 years, which would exclude them from an era of roaming indigenous groups. The area would have been subjected to seasonal migration and therefore scattered artefact such as flint could be randomly distributed throughout the locality. Indigenous groups are known to have mined ironstone and other types of stone for the production of tools, however there are no rock outcrops on ridge within the subject site which could have been utilised for surface extraction. Furthermore, there are no signs of below-ground excavation. Traverses across the area that may be disturbed by the proposed development did not identify any objects of aboriginal relics or artefacts. The proposed development site has been subject to extensive disturbance, including trampling by cattle and clearing/ploughing to facilitate crop production). Remnant woodland and natural springs in the locality may contain some artefacts; however, these areas will not be disturbed by the proposed development.

The following presents a summary of the site investigation:

- An AHIMS search did not identify any objects or places of Aboriginal heritage significance within or adjacent to the site;
- Previous agricultural activities would have affected the integrity of any deposit based archaeological sites, if they had been present;
- The area to be impacted by the new development has been subjected to trampling by stock and/or clearing and ploughing;
- No cultural features or artefacts were noted on the development site;
- There are no landscape features which are likely to indicate the presence of Aboriginal objects (i.e. waterways or caves); and

- The potential for this site to contain sites of significance involves random scatters of artefacts that may have been dropped or discarded during hunting expeditions or whilst travelling and remains around the base of older trees. No such artefacts were identified.

The result of this investigation has therefore determined that the likelihood of disturbing sites or objects of aboriginal cultural significance are relatively low on the area identified for the proposed development. It is therefore recommended that the project proceed on the basis that if items or sites of cultural heritage are identified during the work to be undertaken, this work should cease until further investigation is undertaken in accordance with the recommendations of traditional owners. However, appropriate protocols should be adopted on the site. NSW OEH recommend that the following procedure is adopted:

If any Aboriginal object is discovered and/or harmed in, or under the land, while undertaking the proposed development activities, the proponent must:

- *Not further harm the object*
- *Immediately cease all work at the particular location*
- *Secure the area so as to avoid further harm to the Aboriginal object*
- *Notify OEH as soon as possible on 131555, providing any detailed of the Aboriginal object and its location*
- *Not recommence any work at the particular location unless authorised in writing by OEH.*

6.6.2 European Heritage

No non-indigenous heritage items have been found on or near the development site, nor is the subject site listed under the LEP nor other relevant heritage registers.

'Dobikin Homestead', located on the property 'Dobikin' (Lots 22 and 23 in Deposited Plan 753964) to the south of Horseshoe & Stud Park, is listed as an environmental heritage site of local significance (Item No. I009) in the *Narrabri Shire Local Environmental Plan (2012)*. The property, located approximately 5 kilometres south-west of the proposed feedlot site, is owned by the Applicant's family and will not be impacted by the establishment and operation of the proposed development.

6.7 Resources

The Proponent intends to utilise existing water entitlements to obtain the water supply required for the proposed development. Horseshoe & Stud Park has a maximum harvestable right farm dam capacity of 0.06 ML per hectare. The total property area is approximately 1,400 Ha and therefore the property right is in the order of 84 ML. An existing harvestable rights dam to the north of the proposed feedlot has a capacity of 24 ML; this will be utilised as the primary water supply for the feedlot. The feedlot will also utilise electricity and diesel to operate the facility. No other significant resources will be consumed at the site other than agricultural produce.

6.8 By-Product Management

The feedlot will need to manage and store manure, contaminated runoff, and a small number of cattle mortalities. Manure and effluent will be treated as valuable by-products which can be managed and reused in place of inorganic fertilisers in crop production. Manure generated by the feedlot will be stockpiled on site, prior to being used sustainably on cropland within the property. Effluent will be disposed of via irrigation of crops as a valuable source of nutrient. Application will occur by tractor drawn spreaders in addition to a small hand-shift irrigation system. The loss of effluent through evaporation will be minimised where possible. Regular use of effluent will also reduce the potential for accumulation of salinity in the effluent holding pond.

Carcasses will be disposed of via burial in clay-lined pits, within areas of existing open country on Horseshoe. The volume of carcasses requiring disposal from the proposed feedlotting operation is not considered to be significant.

6.9 Air Quality

Feedlots should be sited so as not to cause unreasonable interference with the comfortable enjoyment of life and property off-site or with off-site commercial activity (Armcanz & Anzecc 1997). Accordingly, feedlots should be separated from sensitive receptors by a sufficient distance to limit any adverse impacts resulting from odour, dust, noise or aesthetic considerations to an acceptable level. The existing environment surrounding the proposed feedlot site is a rural landscape with farm residences and agricultural operations.

6.9.1 Odour and Dust

Feedlots can be a source of fugitive odour and dust emissions. Once emitted into the atmosphere the significance of these fugitive emissions depends largely on the atmospheric dispersion and dilution that takes place between the source of the emission and the potential receptor. For coarser particulate emissions, such as feedlot dust, some degree of settling will occur between the source and the receptor. Vegetation screens can be useful in diminishing the impact of both dust and odours. The amount of dispersion, dilution and settling after emission is a function of distance, and this will vary with the prevailing atmospheric stability.

A Level 1 odour assessment was undertaken to determine the potential impact of odour from the proposed 999 head cattle feedlot. The assessment has been included as Appendix 7. The assessment indicated a “pass” in accordance with the relevant legislation. A pass indicates that the potential for the Feedlot’s odour to impact on adjoining landholders is considered acceptable. The Level 1 method shows that the Feedlot site is well separated from the closest receptors to prevent amenity impacts (e.g. odour, dust and noise) from the operation of the Feedlot. This is important in preventing odour nuisance. However, good design, construction and management are to be maintained to the stated standard in order to minimise emissions.

The risk associated with odour impacts is considered sufficiently infrequent to be considered acceptable. This result is mainly attributed to the available buffer distances from the feedlot to the closest residences.

During the construction phase the earthworks will be a potential source of dust emissions. The main sources of dust during operations will be the feedlot pens and associated yards and laneways during periods of dry weather and vehicle movements transporting grain and cattle to / from the feedlot. Additionally, feed preparation, pen maintenance and management of manure stockpiles also have the potential to create dust. Dry emissions can occasionally cause a nuisance for neighbours, particularly during prolonged periods of hot, dry weather.

During construction, the following measures should be implemented to minimise dust:

- A speed limit will be applied to unsealed roads and areas where vehicles will travel onsite and should be sprayed with water as required.;
- Using water trucks to minimise dust from roads and the feedlot site during construction, where necessary;
- During all stages of the development, all disturbed areas, including stockpiles, are to have a maximum C-factor of 0.15 (50 percent groundcover or more) after 20 days; and
- Where possible, only handling moist topsoil (not dry).

Odour and dust from during operation of the Feedlot will be mitigated by:

- Pen cleaning to occur, at minimum, every 13 weeks;
- Frequent, scheduled pen cleaning will ensure the depth of (dry) manure is maintained at 50mm or less;
- Management of pen stocking densities to minimise odour and dust generation (the cattle urine and manure add moisture to the pen floors);
- Manure will only be loaded for transport offsite when wind conditions are favourable;
- Vehicles moving materials off-site will be required to be covered; and
- Setting a low speed limit on Horseshoe to minimise the generation of dust on internal roads;

6.9.2 Noise

6.9.2.1 Acceptable Noise Generation Criteria

The NSW Noise Policy for Industry 2017 (NPI), published by the EPA, provides noise generation guidelines for developers and consent/approval authorities, to enable potential noise impacts to be predicted and mitigated where required.

The guidelines identify the Project Noise Trigger Level (PNTL) for industrial developments. The PNTL is a level that, if exceeded, would indicate a potential noise impact on the community, and so would 'trigger' a management response, such as mitigation of noise generation. The NPI notes that the PNTL is *not* intended for use as a mandatory noise threshold requirement, but rather a planning tool.

The NPI identifies that the PNTL, feasible and reasonable noise mitigation measures, and consideration of residual noise impacts should be used together to assess the noise impact and manage noise from a development site. It is the combination of these elements that is designed to ensure that decision makers determine acceptable noise outcomes.

The NPI presents a methodology for determining PNTL for industrial development. Table 13 provides the NPI minimum Rating Background Level (RBL) for each period of the day, which were adopted for the site.

Table 13: Rating Background Noise Levels

Period	RBL dB(A)
Day	35
Evening	30
Night	30

Note: Day is defined as the period from 7am to 6pm (Monday to Saturday) and 8am to 6pm (Sundays and public holidays). Evening is defined as the period from 6pm to 10pm. Night is defined as the period from 10pm to 7am (Monday to Saturday), and 10pm to 8am (Sundays and public holidays).

Table 14 provides an analysis of both the intrusiveness and amenity noise levels for the purposes of establishing a PNTL for the proposed development.

Table 14: Assessment of PNTL in adjacent receiving environment

Metric	Day dB(A)	Evening dB(A)	Night dB(A)
Rating Background Level	35	30	30
Project Intrusiveness Criteria	40	35	35
Recommended Amenity Level	50	45	40
Project Amenity Level	45	40	35
Project Noise Trigger Level	**40**	**35**	**35**

The PNTL for the project is identified to be 40, 35 and 35 dB (A) for day, evening and night periods respectively. These noise thresholds are considered to provide a guideline for noise levels above which some noise impacts on the community may be experienced. They are not considered to be mandatory thresholds, yet rather noise levels which may 'trigger' a management response.

6.9.2.2 Construction Noise

Typical construction equipment noise levels, displayed in Table 15, have been obtained from:

- AS 2436 – 2010, Guide to noise and vibration control on construction, demolition and maintenance sites.
- BS 5228-1, Code of practice for noise and vibration control on construction and open sites. Noise.
- DEFRA—Department for Environment Food and Rural Affairs (United Kingdom), Update of noise database for prediction of noise on construction and open sites-Phase 3: Noise measurement data for construction plant used on quarries, July 2006.

Table 15: Typical Sound Levels of Construction Plant and Equipment

Plant Description	A-weighted sound power levels L_{wA} dB ref: 10^{-12} W		A-weighted sound pressure levels L_{pA} (mid-point) dB at 10m
	Typical Range	Typical (midpoint)	
Excavator	97-117	107	79
Generator (diesel)	84-113	99	71
Grader	105-115	110	82
Front end Loader (wheeled)	99-111	105	77
Truck (>20 tonne)	107	107	79
Truck (water cart)	106-108	107	79
Vehicle (light commercial e.g. 4WD)	100-111	106	78
Welder	100-110	105	77

The magnitude of off-site noise impacts associated with construction would be dependent upon a number of factors:

- The intensity and location of construction activities
- The type of equipment used
- Existing local noise sources
- Intervening terrain
- The prevailing weather conditions

During any given period, the machinery items to be used in the study area would operate at maximum sound power levels for only brief stages. At other times, the machinery may produce lower sound levels while carrying out activities not requiring full power. It is highly unlikely that all construction equipment would be operating at their maximum sound power levels at any one time and certain types of construction machinery would be present in the study area for only brief periods during construction. Furthermore, all construction and operation of machinery would only occur during work hours and not during the evening or night periods, where sound can be potentially increased as a result of various factors, including inversion layers. Accordingly, the predictions should be considered as conservative estimates.

Noise impacts associated with the project were estimated using the distance attenuation relationship described in the following equation:

$$L_2 = L_1 - 20\text{Log}(d_1/d_2)$$

(source: Noise Guide for Local Government - epa.nsw.gov.au)

Where: d_1 = distance (m) between source and receiver

d_2 = distance (m) at which Sound Pressure (L_{pa}) measured

L_2 = sound pressure level at the distance d_1 from the source

L_1 = sound pressure level at distance d_2 from the source

Propagation calculations consider sound intensity losses due to hemispherical spreading, with additional losses such as atmospheric absorption, directivity, ground absorption and shielding ignored in the calculations.

Predicted Construction Noise Levels at Nearest Receptor

The closest receptor is approximately 1,730 metres to the east north east of the project site. At this distance, the loudest activity (compacter) is predicted to be:

L_2 = 82 – 20 log (1,730/10)

= 37.2 dB

This noise would be generated during day periods and therefore is considered compliant.

Comparison of Construction Noise to PNTL

Construction works will be confined to daytime hours, in which the acceptable noise threshold criteria is 40dB. The predicted maximum noise generated by the development is therefore below the PNTL. Note that the majority of construction works to be undertaken on site will not be as loud as the use of a compacter. The above calculation therefore represents a 'worst-case scenario'.

It is therefore considered that construction works associated with the proposed development will not have a significant impact upon the amenity of the surrounding location. It is further noted that construction works associated with the proposed development will be temporary in nature and will not result in a lasting alteration to local amenity values.

6.9.2.3 Operational Noise

Cattle in the feedlot make very little noise. The potential noise sources from the site would be dominated by vehicle movements. This would include trucks moving to and from the site as well as the feed wagon and light vehicles. Other noise would include tractors, but this would be considered as normal noise for a farming area.

The closest residence not associated with the Feedlot operation is located approximately 2,260m to the north-east of the site. Noise attenuation over this distance is significant and therefore noise emissions from the feedlot, operations would not disturb the amenity at this residence.

6.9.2.4 Noise Assessment Conclusions

Noise impacts are not considered to be a potential issue from the proposed development. However, noise from the construction and operation of the Feedlot will be mitigated by:

- Maintaining a suitable buffer distance between the feedlot and surrounding receptors to minimise impacts associated with noise. Note that 2,260m is available between the feedlot site and the nearest receptor, which is considered to be more than sufficient;
- Only using machinery fitted with compliant mufflers during both the construction and the operation of the feedlot; and
- Requesting that truck drivers do not use engine brakes when entering / exiting Horseshoe & Stud Park.

No other issues relating to noise are considered to have the potential to cause significant additional impact as a result of the proposed development. As identified above, this can be attributed to the available separation distance between the feedlot site and neighbours as well as the level of management to be adopted on the site.

6.10 Vermin and Pests

Vermin such as rodents and flies can be attracted to feedlots by the ready availability of feed and a moist cattle pad. The Proponent shall develop a management program to avoid outbreaks of flies or rodents and other pests or vermin around the feed ration areas and the feedlot pens. The odour level from the feedlot pens will be low as the design of the feedlot ration is based on optimising feed efficiency which therefore generates a lower level of nutrient and energy in the manure pad.

Fly, mice and rat populations from the operation of the Feedlot will primarily be mitigated through the Feedlot management schedule (i.e. minimise feed wastage and spillage to reduce the likelihood of attracting vermin). A baiting program will also be implemented if the vermin population reaches a nuisance level.

6.11 Traffic and Transport

Traffic to the proposed feedlot is a calculated based on the total capacity, expected occupancy, average length of stay, transport type, and average feed consumption. These numbers will fluctuate based on the market value and availability of stock and grain. The complete traffic calculations have been included in Appendix 8.

If the proposed Feedlot is operated at maximum capacity (as shown in Table 6, Section 3.2.4.7), traffic generation would result in 2.6 heavy vehicle movements (B-doubles and/or Road Trains) per week (0.4 truck movements per day). Traffic generated by the proposed development is expected to travel east along Millie Road which connects to the Newell Highway. Traffic would then either travel north or south along the Newell Highway.

Average Annual Daily Traffic (AADT) data was supplied by Narrabri Shire Council for Millie Creek Road and by Transport for New South Wales for Newell Highway. This data is presented in Table 16. Data shows an Average Annual Daily Traffic (AADT) volume of 4,395 vehicular movements per day across two locations on Newell Highway, and 105 vehicular movements per day on Millie Road near the access point to the proposed feedlot. Heavy vehicles contributed an average 25% of the total vehicular movements on both roads, equivalent to 1,098 and 26.4 heavy vehicle movements per day on Newell Highway and Millie Road, respectively. During grain and cotton harvest periods, truck traffic numbers are likely much higher than this average.

Table 16: Traffic data recorded on Castlereagh Highway in 2019

Road	Site No.	Location	Year	AADT	% HV
Millie Road	N/A	Near Boggy Creek Road	2019	105	25.2%
Newell Highway	91.222	North of Bellata (Narrabri/Moree LGA Boundary)	Projected – 2020	4,020	25%
Newell Highway	92.222	South of Bellata (Edgeroi)	Projected- 2020	4,770	25%
Average Across Both Sites – Newell Highway	**N/A**	**N/A**	**Projected - 2020**	**4,395**	**25%**

Note:
AADT – Average Annual Daily Traffic
%HV – Percentage Heavy Vehicles

Relative to existing usage levels, the predicted increase in heavy traffic vehicle traffic on Millie Road and Newell Highway generated by the proposed Feedlot is considered minor; the increase is equivalent to approximately 3.9% of existing traffic on Millie Road and 0.09% of that on the Newell Highway. This is considered minor and these trucks will potentially consist of existing truck movements diverted to the feedlot rather than other destinations along the local road network.

In addition to heavy vehicle traffic the proposed development is predicted to generate up to 5 light vehicle movements per week, associated with feedlot staff vehicles. The light vehicle movements are not considered to significantly increase the traffic on the local road network.

6.12 Animal Welfare, Biosecurity and Disease Management

The Proponent has an economic incentive to maintain a high standard of animal welfare. This is because high standards of animal welfare result in improved productivity and better beef quality. The essential requirements for animal welfare include:

- Suitable quantity and quality of water. This is provided according to age, bodyweight, production level, air temperature, humidity and feed;
- Access to air free from dust or noxious chemicals;
- Suitable quantity and quality of food. Variations to these standards will result in the reduction of stocking rate, and animal monitoring to ensure satisfactory body condition;
- Protection from climatic extremes. These can be shade/cooling systems, wind breaks, fire and flood mitigation; and
- Protection from predators.

Once the feedlot is constructed the Proponent intends to seek accreditation under the AUS-MEAT Accreditation Scheme This scheme incorporates an extensive animal welfare documentation and

procedural activities. The Australian Lot Feeders Association (ALFA) perform annual audits on accredited feedlots to ensure managements standards are maintained.

Heat Stress

Heat stress in cattle is generally measured by Accumulated Heat Load Units (AHLU), which describe the amount of heat that may potentially be stored in the body. Cattle will generally accumulate heat during the day and dissipate this heat during the night. Throughout the summer months there is potential for insufficient cooling relief overnight, and cattle may enter the following day with an accumulated heat load. The potential accumulated heat load that an individual may carry varies as a result of the surrounding environmental conditions and livestock tolerance.

The ability of livestock to tolerate heat load varies depending on factors such as cattle breed, health status, coat colour, degree of finish, and pen conditions. Cattle fed through the feedlot will be selected on a breed basis to ensure that the cattle are either acclimatised to local conditions or can tolerate the high summer temperatures experienced in this region. Cattle will be regularly monitored and allocated to pens based on type, size, and condition. The feedlot will continue to be managed to high standards with open pens and a maintained manure pad depth up to 50mm.

A heat loading risk assessment was undertaken using the Katestone Risk Analysis Program (Appendix 8). The results were calculated over the long term for healthy, black Bos Taurus cattle within the Narrabri district, with less than 80-130 days on feed, with a limited amount of shade, trough water temperatures of 20-30 degrees, manure management class 1.

The risk of an extreme event lasting three days is less than 1 event in 18 years. This is considered an acceptable risk and as such does not require a heat load plan. This risk assessment should be reviewed annually.

Whilst management can undertake effective actions improving livestock tolerance to heat loads, uncontrollable climatic conditions may also predispose feedlot cattle to high body heat loads and increase the risk of heat stress. These conditions can include:

- A recent rain event
- A high ongoing minimum and maximum ambient temperature
- A high ongoing relative humidity
- An absence of cloud cover with a high solar radiation level
- Minimal air movement over an extended period (4-5 days)
- A sudden change to adverse climatic conditions

For this reason, current and forecasted climatic conditions should be continuously monitored, especially during summer.

The stock described above will begin to accumulate heat load when the Heat Load Index (HLI) exceeds 93. On days when the Heat Load Index for the site is equal to or greater than 93, feedlot will implement an action plan for the management of heat stress in cattle on site. Routine management procedures in heat stress events will include the:

- Installation of extra temporary water troughs;
- Implementation of a heat load feeding strategy;
- Strategic cleaning of high manure deposition areas; and
- Monitoring of physical signs and animal behaviours (panting; water consumption).

Sick Cattle

The cattle will be treated with various vaccines to minimise the potential contraction of disease or infection. In particular, this should help to decrease the occurrence of respiratory problems referred to as Bovine respiratory diseases (BRD). The vaccines would also reduce other cattle health issues in the feedlot. Feedlot staff will be required to undergo vaccination procedures for potential cattle related diseases, including Q-Fever. Disease management for staff is covered under the NFAS and WHS documentation.

All cattle will be inspected regularly to check their welfare (including individual pen walks by feedlot staff). Any sick cattle will be isolated from the production pens and transferred to a designated hospital pen for treatment and monitoring.

Emergency animal disease outbreak and / or mass mortality contingency plans will be developed as required. A suitable site for mass burial of mortalities with clay soil has been identified in Figure 2. The site is separated from the feedlot complex and surface water.

The soil beneath the mass disposal area consists of grey/brown clay. This provides an area where soil permeability is relatively low and therefore the presence of a large burial will present a low risk of local contamination of groundwater or subsoil. In the event of a mass death, appropriate authorities include LLS and potentially EPA would be contacted to review the cause and disposal process.

The Proponent intends to operate the site in accordance with the feedlot industry's quality assurance system, the AUS-MEAT Accreditation Scheme. The AUS-MEAT Accreditation Scheme requires all accredited feedlots to adhere to the *Code of Practice*, along with all other relevant environmental, animal welfare and food safety legislation.

6.13 Community

The Feedlot is sited in an area spatially removed from incompatible land uses. The proposed Feedlot site is in an area designated for rural primary production under the Narrabri LEP 2012. Surrounding land is similarly zoned and used for agricultural production. The likelihood of conflict with neighbours over the development is therefore minimal.

The feedlot site will not significantly detract from regional visual amenity. The site will not be visible from public roads through the region such as Newell Highway or Millie Road, as it will be blocked from view by the topography of the locality and tracts of remnant vegetation on the property. The feedlot site is sufficiently set back (over 2km) from Millie Road and Newell Highway, which complies with the recommended buffer distance of 100m as outlined in the *Living and Working in Rural Areas Handbook for Managing Land Use Conflict Issues on the NSW North Coast* (NSW DPI 2007). The feedlot is therefore not predicted to significantly impact upon the amenity of the regional road network.

The feedlot will be sited and designed such that odour, dust and noise generated by the development has a minimal impact upon community amenity. The proposed development and facilities will comply with management criteria and minimum required separation distances from sensitive receptors to mitigate against any potential amenity impacts.

The subject site has no known significant archaeological or heritage values; therefore, the proposed development is considered to comply with all relevant archaeological and heritage legislation and regulations and to protect heritage values within the region.

The siting and design of the proposed feedlot will not impact upon the safety of the road network. The sight distances from Horseshoe along Millie Road are estimated to be over 200m to the north-west and south-east. These sight distances are considered to be acceptable. The volume of traffic generated by the proposed development is considered to be minimal and is therefore not expected to impact upon road safety by significantly increasing traffic density.

Finally, the feedlot will operate with high safety standards. Potentially hazardous chemicals or waste materials used on site will be used by qualified persons and stored in accordance with relevant guidelines.

Overall, the proposed feedlot is considered to pose minimal risk to community amenity and values.

6.14 Cumulative Impacts

The potential environmental impacts from the construction and operation of the proposed Feedlot have been detailed in their relevant sections throughout this report.

The remoteness of the subject site provides sufficient separation distances between the Feedlot and potentially sensitive receptors to minimise the impacts of odour, noise and dust emissions on surrounding amenities levels. The existing site is already subject to livestock grazing and cultivation of grains and silage. The proposed development will not involve the following any additional clearing of native vegetation. There will be an acceptable increase in traffic to and from the property. Access will be provided via an existing internal road. The project will not affect long term air or water quality objectives for the region.

There are no known development proposals in the vicinity of the site, and the Feedlot development is compatible with surrounding agricultural land uses. There is an existing feedlot - Wilga Feedlot - located approximately 3.2 kilometres north-west of the proposed Horseshoe Feedlot. The cumulative impact of both feedlots was analysed in a cumulative assessment in the Level 1 Odour Assessment included in Appendix 6. The feedlots were found to be sufficiently separated to ensure that sensitive receptors in the locality would incur adverse odour impacts from the presence of both feedlots. Furthermore, no receptors are located within a direct path between the two feedlots.

Due to the small-scale nature of the proposed feedlot (999 head of cattle), the available separation distance between Horseshoe and Wilga Feedlots (over 3km), and the proposed best practice management and mitigation measures which are included in this Statement of Environmental Effects, it is considered unlikely that any other cumulative adverse impacts would result from the construction and operation of the proposed Horseshoe Feedlot.

Given the minimal potential for cumulative impacts to occur, it was concluded that is no further assessment was required.

7 Conclusion

This Statement of Environmental Effects has detailed the activities, potential environmental impacts, and proposed mitigation measures associated with the construction and operation of a 999 head cattle feedlot on Horseshoe & Stud Park.

The feedlot is considered a viable enterprise to 'value add' to the existing grazing enterprise on the property. The intensive feeding of animals within the feedlot provides a controlled environment for the animals where weight gain efficiencies can be managed. It reduces the risk of disease and the subsequent loss of weight gain.

The site for the proposed feedlot complies with the required criteria in selection of a feedlot location. The feedlot design is based on a typical layout. Earthworks are required to form the effluent pond and drain system to allow for a storage capacity in excess of the minimum requirements for accumulation of all effluent as required by guidelines.

Guideline calculations indicate that the available buffer zone between neighbouring residences and a neighbouring feedlot are sufficient not to cause any significant or frequent disturbance to the amenity of these houses.

This investigation of the potential impact of the proposal has determined that the 999 head feedlot is not considered to produce any major environmental impacts due to the scale of the development and the location of the development. Minor issues associated with intensive production of cattle can be dealt with by suitable management of the site.

In conclusion, the proposal complies with all relevant guidelines, is congruent with neighbouring land uses and will provide net economic and social benefits to the regional community.

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Appendix 1 – Effluent Design Calculations

Sedimentation Systems and Effluent Pond Volumes

Introduction

This report has been prepared to assess the effluent collection system for the Horseshoe Feedlot. The proposal involves establishing a controlled drainage area for capture of effluent runoff from the feedlot.

Feedlot Design

The proposed feedlot will comprise three existing drought-feeding pens. The feedlot has a consistent gradual slope towards its south-western corner. Consequently, all three pens will drain into a sedimentation basin. The intended design function of the sedimentation basin is to reduce the velocity of contaminated effluent that allows for settling out of suspended solids (manure) before they enter the effluent holding pond.

The effluent pond will be sized as a storage pond for irrigation using the effluent water. The requirement is therefore to capture and hold the largest runoff value from either a 90-percentile wet year or a 1 in 20-year (24 hour) storm.

Sedimentation basins are typically wide shallow storages having a designed top water level (TWL) equal to or less than 1.2m deep. The base of the basin will slope gently (approximately 0.1% slope) towards a control weir that regulates discharge from the basin into the Effluent pond. Control weirs typically consist of horizontal timber slats that can be removed for cleaning purposes. After each runoff event the sedimentation basin will drain completely (down to bed level).

With each runoff event manure is deposited in thin layers over the base of the basin, which allows the material to dry. The dried manure is then removed at regular intervals to maintain the pond capacity. The manure sediment is then discarded (e.g. by spreading it over a field) with manure scraped from the pens.

Design Storm Calculations

Sedimentation Basin System

The sedimentation basin must accommodate a 1 in 20-year storm.
Calculations for a Single Sedimentation Basin:

- Basins cannot be deeper than 1.2 m (the proposed design runs at 1.2m)
- Maximum velocity (v) = 0.005 m/s to allow solids to settle
- Allow for a 1:3 batter grade to allow earthmoving equipment to access inside for maintenance

The following provides the design calculations.

Time of Concentration

The design storm event for this site was calculated using the time of concentration figures generated by a 1 in 20-year storm event. Using time of concentration generated by calculations for gutter flow (kinematic wave equation). The basin will be designed to handle the run-off generated from a design 1 in 20-year ARI design storm event that will last approximately 27 minutes on the sediment pond catchment.

Based on the same program that uses BOM IFD data, the design rainfall for this event falling on the Horseshoe sedimentation basin catchment is 37.9mm of rain. Total volume for runoff from this storm event is calculated as the product of rainfall, controlled drainage area and runoff coefficient for this storm event.

Volume of Sediment Pont (V)

$$V = Qp(l/w)\lambda/v$$

Where Qp = Peak inflow rate
l/w = length to width ratio, where l is the length along the direction of flow
λ = is the scaling factor
v = flow velocity: maximum – 0.005m/s

Qp = 0.562 m^3/s
l/w =2.35
λ = 2.5 (6 for ponds; 2.5 for basins)
v = 0.005m/s

V = (0.562x 2.35 x 2.5) / 0.005
V = 0.66 ML

Weir Calculations and Design

A weir is to be installed at the lowest end of the sediment basin to act as an outlet controlling the outflow velocity. Specifications for a weir are:

- The freeboard between the weir crest and the basin's top bank must be a minimum of 0.9m
- The bywash level of the effluent storage pond should be at least 0.3m lower than the bed of the outlet weir to allow enough drainage from sediment basin
- The weir width must be a minimum of 2.5m to allow access for cleaning machinery
- Must be designed to handle a 1 in 50-year ARI design storm event

Width of Outlet Weir (b)

$$b = Q/C_d \times h^{3/2}$$

Where: Q = peak flow rate (m^3/s)
C_d = Weir coefficient (1.66)
H = depth of water over the crest of the outlet weir (m)
b = width of the outlet weir

One weir of 2.5m:
Q = 1.191 m^3/s
C_d = 1.66
H = 0.274m
b = 5m

A 5m wide weir will result in a peak flow depth requirement of 0.274m. This is considered acceptable.

Effluent Pond

The intended design function of the effluent pond is to store effluent from major storms and / or extended wet periods so that pond overtopping events are prevented and/or limited to an acceptable frequency. Any effluent available will be irrigated onto pasture or spread over dryland fields as a liquid fertilizer.

Two methods are used to determine the effluent pond volume. They are:

- Method 1: Major storm event based on a 1 in 20 ARI; 24-hour duration
- Method 2: Annual water balance based on a 90th percentile rainfall year

Effluent Pond Volume

Criteria (Method 1): 1 in 20 year; 24-hour storm event
Volume = ACiS

Where A = Total Footprint (CDA)
C = Run-off coefficient for drainage area
i = 1 in 20-year rainfall over 24-hour period
S = 1

A = 48,000 m^2 (Hard and soft catchments)
C = 0.40
i = 130.6 mm over 24 hours

V = 48,000 x 0.40 x 0.130.6 x 1
V = 2507.5 m^3
V = 2.51 ML

Annual Water Balance

Criteria (Method 2): Annual water balance based on a 90th percentile year. This is required for effluent ponds where wastewater is disposed of by irrigation.

Method 2 involves identifying the 90th Percentile Yearly Rainfall, according to BoM Climate Data, depth and finding the year that a similar depth occurred using daily and/or monthly rainfall records for the local area. The monthly rainfall data from the year with the most similar yearly rainfall level is then used to determine the runoff volume for that year. The climate Data on BoM for the closest region was used to determine the yearly value for a 90th Percentile Rainfall Year. The rainfall records reviewed for this design to determine the 90-percentile year rainfall year were those of the Bellata region where 90-years of annual and daily records could be obtained. The 90th percentile rainfall total is 808mm according to BoM. This is the similar rainfall depth for 1978 which equalled 816.6mm. Therefore, the monthly rainfall depths for 1978 were used in calculations.

Cumulative Balance Calculation

The following table presents the calculations of the cumulative annual water balance for the feedlot using the actual monthly rainfall totals for the year of 1978. In this table an adjustment was made to exclude the effluent pond surface area from the controlled drainage area.

The balance is based on the following assumptions:

- Monthly rainfalls for a 90-percentile wet year
- Runoff from the catchment based on a coefficient of 0.4 for soft areas and 0.8 for hard areas
- Rainfall captured in the pond
- Losses from average evaporation rates
- Irrigation of 10 hectares
- No seepage loss component
- Determined maximum cumulative pond capacity requirement

Table 1: Annual Water Balance 90th Percentile Wet Year

Annual Water Balance - Feedlot Development Effluent Storage (ML)									
Month	90th Percentile Wet Year Rainfall (mm)	Pen Runoff	Hard Area Runoff	Soft Area Runoff	Pond Area Runoff	Pond Evaporation	Irrigation	Monthly Effluent Balance	Cumulative Storage Requirement
Jan	221.4	2.6	0.8	0.8	1.1	0.9	0.77	3.7	3.7
Feb	67.4	0.8	0.2	0.2	0.3	0.7	0.77	0.1	3.8
Mar	42.4	0.5	0.2	0.2	0.2	0.7	0.77	-0.5	3.3
Apr	6.4	0.1	0.0	0.0	0.0	0.5	0.77	-1.1	2.2
May	53	0.6	0.2	0.2	0.3	0.3	0.77	0.2	2.4
Jun	89.8	1.1	0.3	0.3	0.4	0.2	0.77	1.1	3.5
Jul	41	0.5	0.1	0.1	0.2	0.3	0.77	-0.1	3.4
Aug	42.8	0.5	0.2	0.2	0.2	0.4	0.77	-0.1	3.3
Sep	91	1.1	0.3	0.3	0.5	0.5	0.77	0.9	4.3
Oct	17	0.2	0.1	0.1	0.1	0.6	0.77	-1.0	3.25
Nov	94.2	1.1	0.3	0.3	0.5	0.8	0.77	0.7	4.0
Dec	50.2	0.6	0.2	0.2	0.3	0.9	0.77	-0.4	3.5
Total	**816.6**	**9.6**	**2.9**	**2.9**	**4.1**	**6.75**	**9.28**	**3.53**	**4.27**

Final dimensions

The 90th Percentile rainfall year generates a larger storage capacity than the 1 in 24-hour rainfall event. On this basis, the feedlot requires a pond capacity of approximately 4.27 ML to avoid spill events of more than once in 10-years.

The final Sedimentation System will be built to manage the requirements calculated above. The completed effluent pond and sediment basin are expected to individually cover 5778.5m^2 and 2240.4m^2 respectively.

Figure 1 and 2 present a preliminary design of the pond system and presents an outline of the two catchment areas.

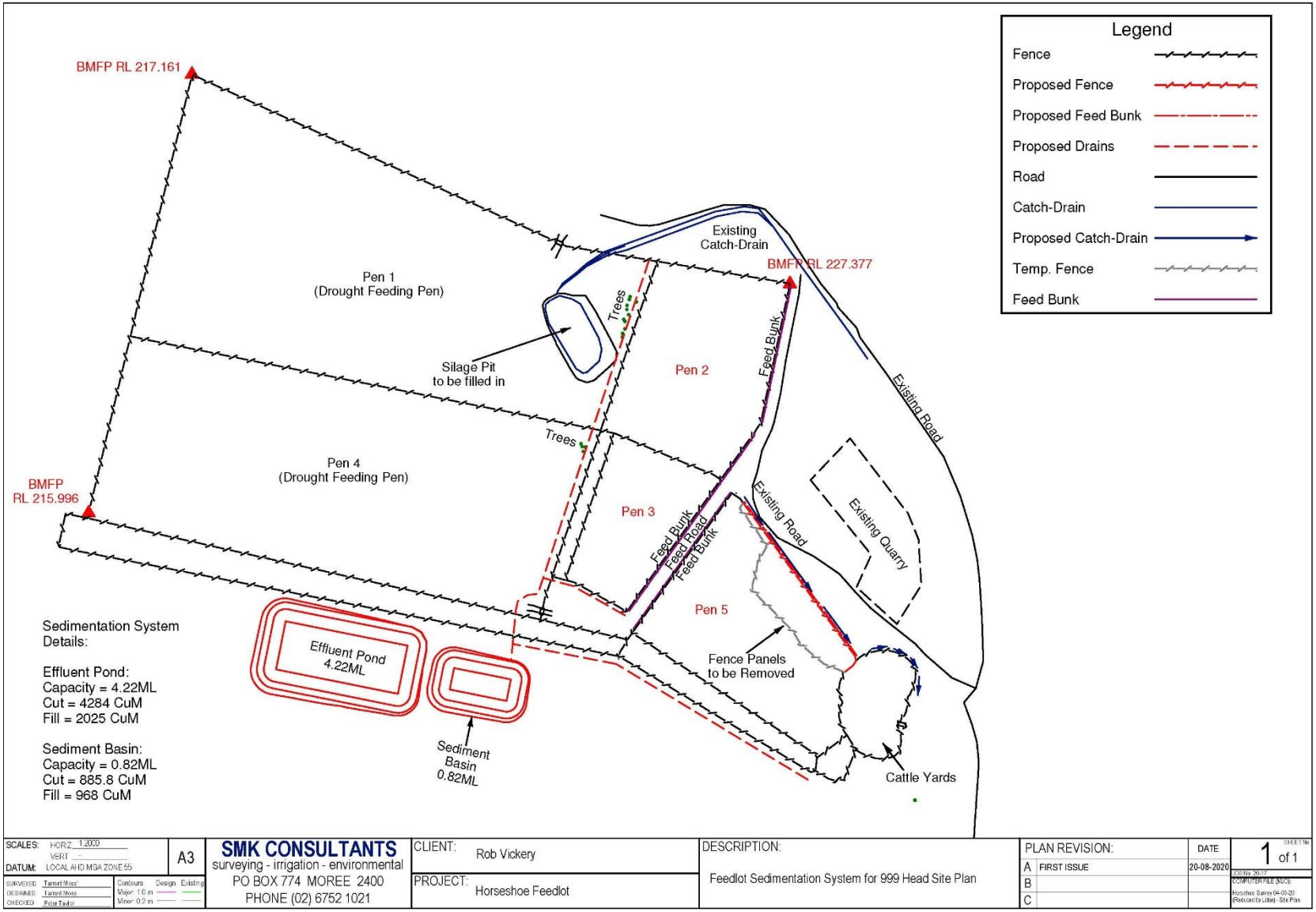

Figure 1: Proposed Site Plan

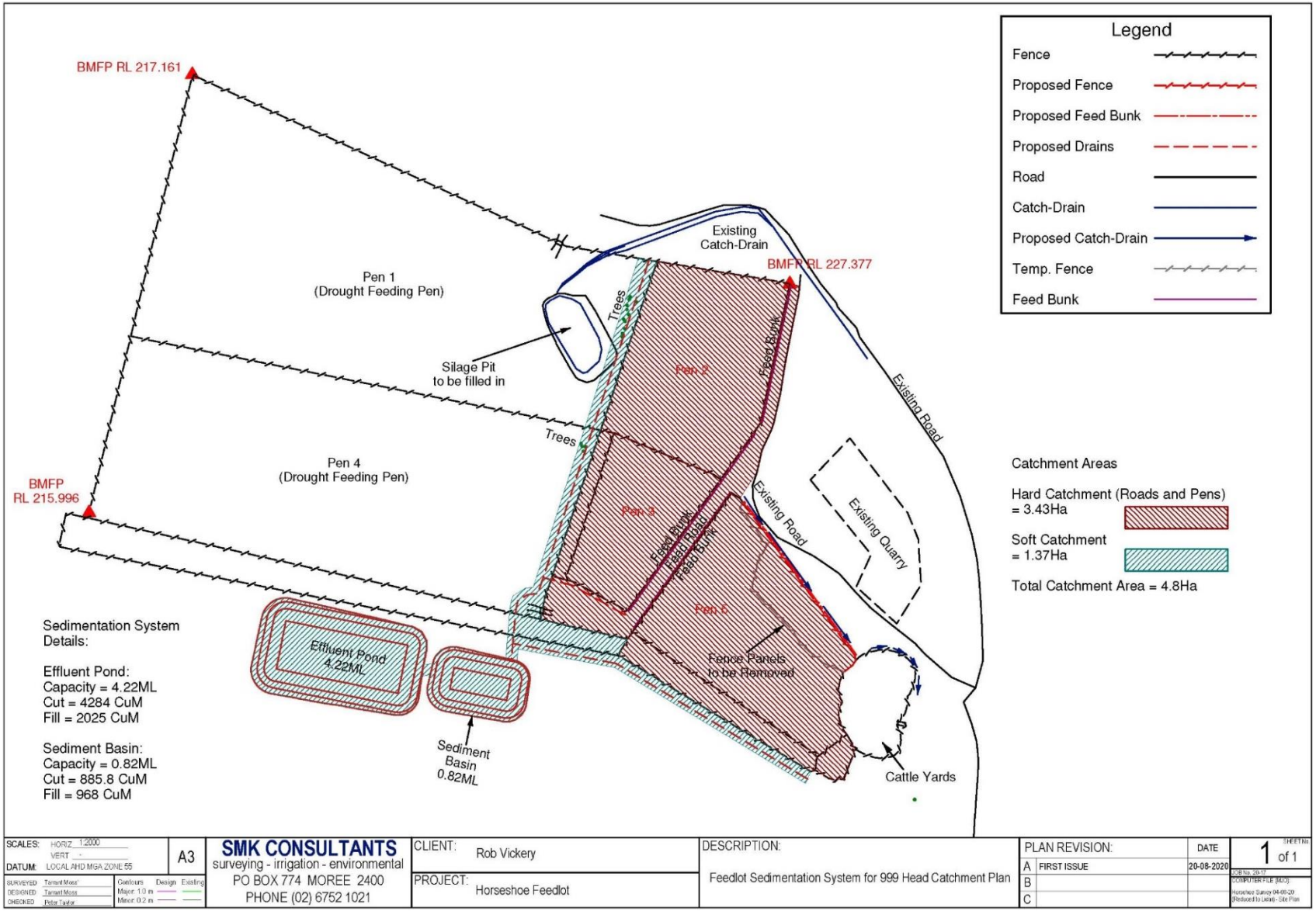

Figure 2: Catchment Areas Associated with the Proposed Feedlot

Appendix 2 – Harvestable Rights

Maximum Harvestable Right Dam Capacity

Information provided by the user

1. The location of the proposed dam is:

- Latitude: **-29.853313**
- Longitude: **149.760024**

2. Total property area to use for calculating the size of the dam is **1400** **Hectares**

Result

The maximum Harvestable right dam capacity for your property is **84** ML (Megalitres)

Date

10/08/2020

Name

SMK Consultants

Limitations of the calculator

a) Where to site a dam

You can only construct a harvestable rights dam where the Harvestable Rights Orders apply, refer to NSW Government Gazette 40 dated 31 March 2006 (pages 1628 to 1631).

b) First and Second order streams

The maximum harvestable right calculator does not verify that the location of the proposed dam sits on a first or second order stream. A factsheet : "Where can they be built without a licence?" is available on WaterNSW website to help you work out the stream orders.

You will need to use the legislated topographic map for your area to identify the stream order. This map is the gazetted map as per NSW Government Gazette 37 dated 24 March 2006 (pages 1500-1509).

c) Size of property and dam

The calculator does not take into account other dams already on your property. If you have existing harvestable rights dams on your property, you must take the capacity of these dams into account when constructing a new dam. In the Eastern and Central Divisions other dams must also be taken into account, as described in the NSW Government Gazette 40 dated 31 March 2006 (pages 1628 to 1631).

d) Protected wetlands

The Harvestable Rights Orders specify that you are not allowed to build a dam on or within 3 km of a RAMSAR wetland site. There are 12 RAMSAR wetlands in NSW. Further information on the location of those 12 RAMSAR sites in NSW can be found on the NSW Environment and Heritage government website.

Appendix 3 – EPBC Assessment

EPBC Protected Matters Assessment

Development Background

The proposed development involves the construction of a 999 head feedlot within Narrabri Plains Shire Council. The property is known as "Horseshoe" and is located approximately 43km south of the township of Moree and 52km north of the township of Narrabri, on the Millie Road in the Narrabri Shire. Arcadia currently supports a grazing and cropping enterprise, which includes opportunity feeding of cattle. The site is located in the middle reaches of the Gwydir Catchment.

The proposed feedlot will primarily be located on land which has already been conditioned for cattle containment pens. The existing drought feeding pens have retained native vegetation (trees and shrubs) which was originally within the footprint of the pens, however the deposition of cattle manure and urine over time has significantly deteriorated the condition of the vegetation. Remaining living trees and dead standing trees and shrubs will be retained within the pens to provide limited shade and to be used as scratching posts for cattle. The remainder of the development footprint is located on mostly cleared land which is currently utilised as cropping land and temporary cattle. The total footprint of the proposed development is approximately 4.8 Ha.

In its current state, the subject site and study area do not constitute important habitat for identified species. Much of the region surrounding the proposed development site is disturbed by agricultural activities, however loosely contiguous areas of remnant vegetation persist, in particular along roads, watercourse corridors and in areas which are not easily exploited for agriculture. Extensive areas of remnant vegetation are also present in the wider region, to the south and east of the study area (e.g. Kaputar National Park). Such vegetation, in addition to water-based habitat associated with creeks in the locality, is likely to serve as significant remnant vegetation for a variety of threatened species, and is considered the preferred habitat for vulnerable species over the study area.

Study Area Delineation

The potential construction impacts of the development are predicted to be minimal. The subject site will not impact high-quality native vegetation. Minimal clearing will result from the proposed development (maximum of 4-5 immature trees). Construction will be undertaken in accordance with best practice construction measures to minimise the risk of erosion and protect environmental values, which will include measures such as installation of sediment traps and minimising the footprint of site disturbance.

A suite of measures will be implemented at the subject site to minimise the potential impact of the feedlot upon the surrounding environment. Measures include:

- Establishment of diversion banks as required to divert clean surface runoff from the surrounding region away from the feedlot site;
- Establishment of a Controlled Drainage Area (CDA) to capture polluted runoff generated from the subject site, for sustainable reuse/disposal; and
- The feedlot complex is to be located on compacted clay soil to a minimum depth of 300mm, achieving a permeability of less than 1×10^{-9} m/s, to ensure protection of local groundwater resources.

A weed and pest management program will be implemented on site once the feedlot is operational, to ensure that the feedlot does not become a source of weeds or vermin for the surrounding regions.

The potential impact of the feedlot development is therefore considered to be limited to the subject site of the feedlot itself.

Matters of National Significance

The EPBC Act requires consideration of the effect of an action on the following 7 Matters of National Environmental Significance (MNES):

- World Heritage Properties
- National Heritage Places
- Ramsar wetlands of international importance
- Nationally threatened species and communities
- Migratory species protected under international agreements
- Nuclear actions, including uranium mining, and
- The Commonwealth marine environment.

The impact of an action on these matters is assessed under the criteria specified in: Matters of National Environmental Significance – Significant Impact Guidelines 1.1 (DoE 2013).

Consideration of EPBC Matters

A search was undertaken using the EPBC Protected Matters Search Tool (PMST) (DoEE 2019) to generate a list of World Heritage Properties, National Heritage Places, Ramsar wetlands and nationally threatened species, communities and migratory species protected under international agreements that may occur on or within 5km of the proposed development (Figure 1).

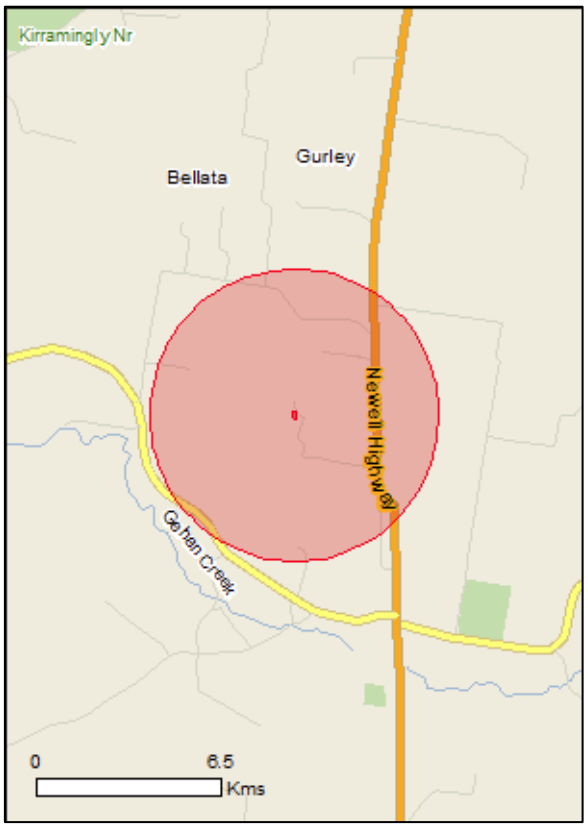

Figure 1: Region searched for MNES using the EPBC PMST (5 km radius around subject site).

Results of Database Search

The EPBC PMST does not list any World Heritage Properties or National Heritage Places on or within the search area. The PMST identified two Ramsar wetlands downstream of the subject site; Banrock station wetland complex located over 1000 km downstream of the site, and The coorong, and lakes alexandrina and albert wetland situated over 1100 km downstream. Given the small scale of the proposed works and the considerable distance of the wetlands from the subject site, the proposed works are not considered to have the potential to negatively impact the wetlands. Further, the proposal does not involve nuclear actions or impact on the marine environment; consequently, these matters are also not relevant to this assessment.

Nationally threatened species and migratory species protected under international agreements have been initially defined within the search area outlined in Figure 1 using the PMST. These species are listed in Tables 1 and 2.

Table 1: Threatened flora and fauna species predicted/known to occur on the proposal area

Category	Scientific Name	Common Name	Legal Status
Birds	*Anthochaera phrygia*	Regent Honeyeater	Critically Endangered
	Calidris ferruginea	Curlew Sandpiper	Critically Endangered; Listed Migratory (Bonn, CAMBA, JAMBA, ROKAMBA); Listed Marine
	Falco hypoleucos	Grey Falcon	Critically Endangered
	Geophaps scripta scripta	Squatter Pigeon (southern)	Vulnerable
	Grantiella picta	Painted Honeyeater	Vulnerable
	Hirundapus caudacutus	White-throated Needletail	Vulnerable; Listed Migratory (CAMBA, JAMBA, ROKAMBA); Listed Marine
	Polytelis swainsonii	Superb Parrot	Vulnerable
	Rostratula australis	Australian Painted Snipe	Listed Endangered as *Rostratula australis*; Listed marine as *Rostratula benghalensis* (sensu lato)
Reptiles	*Anomalopus mackayi*	Five-clawed Worm-skink, Long-legged Worm-skink	Vulnerable
Mammals	*Chalinolobus dwyeri*	Large-eared Pied Bat, Large Pied Bat	Vulnerable
	Nyctophilus corbeni	Corben's Long-eared Bat, South-eastern Long-eared Bat	Vulnerable
	Phascolarctos cinereus (combined populations of NSW, QLD & ACT)	Koala (combined populations of NSW, QLD & ACT)	Vulnerable
	Cadellia pentastylis	Ooline	Vulnerable
	Dichanthium setosum	Bluegrass	Vulnerable
	Homopholis belsonii	Belson's Panic	Vulnerable
	Swainsona murrayana	Slender Darling-pea, Slender Swainson, Murray Swainson-pea	Vulnerable
	Tylophora linearis		Endangered

Category	Scientific Name	Common Name	Legal Status
Reptiles	*Anomalopus mackayi*	Five-clawed Worm-skink, Long-legged Worm-skink	Vulnerable
	Uvidicolus sphyrurus	Border Thick-tailed Gecko, Granite Belt Thick-tailed Gecko	Vulnerable

CAMBA = China Australia Migratory Bird Agreement; JAMBA = Japan Australia Migratory Bird Agreement; ROKAMBA = Republic of Korea Australia Migratory Bird Agreement; Bonn = Convention on the Conservation of Migratory Species of Wild Animals

Table 2: Migratory species predicted to occur on the proposal area

Category	Scientific Name	Common Name	Legal Status
Migratory Marine Birds	*Apus pacificus*	Fork-Tailed Swift	Listed Migratory (CAMBA, JAMBA, ROKAMBA); Listed Marine
Migratory Terrestrial Species	*Hirundapus caudacutus*	White-throated Needletail	Listed Migratory (CAMBA, JAMBA); Listed Marine as *Hirundapus caudacutus* Listed Migratory (ROKAMBA) as *Chaetura caudacuta*
	Motacilla flava	Yellow Wagtail	Listed Migratory (CAMBA, JAMBA, ROKAMBA); Listed Marine
	Myiagra cyanoleuca	Satin Flycatcher	Listed Migratory (Bonn); Listed Marine
Migratory Wetland Species	*Actitis hypoleucos*	Common Sandpiper	Listed Migratory (Bonn, CAMBA, JAMBA); Listed Marine as *Actitis hypoleucos* Listed Migratory (ROKAMBA) as *Tringa hypoleucos*
	Calidris ferruginea	Curlew Sandpiper	Critically Endangered; Listed Migratory (Bonn, CAMBA, JAMBA, ROKAMBA); Listed Marine
	Calidris melanotos	Pectoral Sandpiper	Listed Migratory (Bonn, JAMBA, ROKAMBA); Listed Marine
	Gallinago hardwickii	Latham's Snipe, Japanese Snipe	Listed Migratory (Bonn, JAMBA, ROKAMBA); Listed Marine

CAMBA = China Australia Migratory Bird Agreement; JAMBA = Japan Australia Migratory Bird Agreement; ROKAMBA = Republic of Korea Australia Migratory Bird Agreement; Bonn = Convention on the Conservation of Migratory Species of Wild Animals

The PMST also identified a range of threatened ecological communities which have the potential to be present within the study area. A site visit assessed the subject site and study area and determined that no endangered ecological communities are present. Therefore no further consideration is given to threatened ecological communities in this assessment.

Assessment of Significance

Vulnerable Species

An action has, or will have, or is likely to have a significant impact on a vulnerable species if it does, will or is likely to:

- ***Lead to a long-term decrease in the size of an important population of species***

The land area to be disturbed by the proposed development is highly modified land which supports degraded/dead vegetation, or has been mostly cleared of native vegetation. A maximum of 4-5 trees, 3 of which are dead, will be cleared to facilitate the construction drains.

It is considered to be unlikely that the habitat area to be disturbed by the proposed development will have a significant impact upon any local populations of threatened species. The area of land to be disturbed is negligible in the context of the availability of higher-quality habitat (open woodland and riparian vegetation) in the wider locality. It is important to note that vulnerable plant species identified by the PMST were not observed on site during site inspection.

Given that the habitat value of the land within the subject site is low, the disturbance of the subject site is not considered to pose a significant risk to any threatened species which may be present within the wider region. It is considered that threatened species which may be present within the region are likely to preferentially reside/forage in areas of quality remnant and riparian vegetation both on the property and in the wider locality.

The proposed development is therefore not considered to have the potential to result in the decrease in the size of an important population of vulnerable species.

- ***Reduce the area of occupancy of an important population***

The subject site is not considered to constitute important habitat for any of the identified threatened species. Therefore, disturbance of the subject site is not considered to pose a risk to reducing the area of occupancy of threatened species.

- ***Fragment an existing important population into two or more populations***

The proposed works do not involve the clearance of native vegetation. Furthermore, vegetation within and directly adjacent to the site extends over a very small area (<5 Ha) and is disjunct. It therefore does not constitute an important habitat corridor for species within the locality and disturbance of land over such a small area will not contribute to landscape fragmentation. Overall, it is considered that works associated with the proposed development would not result in significant impacts upon habitat availability and connectivity for threatened species within the area.

- ***Adversely affect habitat critical to the survival of a species***

The subject site is dominated by dead standing Bimble Box trees and Wilga shrubs, as well as cleared, cultivated cropland; it therefore offers low habitat values. The site does not support habitat features (such as tree hollows, fallen timber, water bodies) which are critical for the survival of identified threatened species. Therefore, the development will not impact upon critical habitat for vulnerable species.

It is considered to be likely that threatened fauna species, if present in the region, would primarily utilise areas of remnant vegetation and surface water bodies which are present within the remainder of the property and the wider locality, in preference to the subject site.

- ***Disrupt the breeding cycle of an important population***

It is considered to be highly unlikely that the subject site would constitute habitat important to the life cycle of identified threatened species (such as breeding habitat), due to the following factors:

- The small size of the development footprint;
- The modified nature of the habitat and deteriorated condition of remaining vegetation; and
- The proximity of this area to existing areas of development and regular human activity on site.

- ***Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline***

Whilst some modification of potential habitat may occur as a result of the proposed development, this modification will occur on a small scale. Further, the habitat values of the subject site are considered to be low as a result of agricultural practices including the temporary containment of cattle, and historic clearing and cultivation activities. Species are more likely to utilise either remnant or riparian/water-based habitat in the vicinity of the proposed development, rather than the development site.

Therefore, modification of habitat on site is unlikely to the result in the decline of any identified species.

- ***Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat***

Runoff from the feedlot has the potential to lead to changes in soil chemistry, soil hydrology and soil biota. Changes in nutrient availability and hydrological processes can lead to a decline in native species diversity and/or abundance and can favour the establishment of introduced species. Furthermore, invasive species could be directly imported to the site by construction machinery and trucks entering the feedlot.

A series of mitigating strategies will be implemented to minimise the risk of direct and indirect off-site impacts, including:

- All machinery, equipment and vehicles brought onto a property must be free of soil, seed or plant material. All soil and organic matter should be removed, including under the vehicle and in the cabin or trays.
- Stabilisation measures must be planned to optimise establishment of a healthy groundcover devoid of weeds;
- A diversion bank will be installed where required to divert clean water around the Feedlot;
- The controlled drainage area is designed and will be constructed in accordance with the recommendations included in the Statement of Environmental Effects and the National Guidelines in order to prevent run-off being released into the surrounding environment;
- The siting of the feedlot on a surface with low permeability (i.e. clay soils) to minimise the risk of underlying soil and groundwater contamination;

These mitigating measures are considered to be sufficient to minimise the risk of the feedlot resulting in the establishment and spread of invasive species.

The Proponent also undertakes regular weed management on the subject site in accordance with routine farm management practices. These ongoing weed management practices contribute to protecting environmental values of surrounding habitats in the region.

- ***Introduce disease that may cause the species to decline, or***

The risk of introducing diseases into remnant habitat within the project area results from the potential export of contaminants from the feedlot site in the surface runoff and/or leakage into groundwater. It is considered that, providing that the recommended mitigation measures are implemented, the proposed development will not introduce disease that may cause any vulnerable species to decline.

- ***Interfere substantially with the recovery of the species***

Ensuring the recovery of a species generally involves the protection and enhancement of existing populations and habitat, by preventing further clearing and modification of native vegetation communities and protecting water quality values. As discussed previously, the proposed development entails minimal clearance and modification of any native vegetation communities. As a result, any existing populations and habitat for flora and fauna in the area will be maintained. As part of the project, highly modified habitat (dead open woodland with no groundcover, temporary containment pens and cropland) will be disturbed. These works will not have any substantial impacts on existing flora and fauna populations or habitat. The protection of water quality value will be insured by:

- Installing a diversion bank as required to divert clean water around the Feedlot;
- Ensuring that the controlled drainage area is designed and constructed in accordance with the recommendations included in the Statement of Environmental Effects and the National Guidelines.
- Siting the feedlot on a surface with low permeability (i.e. clay soils) to minimise the risk of groundwater contamination.

Consequently, it is considered the proposed development will not substantially interfere with the recovery of any identified species.

Critically Endangered and Endangered Species

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- ***Lead to a long-term decrease in the size of a population***

Similarly to vulnerable species, the proposed development site is not considered to constitute preferred habitat for endangered or critically endangered species. Development of the subject site is therefore not considered likely to result in a decrease in the size of endangered and/or critically endangered species which may be present within the region. It should be noted that no endangered or critically endangered flora species were observed on site during the site inspection.

- ***Reduce the area of occupancy of the species***

The habitat of the subject site is unlikely to be utilised by identified species. Modification of the site as a result of the proposed development is therefore unlikely to reduce the occupancy of identified species.

- ***Fragment an existing population into two or more populations***

As outlined above, the development will not result in habitat fragmentation, and is therefore not considered to pose a risk of fragmenting populations of endangered or critically endangered species which may be present within the locality.

- ***Adversely affect habitat critical to the survival of a species***

There is no critical habitat for identified endangered and critically endangered species on the development site.

- ***Disrupt the breeding cycle of a population***

There is no habitat on the development site that would be considered suitable for breeding for any listed endangered and critically endangered species, as the site does not contain high-quality native habitat. It is considered that endangered and/or critically endangered species would be more likely to utilise remnant and/or riparian habitats in the vicinity of the subject site in preference to the subject site for breeding purposes.

- ***Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline***

The habitat area within the subject site is already considered to be of low quality as a result of previous human intervention. It is unlikely to be used by any identified threatened species and these species are more likely to utilise either remnant or riparian/water-based habitat in the vicinity of the proposed development, rather than the development site itself. Therefore, modification of habitat on site is unlikely to the result in the decline of any identified species.

- ***Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered species' habitat***

Runoff from the feedlot has the potential to lead to changes in soil chemistry, soil hydrology and soil biota. Changes in nutrient availability and hydrological processes can lead to a decline in native species diversity and/or abundance and can favour the establishment of introduced species. Furthermore, invasive species could be directly imported to the site by construction machinery and trucks entering the feedlot.

A series of mitigating strategies will be implemented to minimise the risk of direct and indirect off-site impacts, including:

- All machinery, equipment and vehicles brought onto a property must be free of soil, seed or plant material. All soil and organic matter should be removed, including under the vehicle and in the cabin or trays;
- Stabilisation measures must be planned to optimise establishment of a healthy groundcover devoid of weeds;

- Undertaking a regular weed management program on the subject site in accordance with routine farm management practices;
- A diversion bank will be installed where required to divert clean water around the Feedlot;
- The controlled drainage area is designed and will be constructed in accordance with the recommendations included in the Statement of Environmental Effects and the National Guidelines in order to prevent run-off being released into the surrounding environment;
- The siting of the feedlot on a surface with low permeability (i.e. clay soils) to minimise the risk of underlying soil and groundwater contamination;

These mitigating measures are considered to be sufficient to minimise the risk of the feedlot resulting in the establishment and spread of invasive species.

- ***Introduce disease that may cause the species to decline, or***

The risk of introducing diseases into remnant habitat within the project area results from the potential export of contaminants from the feedlot site in the surface runoff and/or leakage into groundwater. It is considered that, providing appropriate mitigation measures are implemented, the proposed development will not introduce disease that may cause any endangered or critically endangered species to decline.

- ***Interfere substantially with the recovery of the species***

As discussed previously, the proposed development entails the disturbance if highly modified habitat over a small area. Works on this disturbed habitat will not have any substantial impacts on existing flora and fauna populations and/or habitat. The protection of water quality value will be insured by:

- Installing a diversion bank where required to divert clean water around the Feedlot;
- Ensuring that the controlled drainage area is designed and constructed in accordance with the recommendations included in the Statement of Environmental Effects and the National Guidelines.
- Siting the feedlot on a surface with low permeability (such as heavy clay soils) to minimise the risk of groundwater contamination.

Consequently, it is considered that the proposed development will not substantially interfere with the recovery of any identified species. Overall, the proposed development is not considered to pose a risk to critically endangered or endangered species.

Critically Endangered and Endangered Ecological Communities

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

- ***Reduce the extent of an ecological community***
- ***Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines***
- ***Adversely affect habitat critical to the survival of an ecological community***
- ***Modify or destroy abiotic (non-living) factors (such as water, nutrients or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns***

- ***Cause substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting***
- ***Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:***
    - ***Assisting invasive species, that are harmful to the listed ecological community, to become established, or***
    - ***Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or***
- ***Interfere with the recovery of an ecological community***

An assessment of the subject site indicated that the subject site does not support an endangered ecological community, nor is the site located in close proximity to an endangered ecological community. The development is therefore not considered to pose a risk to any potential endangered or critically endangered ecological communities which may be present within the wider region.

Listed Migratory Species

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- ***Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for migratory species***

Important habitat for a migratory species is defined as habitat which is:

- Utilised by migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or
- Of critical importance to the species at particular life cycle stages, and/or
- Utilised by a migratory species which is at the limit of the species range, and/or
- Within an area where the species is declining.

The definition of an ecologically significant proportion of a migratory species varies depending on the characteristics of each species. Factors which should be considered in determining an ecologically significant proportion include the species' population status, genetic distinctiveness and species specific behavioural patterns (such as site fidelity and dispersal rates).

It is possible that migratory species may utilise the subject site as minor foraging/roosting habitat whilst en route during migration; however, the importance of the subject site in providing foraging/roosting habitat to migratory species is marginal at best. While some trees within the subject site footprint have hollows of various sizes (up to approximately 20cm), the subject site is small in size, is subject to regular disturbance and human activity, and is spatially isolated. The subject site is also devoid aquatic habitat features (such as wetlands), which often function as significant habitat features for migratory species.

In the event that migratory species are present within the locality near the subject site, it is considered to be more likely that species will choose to forage in less disturbed habitats (such as riparian corridors or remnant vegetation) in preference to foraging at the subject site.

Overall, the subject site is not considered to incorporate important habitat for migratory species, as the site is infrequently used by such species, and does not offer key habitat features such as fresh water which may be utilised by these species en route during migration.

- ***Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or***

As outlined in previous sections, a range of design and management measures will be implemented on site to minimise the risk of invasive species becoming established and/or spreading into surrounding habitats, which includes the implementation of a controlled drainage area around the feedlot site to control and capture polluted runoff from the site.

The Proponent undertakes regular weed management on the property in accordance with routine farm management practices. These ongoing weed management practices contribute to protecting environmental values of surrounding habitats in the region.

- ***Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species***

The proposal is not considered a risk to the lifecycle of the listed migratory species.

Assessment of Significance Conclusions

The subject site at 'Horseshoe & Stud Farm' has historically been heavily disturbed for agricultural practices including opportunity feeding and containment of cattle, as well as cultivation. Currently, the site consists of dead and deteriorated open woodland within drought-feeding pens, cultivated cropland, and temporary containment pens.

In its current state, the subject site does not constitute important habitat for identified species. Areas of remnant vegetation are present throughout the property and the wider locality, in particular along paddock edges and watercourses. Such vegetation, in addition to water-based habitat associated with creeks within the locality, is likely to serve as significant remnant vegetation for a variety of threatened species. This is considered to be the preferred habitat for vulnerable species over the study area. The proposed development will not impact upon this habitat.

It is the conclusion of this assessment that there will be no significant long-term impacts on any listed ecological community, threatened or migratory species of national environmental significance as a consequence of the proposed development, providing:

- The design and management of the feedlot is in accordance with best management practices and relevant guidelines.
- Appropriate and recommended mitigation measures are implemented throughout the construction and operation of the feedlot.

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References

DoE (2013) *Matters of National Environmental – Significant Impact Guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999.* Department of the Environment

DoEE Protected Matters Search Tool (accessed 2020). Department of the Environment and Energy Website: http://www.environment.gov.au/epbc/protected-matters-search-tool

Appendix 4 – Test of Significance

Appendix 4: NSW Biodiversity Act 2016 – Test of Significance

Legislative Context

Section 7.2 of the *Biodiversity Conservation Act 2016* (BC Act) requires that the significance of the impact of a development on threatened species and endangered ecological communities is assessed using a five-part test known as a Test of Significance. Where a significant impact is likely to occur, a Species Impact Statement (SIS) must be prepared in accordance with the Director-General's requirements or a Biodiversity Development Assessment Report (BDAR) must be prepared by an accredited assessor in accordance with the Biodiversity Assessment Method (BAM).

The Test of Significance in this report has been prepared in accordance with requirements under Section 7.3 of the BC Act. It includes an assessment of the development against five parameters to determine whether there is likely to be a significant effect on the threatened species, ecological communities, or their habitats, which are recorded at or likely to occur at the site. The assessment has been conducted in accordance with the Threatened Species Test of Significance Guidelines (OEH 2018). It investigates the effects of the development proposal on threatened species, populations and ecological communities, as listed under the BC Act, pursuant to Section 1.7 of the *Environmental Planning & Assessment Act 1979* (EPA Act).

Development Background

The proposed development involves the construction of a 999 head feedlot within Narrabri Shire Council. The property is known as "Horseshoe" and is located approximately 43km south of the township of Moree and 52km north of the township of Narrabri, on the Millie Road in the Narrabri Shire. Horseshoe currently supports a mixed grazing and cropping enterprise, which includes opportunity feeding of cattle. The closest surface watercourse to the development is an unnamed first order stream, located approximately 510m west of the proposed Feedlot site. Tookey Creek, a perennial watercourse, flows in an east-west direction approximately 700m south of the proposed Feedlot.

The subject site has already been modified by human activities in association with the farm enterprise developed on the property. The proposed development site formerly supported Bimble Box (*Eucalyptus populnea*) woodland with an understorey of Wilga (*Geijera parviflora*) shrubs. In 2018, the site on which the Feedlot pens will be located was fenced off to form temporary cattle pens in order to facilitate opportunity feeding during the extended drought. Due to increased soil nutrient concentration and salinity levels resulting from cattle waste, the majority of trees, shrubs and ground flora are now dead or in extremely poor condition. These remain in situ and provide perching habitat for a variety of common birds. Cattle also utilise the tree trunks as scratching posts. The proposed sediment and effluent ponds are sited on cultivated land. Part of the proposed development (including the cattle laneway, earthen bund and catch drain) will be partially constructed within temporary containment pens located adjacent to the existing drought feeding pens. Up to four trees will be cleared to facilitate the construction of an earthen bund and drain along the western boundary of the proposed development. These are in poor condition, and their removal will not significantly alter the quality or availability of habitat in the area.

Study Area and Site Delineation

The following definitions are used throughout this report to refer to locations in the proposal area:

- The ' site' is all areas that would be directly impacted by the works. This consists of the footprint of the proposed development, including the Controlled Drainage Area;
- The 'study area' includes the site and the areas adjacent that may be indirectly impacted by the proposed works. This includes the land described as Lot 29 in DP753941;
- The 'search area' refers to a 10-kilometre area surrounding the site for the purpose of database searches.

The potential construction impacts of the development are predicted to be minimal. The site is located on land which is devoid of good-quality native vegetation. A small number of trees in poor condition will be cleared as a result of the proposed development. Construction will be undertaken in accordance with best practice construction measures to minimise the risk of erosion and protect environmental values.

A suite of measures will be implemented at the site to minimise the potential impact of the feedlot upon the surrounding environment. Measures include:

- Establishment of diversion banks as required to divert clean surface runoff from the surrounding area away from the feedlot site;
- Establishment of a Controlled Drainage Area (CDA) to capture polluted runoff generated from the site, for sustainable reuse/disposal;
- The feedlot complex is to be located on compacted soil to a minimum depth of 300mm, achieving a permeability of less than 1×10^{-9} m/s, to ensure protection of local groundwater resources; and
- A weed and pest management program will be implemented on site once the feedlot is operational, to ensure that the feedlot does not become a source of weeds or vermin for the surrounding regions.

Given the measures implemented to ensure that offsite impacts are minimised, potential impact of the Feedlot development is considered to be limited to the footprint of the feedlot site (i.e. the site).

Assessment of Potential Presence of Threatened Species

A search of the National Parks and Wildlife Atlas of NSW Wildlife (BioNet) identified species with recorded sightings within a 10km radius of the proposed development site. The complete search result for listed species is presented in Appendix A.

The project site is located with the Northern Outwash subregion of the Brigalow Belt South Bioregion. A broader search for species, populations and communities that may occur within the locality of the development site was therefore conducted through investigating known and predicted species' distributions within the Brigalow Belt South Bioregion (Northern Outwash subregion). A copy of the search results for listed species is presented in Appendix B.

Species were considered with regards to their known distribution and habitat requirements, to assess whether the site is likely to serve as suitable habitat, and subsequently whether/how the development is likely to impact upon the species. Only species that have the potential to be present within the available habitat are listed in Table 1 and assessed in this test of significance.

The following species, populations and communities are considered in the Test of Significance for the proposed development of a Feedlot on Lot 29 in Deposited Plan 753941.

Table 1: Results of BioNet Atlas Search

Scientific Name	Common Name	Legal Status	Records [1]
Circus assimilis	Spotted Harrier	BC Act: V, P	10
Hieraaetus morphnoides	Little Eagle	BC Act: V, P	6
Lophoictinia isura	Square-tailed Kite	BC Act: V,P,3	2
Falco subniger	Black Falcon	BC Act: V, P	4
Neophema pulchella	Turquoise Parrot	BC Act: V,P,3	3
Nixos connivens	Barking Owl	BC Act: V,P,3	2
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	BC Act: V,P	5

1Number of BioNet Atlas records in selected area. Status Abbreviations: Vulnerable (V), Endangered (E), Critically Endangered (CE), Protected (P), and Sensitivity Class 3 (Sensitive Species Data Policy) (3).

These above species will be considered within the assessment of significance.

Test of Significance - Assessment of Criteria and Discussion

The following is to be considered for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

The following 5-Part test is to be considered for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

A viable local population of a threatened terrestrial flora or fauna species in this assessment is defined as a population that occurs within the study area and the connected habitat surrounding the proposed development.

Bats

Yellow-bellied Sheath-tail Bat

Yellow-bellied Sheath-tail Bat may use the project area for foraging on occasion, however given the low quality of habitat within the site and the presence of larger areas of native open woodland in the study area and wider locality, it is unlikely that the site is regularly or heavily utilised by the species.

Mature Bimble Box trees (either dead or in poor/declining condition) may provide potential roosting habitat within the proposed development footprint. These trees will not be removed as part of the proposed development works and will remain in situ, continuing to provide potential roosting habitat throughout the proposed project duration.

The risk to these bat species from the development is therefore limited to the loss of sub-optimal foraging habitat. It is therefore considered that no viable local population of any threatened species will be placed at risk of extinction as a result of the proposed development.

Woodland Species

Turquoise Parrot

Habitat loss and/or degradation as a result of clearing, increased weed invasion, under-shrubbing and "tidying up", are all significant threats for these species. Up to four or five trees in poor condition (drought-impacted and/or dead) will be cleared during the pre-construction stage of the proposed Feedlot. In the long-term it is also expected that remaining living mature Bimble Box trees within the footprint of the proposal will die from indirect impacts resulting from manure deposition and associated soil contamination within the CDA.

Given the low number of trees and the small habitat area to be impacted by the proposed works, the modified nature of this habitat, and the availability of higher quality habitat in the vicinity of the proposed Feedlot, the loss of these trees is considered to constitute a negligible impact to threatened woodland species which may be present in the locality.

Additional indirect impacts include potential habitat modification resulting from spread of weed species. An ongoing weed management program will be implemented as part of the Feedlot operation, such that indirect impacts are considered minimal overall and are unlikely to place a viable population at risk of extinction.

Birds of Prey

Spotted Harrier, Little Eagle, Square-tailed Kite, Black Falcon, Barking Owl

These highly mobile species have relatively large home ranges (>200 Ha). It is therefore unlikely that the small area of poor-quality vegetation within the site is an important component of the home range of the above-mentioned species. Birds of prey are highly dependent upon the presence of prey species for their survival. The vegetation present at the site is degraded and consists of open habitat with scattered trees and shrubs with minimal groundcover; this provides limited habitat for prey species. Birds of prey also require mature overstorey trees and/or hollow bearing trees for nesting and provision of hunting perches. The trees within the site will remain in situ throughout the lifetime of the Feedlot, regardless of their condition (alive or dead), and given that many bird of prey species are known nest or perch in dead trees, the proposal is not considered to have a significant impact of the suitability of potential habitat on site for these species. The proposal will also require the clearing of up to five immature, drought impacted/dead trees. The loss of these trees is not considered to constitute a significant adverse impact on habitat availability for these species.

No population of listed threatened species was identified within the site and minimal indirect impacts are expected to occur off site. It is therefore considered that no viable local population of any threatened species will be placed at risk of extinction as a result of the proposed development. Additionally, as the site is surrounded by larger expanses of higher-quality native vegetation, local populations of fauna species will have the ability to access or preference these surrounding areas. Therefore, it is considered unlikely that any local population of threatened species within the study area will be placed at risk of extinction.

b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

- **i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- **ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

A site assessment determined that no endangered ecological communities are present or adjacent to the subject site. The proposed development is therefore not considered to impact upon endangered ecological communities.

c) in relation to the habitat of a threatened species or ecological community:

- **i. the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and**
- **ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and**
- **iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,**

The proposed development extends over approximately 4.8 Ha. As outlined above, the site consists of existing pens use to feed and contain cattle during times of drought. The sediment pond will be sited in an area of cultivated land which currently support forage Sorghum stubble. This habitat area has low species diversity and very limited structural diversity. Native vegetation within the proposed development footprint is limited to dead trees and shrubs, with some remaining living trees in poor condition owing to increased nutrient and salinity levels in the soil.

Disturbance and/or modification of the abovementioned habitat types are not considered to pose a threat to habitat availability for threatened species in the locality. The paddock is of a similar nature to extensive grazing and cropped areas throughout the property and the wider district which will not be impacted by the proposed development. Vegetation within the proposed Feedlot pen area is not considered likely to be utilised by any threatened species due to its low habitat values. The site does not constitute an important habitat corridor for species within the locality; alteration of the habitat area will not result in fragmentation of available habitat within the wider region. Overall, it is considered that disturbance and modification of habitat within the site in association with the proposed development would not result in significant impacts upon habitat availability for threatened species within the area.

The land area which will be impacted by the proposed development is considered to have negligible habitat value for threatened species. Vegetation clearance will be minimal within the proposed development site. None of the threatened species identified would reside long-term within the study area, given its small size and degraded condition. Modification of this land area is therefore not considered to pose a threat to habitat availability for threatened species within the region, as it is considered that the current habitat values of the site are very marginal.

The location of the proposed development at the site is suitable as, given the low habitat values and history of disturbance on the site, the development will have a negligible environmental impact in comparison to other locations which may have greater habitat values.

d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

There are no areas of outstanding biodiversity value either in or in the vicinity of the proposal site. The development is therefore not considered to pose a risk to declared areas of outstanding biodiversity value.

e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

Invasion of Native Plant Communities by Exotic Perennial Grasses

Invasion of Native plant communities by exotic species is listed as a key threatening process. Exotic perennial grasses (e.g. Coolatai Grass) have the capacity to invade native plant communities, competing with an excluding native species. The invasion of these grasses also reduces the habitat value for many native fauna species.

Pathogen control protocols should be developed and implemented in accordance with the requirements of the *Biosecurity Act 2015*. Provided safeguards regarding weed management are implemented, the proposed works are unlikely to result in increased weed incursion. The proposed works are therefore considered unlikely to increase the impact of this key threatening process.

Conclusion

The proposed development extends over land which has been heavily modified due to previous agricultural activities. The site consists of cultivated land and existing cattle pens which are utilised for drought feeding and temporary containment of cattle, and which contain a mixture of dead (approximately 80%) and living (approx. 20%) Bimble Box trees and Wilga shrubs.

It is unlikely that significant indirect, off-site impacts will arise from the proposed development, provided that appropriate measures are put in place during the construction and operation of the feedlot. Direct impacts within the site are limited to the clearing of 2 living trees (immature) and 3 dead trees to facilitate the construction of catch drains to the west of the proposal site. The operation of the Feedlot is also likely to results in changes in additional increases in soil nutrient concentration and salinity, resulting from deposition of manure and urine by livestock over the lifetime of the proposed project. These changes are likely to impact remaining living trees and shrubs within the feedlot pen footprint and may lead to their death over time.

Whilst the site may serve as marginal habitat for a number of threatened species within the region, it is small and is highly modified in nature as a result of previous agricultural activities. It would therefore not function as ecologically important habitat for any identified species and consequently, alteration of habitat within the site is not predicted to pose a risk to threatened flora and fauna within the wider locality.

The above assessment was conducted under the provisions of the *Biodiversity Conservation Act 2016* and determined that the proposal would not have a significant impact on any listed threatened species or their habitat and as such further assessment is not required.

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Appendix A: Bionet Threatened Species, Populations and Communities Search Results for a 10-kilometre radius from the Site

Scientific Name	Common Name	NSW Status	Comm. Status	Records
Hieraaetus morphnoides	Little Eagle	V,P		2
Calyptorhynchus lathami	Glossy Black-Cockatoo	V,P,2		3
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V,P		1
Tylophora linearis		V	E	1
Digitaria porrecta	Finger Panic Grass	E1		2
Homopholis belsonii	Belson's Panic	E1	V	12

Appendix B: Bionet Threatened Species, Populations and Communities Search Results for Brigalow Belt South Bioregion (Northern Outwash IBRA Subregion)

Note:

The following definitions are used throughout the table below to refer to locations in the proposal area:

- The ' site' describes all areas that would be directly impacted by the works. This includes the access route and the footprint of the proposed feedlot and Controlled Drainage Area (CDA);
- The 'study area' includes the site and the areas adjacent that may be indirectly impacted by the proposed works;
- The 'search area' refers to a 10-kilometre area surrounding the proposal for the purpose of database searches.

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
Aves					
Alectura lathami **Australian Brush-turkey**	BC Act - E	Largely coastal distribution from Cape York south as far as the Illawarra in NSW. Occurs in forested and wooded areas of tropical and warm-temperate districts, particularly above 300 m to at least 1200 m altitude. Usually prefers dry rainforest that is found within the Semi-evergreen Vine Thicket.	P	**Low** The subject site is outside of the species' range and thus is therefore not considered important habitat.	No
Anseranas semipalmata Magpie Goose	BC Act - V	Mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges. Equally at home in aquatic or terrestrial habitats; often seen walking and grazing on land; feeds on grasses, bulbs and rhizomes. Activities are centred on wetlands, mainly those on floodplains of rivers and large shallow wetlands formed by run-off; breeding can occur in both summer and winter.	3	**Unlikely** There is no suitable habitat on the subject site or study area.	No
Ephippiorhynchus asiaticus **Black-necked Stork**	BC Act - E	Floodplain wetlands (swamps, billabongs, watercourses and dams) of the major coastal rivers are the key habitat in NSW for the Black-necked Stork. Secondary habitat	1	**Low** The subject site is outside of the species' range (coastal habitat) and	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
		includes minor floodplains, coastal sandplain wetlands and estuaries.		thus is therefore not considered important habitat.	
Circus assimilis **Spotted Harrier**	BC Act - V	In New South Wales, this species is widespread from coast to inland, including the western slopes of the Great Dividing Range and farther west. It is sparsely scattered in, or largely absent from, much of the Upper Western region. Primarily inhabits woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations. It has also been recorded in shrublands and heathlands and various modified habitats, including regenerating forests; very occasionally in moist forests or rainforests. Generally, the understorey is open with sparse eucalypt saplings, acacias and other shrubs, including heath.	10	**Moderate** This species may hunt within the subject site.	Yes
Haliaeetus leucogaster **White-bellied Sea-Eagle**	BC Act - V	The White-bellied Sea-eagle is distributed around the Australian coastline, including Tasmania, and well inland along rivers and wetlands of the Murray Darling Basin. In New South Wales it is widespread along the east coast, and along all major inland rivers and waterways. Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea.	3	**Low** The site is not considered important for this species due to the paucity of suitable habitat in surrounding areas.	No
Hieraaetus morphnoides **Little Eagle**	BC Act - V	The Little Eagle is found throughout the Australian mainland. Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.	6	**Moderate** This species may hunt throughout the subject site. Furthermore there are records of this species within 10km of the subject site. The species is therefore considered in this assessment.	Yes

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
Lophoictinia isura **Square-tailed Kite**	BC Act - V	In NSW, the species is a regular resident in the north, north-east and along the major west-flowing river systems. Found in a variety of timbered habitats including dry woodlands and open forests. Is a specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items from the outer foliage. Appears to occupy large hunting ranges of more than 100km.	2	**Moderate** This species may hunt throughout the subject site.	Yes
Falco hypoleucos **Grey Falcon**	BC Act - E	The Grey Falcon is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin. The breeding range has contracted since the 1950s with most breeding now confined to arid parts of the range. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. Also occurs near wetlands where surface water attracts prey.	P	**Moderate** This species is not considered in this assessment due to a paucity of suitable habitat.	Yes
Falco subniger **Black Falcon**	BC Act - V	The Black Falcon is widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions. In New South Wales there is assumed to be a single population that is continuous with a broader continental population, given that falcons are highly mobile, commonly travelling hundreds of kilometres.	4	**Moderate** This species may hunt throughout the subject site.	Yes
Ardeotis australis **Australian Bustard**	BC Act - E	The Australian Bustard mainly occurs in inland Australia and is now scarce or absent from southern and south-eastern Australia. In NSW, they are mainly found in the north-west corner and less often recorded in the lower western and central west plains regions. Breeding now only occurs in the north-west region of NSW. Mainly	3	**Low** The subject site is not considered important habitat for this species given the paucity of suitable habitat and the fact that the species is mainly	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
		inhabits tussock and hummock grasslands, though prefers tussock grasses to hummock grasses; also occurs in low shrublands and low open grassy woodlands; occasionally seen in pastoral and cropping country, golf courses and near dams.		found in the north-west corner of NSW.	
Burhinus grallarius **Bush Stone-curlew**	BC Act - E	The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber. Feed on insects and small vertebrates, such as frogs, lizards and snakes. Nest on the ground in a scrape or small bare patch.	P	**Low** There is no suitable habitat for this species within the subject site and it is therefore not considered important for the species.	No
Calyptorhynchus lathami **Glossy Black-Cockatoo**	BC Act - V	Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak and Forest Sheoak are important foods. Inland populations feed on a wide range of sheoak. Belah is also utilised and may be a critical food source for some populations. Feeds almost exclusively on the seeds of several species of she-oak (*Casuarina* and *Allocasuarina* species), shredding the cones with the massive bill. Dependent on large hollow-bearing eucalypts for nest sites.	10	**Low** There is no suitable habitat within the subject site for the species. No Sheoak trees were recorded in the vicinity of the site and it is therefore not considered important habitat for the Glossy Black-Cockatoo.	No
Neophema pulchella **Turquoise Parrot**	BC Act - V	Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. Prefers to feed in the shade of a tree and spends most of the day on the ground searching for the seeds or grasses and herbaceous plants, or browsing on vegetable matter.	3	**Moderate** This species may forage within the subject site, given the presence of suitable habitat in the study area.	Yes

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
		Nests in tree hollows, logs or posts, from August to December.			
Ninox connivens **Barking Owl**	BC Act - V	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey on these fertile riparian soils.	2	**Moderate** This species may hunt throughout the subject site.	Yes
Tyto longimembris **Eastern Grass Owl**	BC Act - V	Eastern Grass Owls are found in areas of tall grass, including grass tussocks, in swampy areas, grassy plains, swampy heath, and in cane grass or sedges on flood plains. They rest by day in a 'form' - a trampled platform in a large tussock or other heavy vegetative growth. Always breeds on the ground. Nests are found in trodden grass, and often accessed by tunnels through vegetation.	1	**Low** This species is not considered in this assessment due to a paucity of suitable habitat within the subject site.	No
Climacteris picumnus victoriae **Brown Treecreeper (eastern subspecies)**	BC Act - V	The Brown Treecreeper is endemic to eastern Australia and occurs in eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range. Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species. When foraging in trees and on the ground, they peck and probe for insects, mostly ants, amongst the litter, tussocks and fallen timber, and along trunks and lateral branches.	1	**Low** The subject site is not considered important habitat for the species, due to a paucity of suitable habitat within the site. Furthermore there are is only a single record within the Northern Outwash IBRA subregion.	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
		Hollows in standing dead or live trees and tree stumps are essential for nesting.			
Chthonicola sagittata **Speckled Warbler**	BC Act - V	The Speckled Warbler has a patchy distribution throughout the eastern half of NSW. There has been a decline in population density throughout its range, with the decline exceeding 40% where no vegetation remnants larger than 100ha survive. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. The diet consists of seeds and insects, with most foraging taking place on the ground around tussocks and under bushes and trees. The rounded, domed, roughly built nest of dry grass and strips of bark is located in a slight hollow in the ground or the base of a low dense plant, often among fallen branches and other litter.	1	**Low** The subject site is not considered important habitat for the species, which is dependent on woodland/forest for nesting and foraging. The majority of trees within the subject site are dead and therefore the subject site are not considered important habitat for the species.	No
Grantiella picta **Painted Honeyeater**	BC Act - V	The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. Inhabits Boree/ Weeping Myall (*Acacia pendula*), Brigalow (*A. harpophylla*) and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus *Amyema*.	32	**Low** The subject site is not considered important habitat for the species. No mistletoe was recorded during the site visit and the preferred habitat type of this species is not present in the subject site.	No
Melithreptus gularis gularis **Black-chinned Honeyeater**	BC Act - V	The Black-chinned Honeyeater has two subspecies, with only the nominate (*gularis*) occurring in NSW where it is widespread, with records from the tablelands and western slopes of the Great Dividing Range to the north-	3	**Low** The subject site is not considered important habitat for the species, given that there is no suitable habitat for the	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
		west and central-west plains and the Riverina. Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts. Feeding territories are large making the species locally nomadic. Recent studies have found that the Black-chinned Honeyeater tends to occur in the largest woodland patches in the landscape as birds forage over large home ranges of at least 5 hectares.		species in the subject site and the adjacent woodland patch is less than 5 Ha.	
Pomatostomus temporalis temporalis **Grey-crowned Babbler (eastern subspecies)**	BC Act - V	In NSW, the eastern sub-species occurs on the western slopes of the Great Dividing Range, and on the western plains reaching as far as Louth and Balranald. Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Woodlands on fertile soils in coastal regions. Feed on invertebrates, either by foraging on the trunks and branches of eucalypts and other woodland trees or on the ground, digging and probing amongst litter and tussock grasses.	34	**Moderate** The subject site is not considered important habitat for the species, which is dependent on woodland/forest habitat. There is no suitable habitat for the species within the subject site.	No
Daphoenositta chrysoptera **Varied Sittella**	BC Act - V	Inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees, and from small branches and twigs in the tree canopy.	7	**Low** The species is dependent on woodland/forest habitat. The subject site contains numerous dead trees and a small number of Bimble Box and Wilga which are in declining condition. The subject site is therefore not considered suitable habitat for the species.	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
Artamus cyanopterus cyanopterus **Dusky Woodswallow**	BC Act - V	Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. Primarily eats invertebrates, mainly insects, which are captured whilst hovering or sallying above the canopy or over water. Most breeding activity occurs on the western slopes of the Great Dividing Range.	1	**Low** The subject site does not contain woodland habitat or suitable foraging habitat required to support this species and is therefore not considered important habitat for the species.	No
Melanodryas cucullata cucullata **Hooded Robin (south-eastern form)**	BC Act - V	The south-eastern form (subspecies *cucullata*) is found from Brisbane to Adelaide and throughout much of inland NSW, with the exception of the extreme north-west, where it is replaced by subspecies *picata*. Two other subspecies occur outside NSW. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.	2	**Low** The subject site is not considered important habitat due to the limited structural diversity and the modified nature of grassland onsite.	No
Stagonopleura guttata **Diamond Firetail**	BC Act - V	Found in grassy eucalypt woodlands, including Box-Gum Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Prefers clearings or areas with open understoreys. Feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects. Nests are globular structures built either in the shrubby understorey, or higher up, especially under hawk's or raven's nests. Birds roost in dense shrubs or in smaller nests built especially for roosting.	2	**Low** The subject site does not contain suitable habitat for the species.	No
Mammalia					

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
Dasyurus maculatus **Spotted-tailed Quoll**	BC Act - V	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites. Females occupy home ranges of 200-500 hectares, while males occupy very large home ranges from 500 to over 4000 hectares.	1	**Low** The species may travel through or rest within the site given its very large home range, however it is not considered important habitat for the species. No potential den sites were observed on site and there is little natural habitat available in the subject site.	No
Sminthopsis macroura **Stripe-faced Dunnart**	BC Act - V	The species is rare on the NSW Central West Slopes and North West Slopes with the most easterly records of recent times located around Dubbo, Coonabarabran, Warialda and Ashford. Found in native dry grasslands and low dry shrublands, often along drainage lines where food and shelter resources tend to be better. Co-occupies areas with the more common Fat-tailed Dunnart, but prefers relatively ungrazed habitats with greater diversity and healthier understorey vegetation.	P	**Low** The subject site is not considered important habitat for the species given the species preference for ungrazed, native grasslands with a healthy species and structural diversity.	No
Phascolarctos cinereus **Koala**	BC Act - V	Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size.	152	**Low** Bimble Box trees are listed as a feed tree species within the Western Slopes and Plains management area (NSW Dept. of Planning, Industry and the Environment 2019). There are a few Bimble Box trees in poor condition (due to increased nutrient and salinity levels associated with existing cattle pens) within the proposed development area. These trees are not considered to provide suitable foraging habitat for	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
				the species, in particular when taking in consideration that the habitat in and adjacent to the subject site is not contiguous habitat.	
Macropus dorsalis **Black-striped Wallaby**	BC Act - E	From the Townsville area in Queensland to northern NSW where it occurs on both sides of the Great Divide. On the north west slopes of NSW it occurs in Brigalow remnants to south of Narrabri. Preferred habitat is characterised by dense woody or shrubby vegetation within three metres of the ground. This dense vegetation must occur near a more open, grassy area to provide suitable feeding habitat. On the north west slopes, associated with dense vegetation, including brigalow, ooline and semi-evergreen vine thicket.	8	**Low** There is no suitable habitat (dense vegetation) within the subject site. The subject site is therefore not considered important habitat.	No
Pteropus poliocephalus **Grey-headed Flying-fox**	BC Act - V	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.	P	**Low** There is no suitable habitat, including foraging and roosting habitat, for the species on the subject site. Therefore the subject site is not considered important habitat for the species.	No
Saccolaimus flaviventris **Yellow-bellied Sheathtail-bat**	BC Act - V	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.	5	**Moderate** This species may forage within the open areas of the subject site.	Yes
Setirostris eleryi	BC Act - E	In NSW, the species has been recently recorded from only three disjunct locations: thirteen individuals from	K	**Low**	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
Bristle-faced Free-tailed Bat		Gundabooka National Park, south of Bourke; one individual from Dhinnia Dthinawan Nature Reserve (formerly Bebo State Forest), north of Warialda two individuals near Bonshaw. Appears to be extremely rare throughout its range. Nationally, it has been recorded from only 15 locations. Knowledge of the ecology of the Hairy-nosed Freetail Bat is limited, however evidence suggests that the species depends on hollows and tree fissures for roosting sites.		Given the rarity of the species and the lack of suitable habitat on the subject site, it is not considered important habitat for the species.	
Chalinolobus picatus **Little Pied Bat**	BC Act - V	Occurs in dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress pine forest and mallee and Bimbil box woodlands. Roosts in caves, rock outcrops, mine shafts, tunnels, tree hollows and buildings. Feeds on moths and possibly other flying invertebrates.	4	**Low** Habitat within the subject site is highly modified and natural habitat is limited to trees and shrubs which are either dead or in decline. It is therefore unlikely that the site constitutes important habitat for the species.	No
Nyctophilus corbeni **Corben's Long-eared Bat**	BC Act - V	Inhabits a variety of vegetation types, including mallee, bulloke and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation. Roosts in tree hollows, crevices, and under loose bark. Slow flying agile bat, utilising the understorey to hunt non-flying prey - especially caterpillars and beetles - and will even hunt on the ground.	P	**Low** Habitat within the subject site is highly modified and natural habitat is limited to trees and shrubs which are either dead or in decline. It is therefore unlikely that the site constitutes important habitat for the species.	No
Pseudomys gouldii **Gould's Mouse**	BC Act - E	The species is presumed extinct in NSW. The species is reported to have preferred sandhills and plains, and to make burrows under bushes in loose soil.	1	**Low** The species is presumed extinct, and the subject site is therefore not considered important habitat.	No
Reptilia					

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
Anomalopus mackayi **Five-clawed Worm-skink**	BC Act – E	The species has a patchy distribution on the North West Slopes and Plains of north-east NSW. Occurs close to or on the lower slopes of slight rises in grassy White Box woodland on moist black soils, and River Red Gum-Coolibah-Bimble Box woodland on deep cracking loose clay soils. May also occur in grassland areas and open paddocks with scattered trees.	1	**Moderate** The subject site is not considered important habitat for the species due to a paucity of suitable habitat.	No
Furina dunmalli **Dunmall's Snake**	BC Act – Not listed	Preferred habitat is Brigalow forest and woodland with fallen timber and ground litter, growing on cracking clay soils and clay loam soils. Also occurs in eucalypt and *Callitris* woodland with fallen timber and ground litter.	P	**Low** There is no suitable habitat for the species within the subject site.	No
Hoplocephalus bitorquatus **Pale-headed Snake**	BC Act - V	A patchy distribution from north-east Queensland to the north-eastern quarter of NSW. In NSW it has historically been recorded from as far west as Mungindi and Quambone on the Darling Riverine Plains, across the north west slopes, and from the north coast from Queensland to Sydney. Found mainly in dry eucalypt forests and woodlands, cypress forest and occasionally in rainforest or moist eucalypt forest. In drier environments, it appears to favour habitats close to riparian areas.	4	**Low** There is no suitable habitat for the species within the subject site. The subject site is therefore not considered important habitat for the Pale-headed Snake.	No
Insecta					
Jalmenus eubulus **Pale Imperial Hairstreak**	BC Act – E	In NSW, the species is found only in brigalow-dominated open forests and woodlands in northern areas of the state. Only known to breed in old-growth forest or woodland and does not appear to colonise regowth habitats following clearing or other major disturbance.	4	**Low** The subject site is not considered important for this species due to the lack of suitable habitat.	No
Flora					
Tylophora linearis	BC Act – V	Grows in dry scrubland that may have a eucalypt,	1	**Low**	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
		Callitris glaucophylla and/or *Allocasuarina luehmannii* overtopping the scrub, in the Barraba, Mendooran, Temora and West Wyalong districts.		The subject site is outside of the species' known distribution. It is therefore not considered important habitat for the species.	
Lepidium aschersonii **Spiny Peppercress**	BC Act – V	Not widespread, occurring in the marginal central-western slopes and north-western plains regions of NSW (and potentially the south western plains). In the north of the State recent surveys have recorded a number of new sites including Brigalow Nature Reserve, Brigalow State Conservation Area, Leard State Conservation Area and Bobbiwaa State Conservation Area. Found on ridges of gilgai clays dominated by Brigalow (*Acacia harpophylla*), Belah (*Casuarina cristata*), Buloke (*Allocasuarina luehmanii*) and Grey Box (*Eucalyptus microcarpa*).	P	**Low** The subject site does not constitute suitable habitat for the species. Therefore the subject site is not considered important habitat for the species.	No
Cyperus conicus	BC Act – E	Occurs rarely in the Pilliga area of NSW and is also found across the tropics in in Qld, WA and the NT, including central deserts north of Alice Springs. Grows in open woodland on sandy soil. In central Australia, the species grows near waterholes and on the banks of streams in sandy soils. Recorded from Callitris forest in the Pilliga area, growing in sandy soil with *Cyperus gracilis, C. squarrosus* and *C. fulvus*.	P	**Low** Within NSW, this species is not known to occur outside of the Piliga forest. The subject site is therefore not considered important habitat for the species.	No
Desmodium campylocaulon **Creeping Tick-trefoil**	BC Act – E	Occurs chiefly in the Collarenebri and Moree districts in the north-western plains of NSW. Creeping Tick-Trefoil is confined to clay soils, usually with *Astrebla* and *Iseilema* species. In NSW *Desmodium campylocaulon* grows on cracking black soils in the Narrabri, Moree and Walgett local government areas. The species is said to be hardy,	78	**Low** Nutrient and salinity levels within the subject site have been increased through the site's previous land use as drought feeding pens for cattle. The site is therefore highly modified and is	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
		but grazed where sheep have regular access. Plants are strongly stoloniferous and well-cropped by cattle.		not considered as suitable habitat for any threatened flora species.	
Swainsona murrayana **Slender Darling Pea**	BC Act – V	Found throughout NSW, it has been recorded in the Jerilderie and Deniliquin areas of the southern riverine plain, the Hay plain as far north as Willandra National Park, near Broken Hill and in various localities between Dubbo and Moree. Grows in a variety of vegetation types including bladder saltbush, black box and grassland communities on level plains, floodplains and depressions and is often found with *Maireana* species. Plants have been found in remnant native grasslands or grassy woodlands that have been intermittently grazed or cultivated.	7	**Low** Nutrient and salinity levels within the subject site have been increased through the site's previous land use as drought feeding pens for cattle. The site is therefore highly modified and is not considered as suitable habitat for any threatened flora species.	No
Phyllanthus maderaspatensis	BC Act – E	Recorded for the Brewarrina and Collarenebri districts in the north-western plains of NSW. Grows in floodplain areas on heavy soils and may rely on appropriate and intermittent rainfall and flooding events for its survival. The species is described as being a summer-growing annual and is thus dependent on seasonal conditions. Often associated with open grasslands and eucalypt woodlands in or near creek beds, and grassy flats and levees near watercourses.	1	**Low** This species is only known from 2 locations within the north-western plains. It is unlikely that any listed plant species would be found in the area given the history of drought feeding and cattle containment within the subject site. The site is therefore not considered important habitat for the species.	No
Dichanthium setosum **Bluegrass**	BC Act – V	Bluegrass occurs on the New England Tablelands, North West Slopes and Plains and the Central Western Slopes of NSW, extending to northern Queensland. Associated with heavy basaltic black soils and red-brown loams with clay subsoil. Often found in moderately disturbed areas such	4	**Low** Nutrient and salinity levels within the subject site have been increased through the site's previous land use as drought feeding pens for cattle. The site is therefore highly modified and is	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
		as cleared woodland, grassy roadside remnants and highly disturbed pasture.		not considered as suitable habitat for any threatened flora species.	
Digitaria porrecta **Finger Panic Grass**	BC Act – E	In NSW, the most frequently recorded associated tree species are *Eucalyptus albens* and *Acacia pendula*. Common associated grasses and forbs in NSW sites include *Austrostipa aristiglumis, Enteropogon acicularis, Cyperus bifax, Hibiscus trionum* and *Neptunia gracilis*. Common associated grasses and forbs in NSW sites include *Austrostipa aristiglumis, Enteropogon acicularis, Cyperus bifax, Hibiscus trionum* and *Neptunia gracilis*.	24	**Low** Nutrient and salinity levels within the subject site have been increased through the site's previous land use as drought feeding pens for cattle. The site is therefore highly modified and is not considered as suitable habitat for any threatened flora species.	No
Homopholis belsonii **Belson's Panic**	BC Act – E	Occurs on the northwest slopes and plains of NSW, mostly between Wee Waa, Goondiwindi and Glen Innes. It also occurs in Queensland, mainly in the Brigalow Belt South bioregion. Grows in dry woodland (e.g. Belah) often on poor soils, although sometimes found in basalt-enriched sites north of Warialda and in alluvial clay soils.	118	**Low** Nutrient and salinity levels within the subject site have been increased through the site's previous land use as drought feeding pens for cattle. The site is therefore highly modified and is not considered as suitable habitat for any threatened flora species.	No
Polygala linariifolia **Native Milkwort**	BC Act – E	North from Copeton Dam and the Warialda area to southern Queensland. The species has been recorded from the Inverell and Torrington districts growing in dark sandy loam on granite in shrubby forest of *Eucalyptus caleyi, Eucalyptus dealbata* and *Callitris*, and in yellow podsolic soil on granite in layered open forest.	P	**Low** Nutrient and salinity levels within the subject site have been increased through the site's previous land use as drought feeding pens for cattle. The site is therefore highly modified and is not considered as suitable habitat for any threatened flora species.	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
***Cadellia pentastylis* Ooline**	BC Act – V	Occurs along the western edge of the North West Slopes from north of Gunnedah to west of Tenterfield. Also occurs in Queensland. Ooline is a medium-sized spreading tree usually about 10 m tall, and rarely to 25 m. It forms a closed or open canopy mixing with eucalypt and cypress pine species.	P	**Low** The species is not present within the subject site, and the subject site is not considered potential habitat given the previous land use.	No
Communities					
Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions	BC Act – EEC	The Brigalow community is a low woodland or forest community dominated by Brigalow (*Acacia harpophylla*), with pockets of Belah (*Casuarina cristata*) and Poplar Box (*Eucalyptus populnea subsp. bimbil*). Scattered remnants on the North West Slopes and Plains and Darling River Plains in NSW. This community has been extensively cleared for agriculture, with most surviving remnants along roadsides and paddock edges.	K	**Low** This EEC does not occur on the site, and the site is thus not considered important habitat.	No
***Cadellia pentastylis* (Ooline) community in the Nandewar and Brigalow Belt South Bioregions**	BC Act – EEC	The Ooline community is an unusual and distinctive forest community with the canopy dominated by the tree Ooline (*Cadellia pentastylis*). The understorey is made up of a range of shrubs, such as Wattles (*Acacia* spp.), and grasses. Extensively cleared and now known from only seven main locations on the North West Slopes in NSW, between Narrabri and the Queensland border, and also in Queensland.	K	**Low** This EEC does not occur on the site, and the site is thus not considered important habitat.	No
Carbeen Open Forest Community in the Darling Riverine Plains and Brigalow Belt South Bioregions	BC Act – EEC	This was previously an open forest community of flora and fauna that may now exist as woodland or as remnant trees. Carbeen Open Forest Community is a distinctive plant community on the riverine plains of the Meehi, Gwydir, MacIntyre and Barwon Rivers and in small remnants farther south. It is found on flats and gentle	K	**Low** This EEC does not occur on the site, and the site is thus not considered important habitat.	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
		rises of alluvial or aeolian sandy soils derived from ancient watercourses (it also occurs on some clay alluvial soils but is mostly restricted to well-drained sandy sites)			
Coolibah-Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands Bioregions	BC Act – EEC	Abiotic factors that help define this community are that it typically occurs on grey self-mulching clays of periodically waterlogged floodplains, swamp margins, ephemeral wetlands and stream levees. The vegetative community provides characteristic habitat features of value to particular fauna, including a grassy understorey with scattered fallen logs, areas of deep-cracking clay soils, patches of thick regenerating Eucalyptus saplings, and large trees containing a diverse bark and foliage foraging resource and an abundance of small and large hollows.	P	**Low** This EEC does not occur on the site, and the site is thus not considered important habitat.	No
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	BC Act – EEC	Inland Grey Box Woodland occurs on fertile soils of the western slopes and plains of NSW. The community generally occurs where average rainfall is 375- 800 mm pa and the mean maximum annual temperature is 22-26°C. Inland Grey Box Woodland includes those woodlands in which the most characteristic tree species, *Eucalyptus microcarpa* (Inland Grey Box), is often found in association with *E. populnea* subsp. *bimbil* (Bimble or Poplar Box), *Callitris glaucophylla* (White Cypress Pine), *Brachychiton populneus* (Kurrajong), *Allocasuarina luehmannii* (Bulloak) or *E. melliodora* (Yellow Box), and sometimes with *E. albens* (White Box). Shrubs are typically sparse or absent, although this component can be diverse and may be locally common, especially in drier western portions of the community. A variable ground layer of grass and herbaceous species is present at most	P	**Low** This EEC does not occur on the site, and the site is thus not considered important habitat.	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
		sites. At severely disturbed sites the ground layer may be absent.			
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	BC Act – EEC	This ecological community is scattered across the eastern parts of the alluvial plains of the Murray-Darling river system. Typically, it occurs on red-brown earths and heavy textured grey and brown alluvial soils within a climatic belt receiving between 375 and 500 mm mean annual rainfall. The structure of the community varies from low woodland and low open woodland to low sparse woodland or open shrubland, depending on site quality and disturbance history. The tree layer grows up to a height of about 10 metres and invariably includes *Acacia pendula* (Weeping Myall or Boree) as one of the dominant species or the only tree species present. The understorey includes an open layer of chenopod shrubs and other woody plant species and an open to continuous groundcover of grasses and herbs.	K	**Low** This EEC does not occur on the site, and the site is thus not considered important habitat.	No
Semi-evergreen Vine Thicket in the Brigalow Belt South and Nandewar Bioregions	BC Act – EEC	A low, dense form of dry rainforest generally less than 10 m high, made up of vines and rainforest trees as well as some shrubs. This community often occurs on rocky hills, in deep, loam, high nutrient soils derived from basalt or other volcanic rocks, in areas which are sheltered from frequent fire.	P	**Low** This EEC does not occur on the site, and the site is thus not considered important habitat.	No
White Box Yellow Box Blakely's Red Gum Woodland	BC Act – EEC	White Box Yellow Box Blakely's Red Gum Woodland is an open woodland, in which the most obvious species are one or more of the following: White *Box Eucalyptus albens*, Yellow Box *E. melliodora* and Blakely's Red *Gum E. blakelyi*. Intact sites contain a high diversity of plant species, including the main tree species, additional tree	K	**Low** This EEC does not occur on the site, and the site is thus not considered important habitat.	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
		species, some shrub species, several climbing plant species, many grasses and a very high diversity of herbs. Characterised by the presence or prior occurrence of White Box, Yellow Box and/or Blakely's Red Gum. Shrubs are generally sparse or absent, though they may be locally common. Remnants generally occur on fertile lower parts of the landscape where resources such as water and nutrients are abundant.			

Appendix 5 – AHIMS Results

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : 20-17

Client Service ID : 525063

SMK Consultants Pty Ltd - Moree

P O Box 774
Moree New South Wales 2400

Attention: Marie Duffy

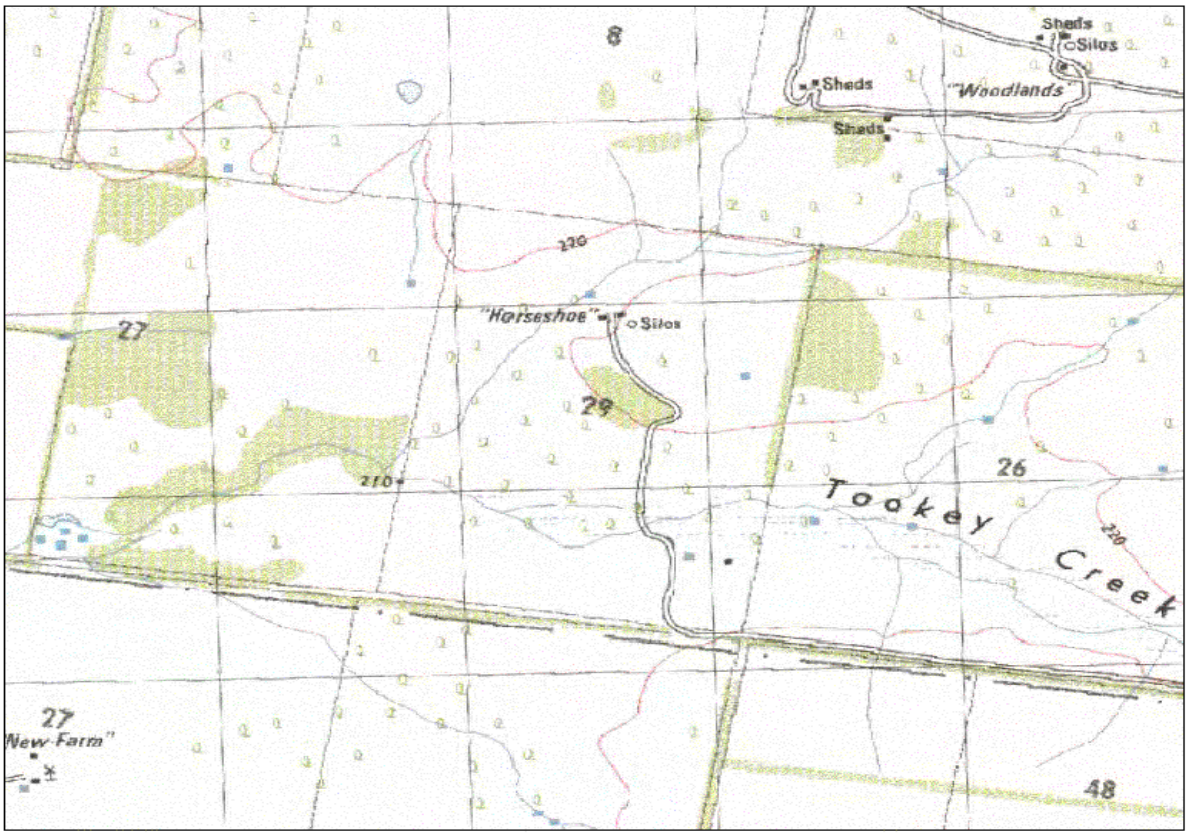
Email: marie@smk.com.au

Date: 04 August 2020

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 29, DP:DP753941 with a Buffer of 1000 meters, conducted by Marie Duffy on 04 August 2020.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

3 Marist Place, Parramatta NSW 2150
Locked Bag 5020 Parramatta NSW 2220
Tel: (02) 9585 6380 Fax: (02) 9873 8599

ABN 30 841 387 271
Email: ahims@environment.nsw.gov.au
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Appendix 6 – Odour Assessment

SMK

CONSULTANTS

surveying – irrigation – environmental – planning
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999 Head Cattle Feedlot at 'Horseshoe & Stud Park'

Level 1 Odour Assessment

Lot 29 in Deposited Plan 753941
Dobikin Pastoral Co Pty Ltd

September 2020

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1 Introduction

The following provides a Level 1 Odour Impact Assessment for a proposed 999 Head Cattle Feedlot on the property of "Horseshoe & Stud Park". The assessment is based on guidelines for odour assessment prepared by NSW EPA and the Department of Environment and Conservation. The methodology has been adopted as a universal method of feedlot odour assessment across Australia.

1.1 Aims and Objectives

This assessment aims to ensure that potential offensive odours that may be generated by the feedlot do not cause unreasonable interference to the community. Accordingly, feedlots should be separated from sensitive receptors by a sufficient distance to limit any adverse impacts resulting from odour, dust, noise or aesthetic considerations to an acceptable level.

The proposed objectives for the Horseshoe Feedlot are to:

- Minimise odour emissions and their impacts;
- Ensure that the feedlot facilities do not expose neighbouring land users to an unacceptable level of odorous emission; and
- Ensure that the feedlot operates in such a manner that the odour emissions are managed within the accepted criteria.

1.2 Legislation

This assessment was prepared in accordance with the following relevant legislation and NSW EPA required guidelines:

- *Protection of the Environment Operations Act 1997* (POEO Act)
- *Protection of the Environment Operations Clean Air Regulation 2010* (POEO Clean Air Regulation)
- *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW 2005*
- *Technical Framework: Assessment and Management of Odour from Stationary Sources, DEC 2006* (Technical Framework)
- *Technical Notes: Assessment and Management of Odour from Stationary Sources, DEC 2006* (Technical Notes)

1.3 Classifying Odour

Odour can generally be classified into the following categories:

- **Point source**: broadly contains activities that involve stack emissions of odour. Generally, these are controllable through waste reduction, minimisation and cleaner production principles or conventional emissions control equipment.

- **Diffuse/ Fugitive source**: lists activities that are generally dominated by area or volume source emissions of odour, which can be more difficult to control (e.g. intensive agricultural activities)[1].

1.4 Odour Measurement

Odour is typically measured in Odour Units (OU) that indicate the concentration of odorous mixtures. The detectability of an odour is a sensory property that refers to the theoretical minimum concentration that produces an olfactory response or sensation. This point is called the 'odour threshold'. The number of OU is the concentration of a sample divided by the odour threshold or the number of dilutions required for the sample to reach the threshold. This threshold is the numerical value equivalent to when 50% of a testing panel correctly detect an odour. Therefore, an odour criterion of less than 1 OU would theoretically result in no odour being experienced. For complex mixtures of odours, odour is specified in OU/m^3 (odour units per cubic metre) as a nose-response-time average.

1.5 Odour Criteria

The proposed development involves an intensive agricultural activity and under the Technical Framework is classed as an activity with the potential to produce a complex mixture of air pollutants. The following criteria is recommended as threshold criteria to protect the majority of the population living within the vicinity of activities that emit odour. The impact assessment criteria for complex mixtures of odorous air pollutants in Table 1 have been extracted from the *Approved methods for the modelling and assessment of air pollutants in NSW* and are further outlined in the Technical Framework.

Table 1: Odour Criteria

Population of affected community	Odour assessment criteria[2] (OU)
Rural single residence	7.0
~ 10	6.0
~ 30	5.0
~ 125	4.0
~ 500	3.0
Urban area (≥2000) and/or schools and hospitals	2.0

Source: Table 7.5 Approved methods for the modelling and assessment of air pollutants in NSW (2005)

The odour assessment criteria applicable to rural single residences located close to Horseshoe & Stud Park is 7.0 OU. To be considered within the acceptable limits of the criteria, the predicted odour levels must not be exceeded for 99% of the time.

[1] *Technical Notes: Assessment and Management of Odour from Stationary Sources, DEC, 2006*

[2] Nose-response-time average, 99th percentile, AS4323.3-2001

2 Development Proposal and Associated Activities

2.1 Development Background

The proposal involves the construction and operation of a feedlot with a maximum capacity of 999 head on the property of Horseshoe & Stud Park. The property is located approximately 7 kilometres north west of the village of Bellata. The property incorporates a total of 1,400 Ha of land, extending over relatively flat topography. The proposed feedlot site is situated on an ironstone ridge in the vicinity of the existing sheds and homestead. The land is zoned as RU1 - Primary Production under the Narrabri Local Environment Plan 2012 (the LEP). The property currently used for grazing and cropping.

Existing infrastructure on site includes internal access roads, cattle handling facilities, cattle pens, feedmill, grain storage facilities, water storage, sheds and a residence. The proposal would involve the reconfiguration of pens and the construction of sedimentation and effluent ponds. Existing access roads are sufficient for the purposes of the proposed feedlot. The feedlot has been designed to have a stocking density of 19 m^2/head at maximum capacity and will be operated to a high design standard equivalent to a Class 1 feedlot.

The property has historically been partially cleared for agricultural purposes. Areas retained as grazing land, ridges and riparian areas retain remnant vegetation, while cultivated areas have been entirely cleared. Significant areas of remnant vegetation also occur in the wider region, particularly to the east and south of the property. All properties directly adjacent to Horseshoe are also zoned RU1 – Primary Production under the Narrabri LEP. As a result, the development will not be out of character for the surrounding area. There is limited potential for future land use conflict with respect to surrounding properties in the locality. The surrounding area is zoned as RU1 and therefore the potential for additional subdivision and construction of additional residences is considered limited.

Figure 1 presents an aerial image of the region surrounding the property. The image provides an indication of the extent of agricultural development within the region.

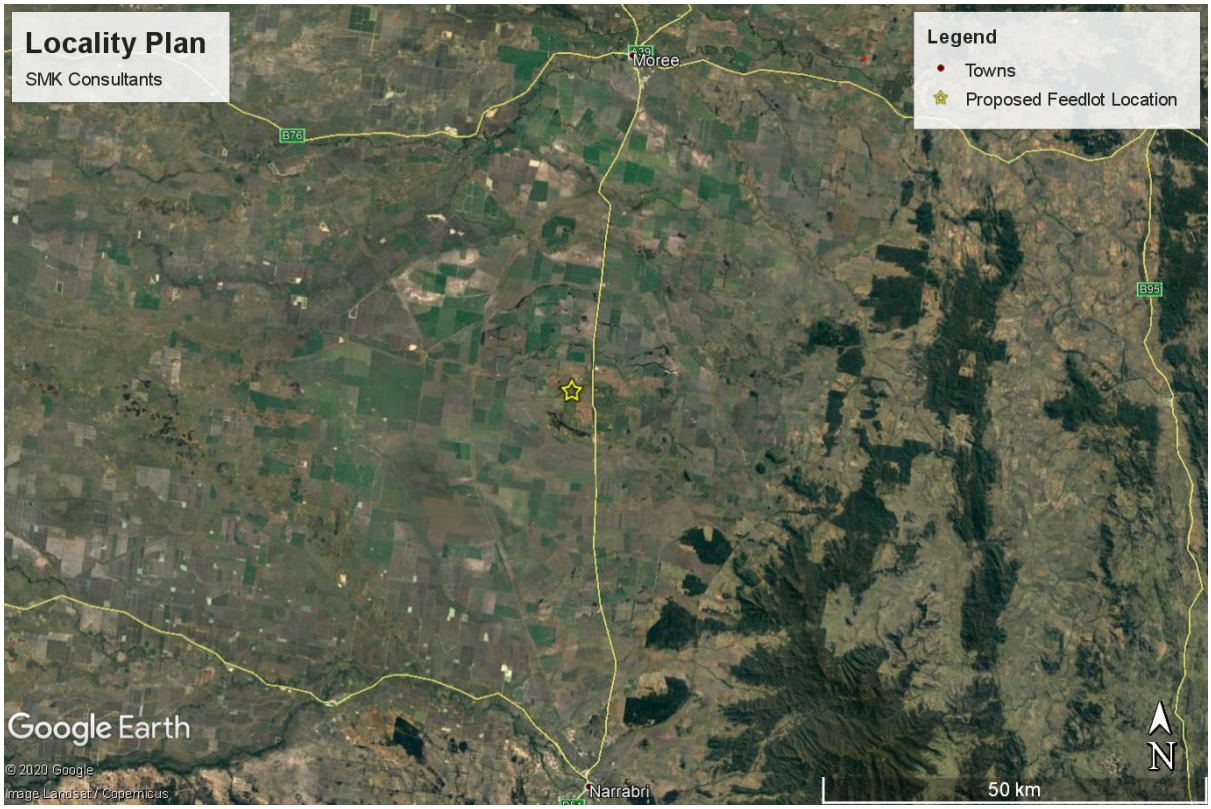

Figure 1: Locality Plan for Horseshoe Feedlot

2.2 Climate

Horseshoe & Stud Park is situated in northern NSW at an elevation of approximately 230m ASL. The climate is best described as temperate.

Temperature data was sourced from Narrabri West Post Office Station (BOM Station No. 053030), which is the closest recording site to the feedlot with comprehensive temperature datasets (1962-2002). Overall, the site has the potential to experience considerable climate variability, with summer average maximum temperatures over 33°C and with maximum recorded temperatures above 43°C, through to winter average minimum temperatures around 4°C, with temperatures below -5°C being recorded.

Rainfall data is also based on Bureau of Meteorology (BOM) information from Narrabri West Post Office Station (BOM Station No. 053030), which is the closest recording station to Horseshoe Station with comprehensive rainfall datasets (1881-2018). The locality has an average annual rainfall in the order of 658.5mm.

Based on an annual average evaporation of approximately 2,000mm (Figure 2) and an annual average rainfall of 688mm, the site generally has an annual moisture deficit of >1,300mm.

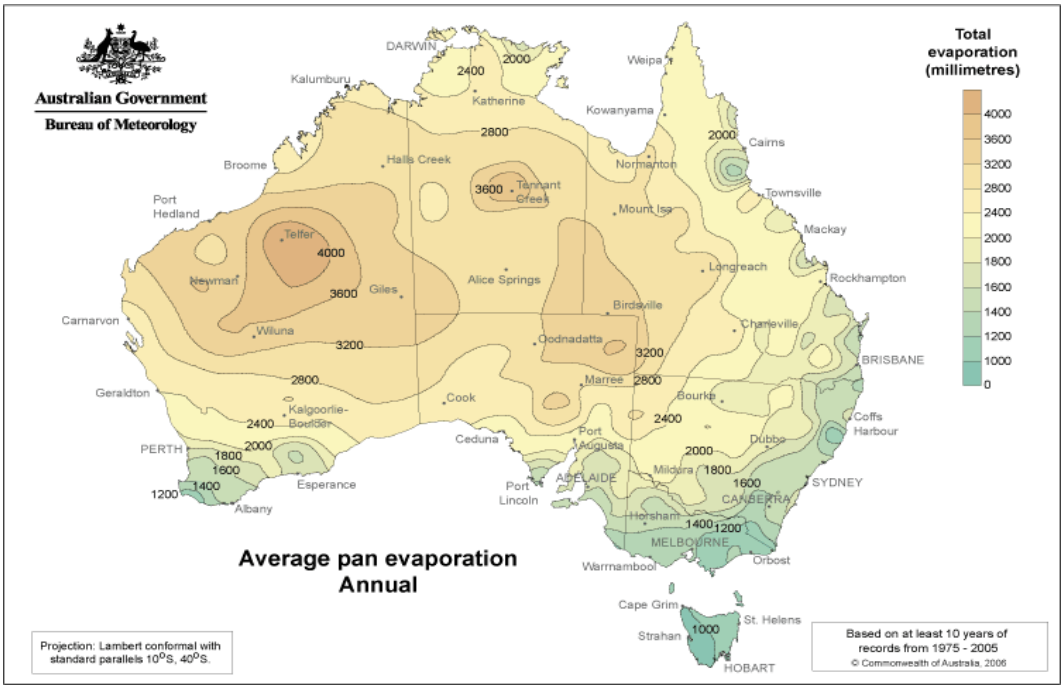

Figure 2: Annual Average Evaporation in Australia

Wind data was sourced from BOM information available for Narrabri West Post Office Station (Station No. 053030). The average wind speed and direction for the area varies according to the season and time of day. Annual average wind data is depicted in Figure 3.

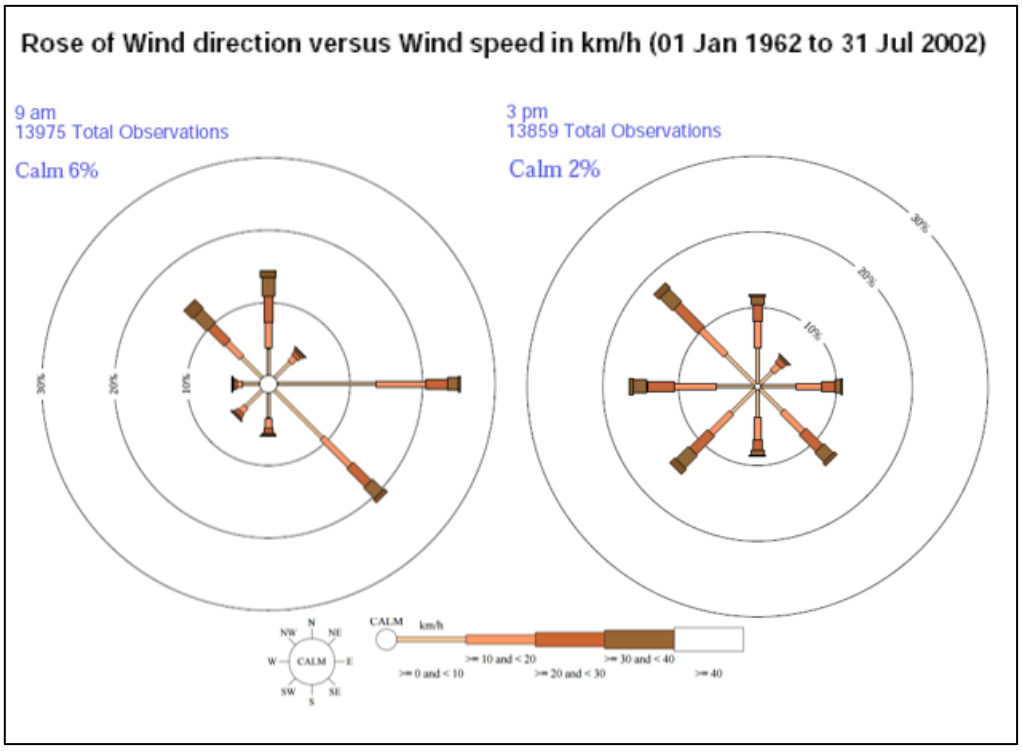

Figure 3: **Wind Roses for Narrabri West Post Office. Source: BoM Data 1962-2002**

2.3 Potential Odour Generating Operations

Table 2 below identifies and describes the potential sources of odour that may be generated from the feedlot once it is operational.

Table 2: Sources of Odour

Source	Odour Type	Description
Feedlot Pens	Diffuse Source	The feedlot pens are the primary odour source on a feedlot. As the manure pad accumulates, the waste starts to decompose anaerobically. It is this process that generates odours. The level of odour is exacerbated in wet weather if the pad does not dry out.
Effluent Ponds	Diffuse Source	Ponds are designed to hold effluent. Anaerobic conditions develop in the ponds on occasion.
Drains and Collection Channels	Diffuse Source	Drains and collection channels have the potential to produce odour after rain events if the drains to not dry out. Sediment can also accumulate in drains between cleaning and be left to decompose.
Manure Storage	Diffuse Source	Manure storage areas can be a source of odour as the compounds heat up and decompose, especially when wet.
Feed Storage and Processing Areas	Diffuse Source	The feed production area has slightly sweet odour and the extended storage of feed can generate some odour.
Carcass Disposal Areas	Diffuse Source	The anaerobic decomposition of organic matter can generate odour emissions.

The odour sources listed above are predominantly diffuse sources and most effectively managed through good design and operating practices. For example, routine pen cleaning, the removal of manure, well-designed slopes and continued maintenance to enhance drainage would significantly reduce the potential for odour generation in the feedlot pens.

2.4 Odour Prevention and Control

The prevention of odour is considered the most effective method in controlling the risk of odour impacts to the community. The following sections outline odour control methods for odour emissions sources identified in Table 2.

2.4.1 Feedlot Pens

Odour emissions from cattle pens are related to several factors, such as the depth of manure on the pen surface and its moisture content. These are, in turn, related to factors including pen cleaning frequency, stocking density and pen design. The following odour prevention recommendations are consistent with a Class 1 feedlot operation and are consistent with odour control recommendations provided by the National Guidelines for Beef Cattle Feedlots[3].

Feedlot pens should be cleaned sufficiently often so that the depth of dry manure on the pen surface should not exceed 50 mm. To this end, it is recommended that the pen cleaning interval should not exceed 13 weeks.

Appropriate stocking density is dependent upon the climatic conditions of the feedlot's location. For comparable emissions, feedlots must be stocked at a lower density in a wetter climate than in a drier one. The feedlot is in a climatic zone which receives more than 680mm of average annual rainfall.

The feedlot pens are located on a natural slope, which will provide sufficient pen drainage to enable appropriate drying of pen floors, whilst preventing excessive drainage which may produce scouring of manure deposits within pens. Pens will be constructed from in-situ clay materials to provide a durable all-weather surface that promotes drainage and rapid drying.

2.4.2 Effluent Ponds

To minimise the occurrence of the development of anaerobic conditions in effluent and sediment ponds, the ponds should be allowed to completely dry and should be cleaned as required.

2.4.3 Drains and Collection Channels

Drains and collection channels should be regularly inspected, cleaned and maintained to ensure appropriate drain function (i.e. prevent occurrence of blockages) and to remove captured materials to minimise the risk of odour emissions.

[3] MLA 2012, *National Guidelines for Beef Cattle Feedlots in Australia*, 3rd Edition, Meat and Livestock Australia in association with the Australian Lot Feeders Associations and the Feedlot Industry Accreditation Committee, North Sydney, NSW.

2.4.4 Manure Storage Areas

Severe odour emissions from manure stockpiles are often associated with anaerobic decomposition processes. To minimise odour production, manure will not be stored for long at the feedlot site. Instead, manure will be removed from stockpiles shortly after collection from pens, to be utilised on cropland areas within the property at sustainable rates. Ensuring manure is not stored for long periods of time will minimise the risk of strong anaerobic decomposition processes commencing with associated severe odour production.

2.4.5 Feed Storage and Processing Areas

Where practicable, minimise storage periods of feed, as fresh feed typically produces lower rates of odour emissions.

2.4.6 Carcass Disposal Area

Carcasses are to be disposed of via burial in clay-lined pits, in an area of open woodland, utilised as grazing country, west of the proposed Feedlot site on the property of Horseshoe. The pits will be capped with a minimum of 1m depth of soil which will assist in minimising odour generation. The carcass burial site will not be sited in close proximity to sensitive receptors within the locality. It is considered that carcass disposal at Horseshoe does not pose a risk to sensitive receptors within the locality with regards to excessive odour production.

2.5 Assessment of Risk

The potential discharge of fugitive (diffuse) emissions from the feedlot are predominantly a concern in terms of the risk of impacts to existing amenity. The level of expected odour is not considered to have any direct effect on the environment or pose a risk to human health. Risk of odour pollution relates to the potential frequency of adverse odour at nearby residences. On this basis, these residences are considered as sensitive receivers.

3 The Model

The Level 1 Odour Impact Assessment is the most conservative of the three levels of assessment and is recommended for use with diffuse sources. It is a screening-level technique that is based on generic parameters for the type of activity and site. It may be used to assess site suitability and odour mitigation measures for new or modified activities. The Level 1 assessment is a rigorous numerical impact assessment that overestimates the potential for odour impacts to produce a conservative estimation of likely odour impacts and required separation distances.

The Level 1 odour impact assessment for diffuse sources considers the following factors:

- Type of operation
- Size of operation

- Proposed management practices
- Density of populations likely to be impacted, ranging from a single rural residence to a predominantly urban setting
- Local topography (flat, undulating, high relief, low relief or drainage flows)
- Surrounding vegetation (none, light or heavy tree cover)
- Local meteorology (high, average or low frequency winds toward sensitive receptor)
- Possibility of cumulative impacts

For a Level 1 assessment, a 'pass' suggests the calculated extent of the odour impact is less than the distance to the nearest receptor and that the proposed management practices are sufficient to prevent odour problems. If a Level 1 assessment conclusively demonstrates that adverse impacts will not occur, it is not considered necessary to progress to a Level 2 or 3 Odour assessment. Furthermore, a clear 'pass' at a Level 1 assessment for odour impacts is generally considered acceptable for other potential air quality impacts such as dust and noise.

3.1 Justification

SMK Consultants reviewed the three Levels of odour assessment outlined within the Technical Notes and the Level 1 method is considered sufficient for the proposed development. The reasons that support the use of the Level 1 method are:

- **Location:** The feedlot is appropriately sited a considerable distance from the closest township and other potentially sensitive receptors, in this case being isolated rural residences.
- **The characteristics of the receiving environment:** The region immediately surrounding the subject site is dominated by cleared grazing land, interspersed with scattered trees and areas of native open woodland. In the areas between the feedlot site and the closest sensitive receptors, the trees are not considered to be of sufficient density to significantly impede air flow throughout the landscape between the feedlot and the sensitive receptors.
- **The type and quantity of pollutants emitted:** The odour emissions expected from the feedlot are generally diffuse source emissions. Whilst odour impacts from these sources are difficult to contain, the potential impacts are most effectively managed through careful site selection, appropriate design and layout and good management practices. Odour from the proposed feedlot will be carefully monitored on site, and actions will be taken to reduce odour production where required. Actions taken may include steps such as modifying cattle feed rations or undertaking pen cleaning.

3.2 Variable Separation Distances

The following variable separation distance equations are used to calculate the allowable cattle numbers (N) at any one time for a site at distance (D) metres from an impact distance,

or the distance for a specified number of cattle. The result, either cattle numbers or distance, is considered an acceptable limit to ensure that offensive odours do not cause unreasonable interference to the community or specific receptor amenity. Both equations are outlined in the Technical Notes.

Equation 7.1: Allowable cattle number, given the distance

$$N = (D \div S)^2$$

Equation 7.2: Separation distance, given the number of cattle

$$D = \sqrt{N} \times S$$

Where:

D = separation distance in metres from pens and stockpiles
N = cattle numbers in SCU
S = composite site factor (S1 x S2 x S3 x S4 x S5)

The variable separation distance calculations use several different factors to determine the minimum separation distance that is required between a feedlot in a specific location and the closest sensitive receptors. The factors include:

S1 = stocking density
S2 = receptor type (e.g. small or large town, rural residence and public use areas e.g. school, rural church, national park)
S3 = topography
S4 = intermediate landscape (surface roughness / vegetation)
S5 = wind frequency factor

The following summarises the variable separation distance calculations for the Level 1 method as described in the Technical Notes.

4 Composite Site Factors

4.1 Stocking Density Factor (S1)

The stocking density factor (S1) considers odour production from manure accumulation within feedlot pens. Depth, moisture content and rate of deposition of manure are major factors influencing odour production from pen manure pads.

Values of S1 have been derived for selected stocking densities. Data collected in published research field trials and field observations was used to identify the relationship between odour production rate and the stocking density. The values were derived using field trial relationships between odour generation rates and stocking density for the various feedlot

categories (defined by pad moisture content) and with modelled odour levels at impact locations (calibrated using the observed odour impact at some existing feedlots).
The stocking density factor S1 varies depending upon annual average rainfall conditions, feedlot design standards and stocking density.

The proposed development will occur within a climatic zone which receives less than 750mm rainfall. The stocking density factor may therefore be derived from Table B.1. from the National Guidelines for Beef Cattle Feedlots in Australia (presented here as **Table 3**).

The feedlot will operate with a stocking density of approximately 19m^2/head and be consistent with the design and management standards of a Class 1 facility. Therefore, the S1 composite site factor for the proposed development equals 42.

Table 3: Stocking Density Factor, S1, average annual rainfall more than 750mm

	Average Annual Rainfall		
	<750mm	**>750mm**	**S1 Value**
Stocking Density (m²/SCU)	11	16	62
	12	17	60
	13	18	57
	14	19	55
	15	20	52
	16	21	50
	17	22	47
	18	23	45
	19	24	42
	20	25	40

4.2 Receptor Factor (S2)

The receptor factor S2 varies depending on the likely impact area and is determined from Table 4. Impact location may be a neighbour's house, small town or a large town that may be affected by odour generated at the feedlot. The separation distances to impact locations are usually the key factors, which limit the number of cattle that could be accommodated on a particular site.

Table 4: Receptor Factor, S2[4]

Receptor Type	Value
Large Towns >2000 persons	1.6
Medium Towns 500-2000 persons	1.2

[4] Table 7.3 from the Technical Notes

Receptor Type	Value
Medium Towns 125-500 persons	1.1
Small Towns 30-125 persons	1.0
Small Towns 10-30 persons	0.6
Single Rural Residence	0.3
Public Area (occasional use)	0.05*

The closest sensitive receptors to the Feedlot were identified to consist of single rural residences. The closest village to the proposed development (Bellata) is located over 7km from the feedlot site.

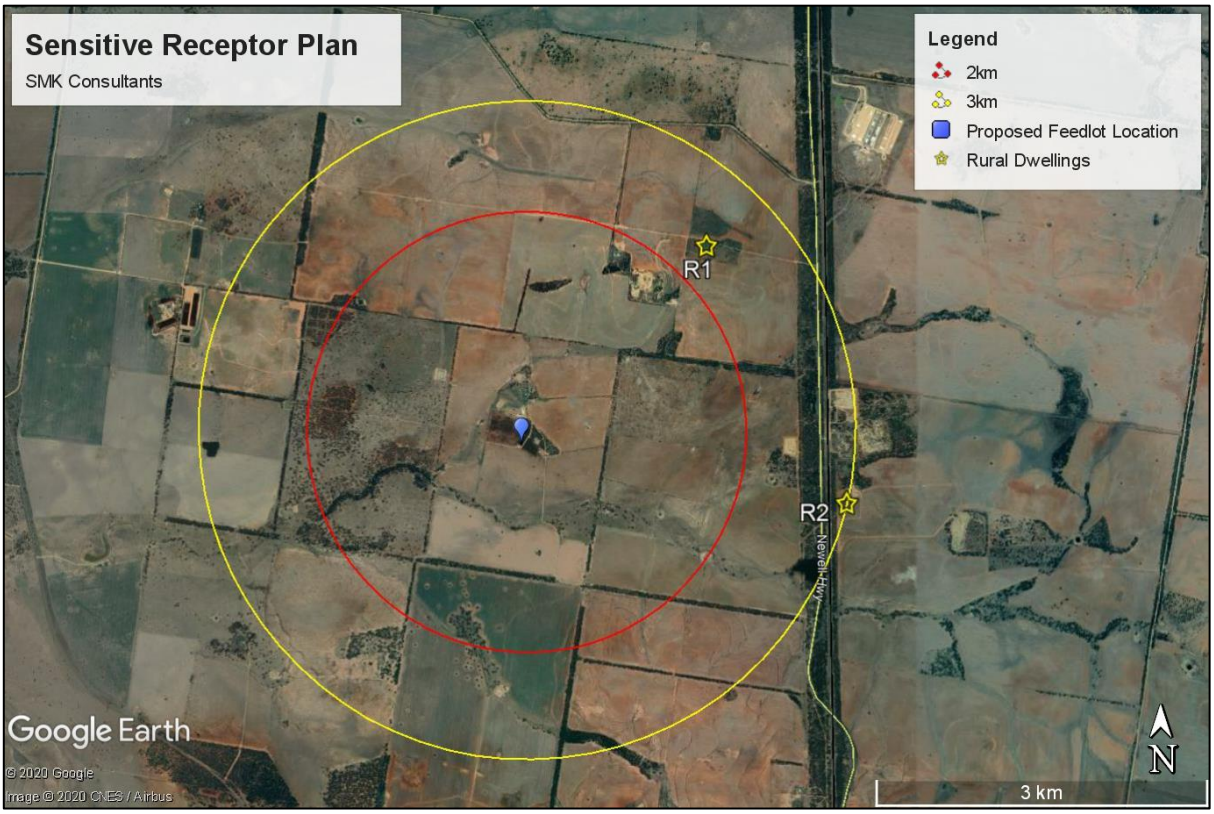

Figure 4: Aerial Image Identifying the Closest Sensitive Receptors

Table 5 summarises the receptors considered to be subject to the potential odour impacts associated with the feedlot, and each receptor's S2 value.

Table 5: Receptor Types

Closest Sensitive Receptors				
Receptor	**Receptor Type**	**S2 Value**	**Direction**	**Distance (m)**
R1	Single Rural Residence - 'Woodlands'	0.3	NE	2,260
R2	Single Rural Residence	0.3	WSW	2,870

4.3 Terrain Factor (S3)

The terrain factor S3 varies according to topography and is determined from Table 6.

- **Flat** is regarded as less than 10% upslope, 2% downslope and not in valley drainage zone.
- **High relief** is regarded as up-slope terrain of a hill that projects above the 10% rising grade line from the feedlot. Thus, the receptor location will be either uphill from the feedlot or be behind a significant obstruction.
- **Low relief** is regarded as terrain, which is generally below the 2% falling grade line from the feedlot. Thus, the receptor will be downhill from the feedlot.
- **Undulating hills** is regarded as terrain where the topography consists of continuous rolling, generally low-level hills and valleys with minimal vegetation cover, but without sharply defined ranges, ridges or escarpments.
- A **valley drainage zone** has topography at low relief (as above) with significant confining sidewalls.

Topographical features of the selected site may adversely affect the odour impact under certain circumstances. During the early evening or night time under low wind speed conditions, population centres located in a valley complex at a lower elevation than a feedlot may be subject to higher odour concentrations as a result of down-valley wind or the occurrence of low-level inversions.

Table 6: Terrain Factor, S3[5]

Terrain	Value
Valley Drainage Zone	2.0
Low Relief	1.2
Flat	1.0
Undulating country between cattle feedlot and receptor	0.9
High relief or significant hills and valleys between cattle feedlot and receptor	0.7

The nearest sensitive receptors are separated from the proposed by undulating terrains. The proposal is located on a slight rise relative to sensitive receptors R1 and R2, however the receptors are not located above a 10% rising grade line or below a 2% falling grade line from the feedlot; therefore, the terrain is considered to be undulating. The S3 values of the receptors are therefore 0.9.

[5] Table 7.4 from the Technical Notes

4.4 Vegetation Factor (S4)

The vegetation factor S4 varies according to vegetation density and is determined from Table 7. The vegetation density is assessed by the effectiveness with which the vegetation stand will reduce odour by dispersion:

- **Few trees, long grass** is regarded as open country with a permanent covering of grass or pasture of around 1 m or more in height and with a light scattering of timber which is distributed continuously across the buffer area. Topography would be predominantly flat to slightly undulating. Isolated clumps of trees would not be sufficient to attract this concession. Land being actively cropped would not attract this concession because of the extended periods when it is bare or carrying only very low ground cover.
- **Wooded country** is regarded as open forest country with tree density not sufficient to provide a continuous canopy, but sufficiently dense to influence air movement. There would be little or no lower storey vegetation. The density needs to be such that the vegetation can be considered as a contiguous belt and isolated clumps would not attract this concession. The minimum tree height is 4 m and the minimum extent in the direction of the receptor is 400 m.
- **Heavy timber** is regarded as tall forest areas with dense timber stands providing a continuous canopy. There is limited understorey vegetation, mainly associated with regrowth. The minimum tree height is 4 m and the minimum extent in the direction of the receptor is 400 m.
- **Heavy forest, upper and lower storey** is regarded as dense layers of taller timber with an interlocking canopy and with extensive amounts of lower storey vegetation of various species resulting in almost complete ground cover and a dense upper canopy. The minimum tree height is 4 m and the minimum extent in the direction of the receptor is 400 m.

Table 7: Vegetation Factor, S4[6]

Vegetation	Value
Crops only, no tree cover	1.0
Few trees, long grass	0.9
Wooded country	0.7
Heavy timber	0.6
Heavy forest (both upper and lower storey)	0.5

The land between the subject site and all identified nearest sensitive receptors is characterised by cleared pasture, with small areas of open woodland and/or scattered trees

[6] Table 7.5 from the Technical Notes

throughout. The density of the trees within the landscape is not considered to be sufficient to significantly influence air movement. Therefore, all receptors have been assigned a vegetation factor of 0.9 (few trees, long grass).

4.5 Wind Frequency Factor (S5)

The wind frequency S5 factor is determined from Table 8. Wind speed and direction varies by the season and by the hour of the day. Although there is generally one direction that is the most frequently observed (prevailing wind), the wind direction usually blows from all directions at some time.

The wind can be classed as **high frequency** towards the receptor if the wind is blowing towards the receptor (± 40 degrees) with a frequency of at least 60% of the time for all hours over a whole year.

The wind can be classed as **low frequency** towards the receptor if the wind is blowing towards the receptor (± 40 degrees) with a frequency of less than 5% of the time for all hours over a whole year.

Table 8: Wind Frequency Factor, S5[7]

Wind Frequency	Value
High frequency towards receptor (greater than 60%)	1.5
Normal wind conditions	1.0
Low frequency towards receptor (less than 5%)	0.7

The closest weather station recording wind data is the Narrabri West Post Office weather station. Examination of climate data sourced from this station indicates that no receptor is downwind of the feedlot for more than 60% of the time. All of the receptors are located in directions that experience normal wind conditions. Therefore, a site factor value of 1.0 is appropriate.

5 Analysis and Results

This assessment aims to ensure that offensive odours do not cause unreasonable interference to any of the nearby sensitive receptors.

The site and surrounding topographical features were assessed in detail and the selected composite site factors are summarised below:

[7] Table 7.6 from the Technical Notes

S1: 42 – based on a feedlot with a stocking density of 19 m^2/SCU with <750 mm of annual average rainfall.
S2: 0.3 – single rural residence used for all receptors
S3: 0.9 – Undulating between the feedlot and all receptors, based on local topographic maps.
S4: 0.9 – (Few trees, long grass) used for all receptors
S5: 1.0 – Normal wind conditions used for all receptors, based on long-term data collected from the Narrabri BOM site.

Equation 7.1 was applied using the site-specific composite factors and the results are summarised in Table 9. The analysis compares the calculated minimum separation distances required with the available separation distances.

Table 9: Results of Equation 7.1 for Minimum Separation Distances

Minimum Separation Distances for the Horseshoe Feedlot								
Receptors	Feedlot Capacity (head)	Composite Site Factors					Required Minimum Distance (m)	Available Distance (m)
		(S1)	(S2)	(S3)	(S4)	(S5)		
1	999	42	0.3	0.9	0.9	1	323	2,260
2	999	42	0.3	0.9	0.9	1	323	2,860

To further clarify the assessment, Equation 7.2 was applied using the site-specific composite factors and the results are summarised in Table 10.

Table 10: Results of Equation 7.2 for Maximum Number of Stock

Maximum Number of Stock for Horseshoe Feedlot							
Receptors	Available Distance (m)	Composite Site Factors					Maximum Number of Stock (head)
		(S1)	(S2)	(S3)	(S4)	(S5)	
1	2,260	55	0.3	0.9	0.9	1	49,035
2	2,860	55	0.3	0.9	0.9	1	78,692

The proposed Horseshoe Feedlot to accommodate a maximum capacity of 999 head has resulted in a clear 'pass' from the Level 1 Odour Impact Assessment. The results conclusively demonstrate that adverse impacts will not occur if appropriate management practices are upheld. The potential extent of adverse odour impacts has been calculated to be less than the nearest sensitive receptor. It is therefore considered unnecessary to undertake additional assessment. Furthermore, a clear 'pass' at a Level 1 assessment for odour impacts is generally considered acceptable for other potential air quality impacts such as dust and noise.

6 Cumulative Impacts

Cumulative impacts result from the aggregation and interaction of impacts of the proposed development in combination with other existing/future developments of a similar nature, on surrounding receptors.

There are no known proposals for projects of a similar nature in the locality at present.

The Wilga Feedlot is located approximately 3.2 kilometres north-west of the proposed Horseshoe Feedlot. In situations where two cattle feedlots are in close proximity, it is required to increase the minimum separation distance to ensure impacts are reduced. The National Guidelines for Beef Cattle Feedlots in Australia estimate that when assessing two feedlots in combination, a 20% increase in separation distance may apply to the proposed second cattle feedlot. Based on the calculations in this report, the normal separation distance for the proposed feedlot is 323 metres. The increased separation distance (120%) is therefore 436m.

The Wilga Feedlot has a maximum capacity of 5,000 head and is operated as a Class 3 Feedlot. The minimum separation for this feedlot was calculated based on the NSW EPA Odour Assessment Guidelines, and was calculated to be 1,340 metres, based on the following values:

- **S1:** 78 – based on a feedlot with a stocking density of 24 m^2/SCU with <750 mm of annual average rainfall.
- **S2:** 0.3 – single rural residence used for all receptors
- **S3:** 0.9 – Undulating between the feedlot and all receptors, based on local topographic maps.
- **S4:** 0.9 – (Few trees, long grass) used for all receptors
- **S5:** 1.0 – Normal wind conditions used for all receptors, based on long-term data collected from the Narrabri BOM site.

The increased separation for Wilga Feedlot is therefore 120% of the normal separation distance of 1,340m, which is equivalent to 1,608 metres.

These separation distances (i.e. 436 metres for Horseshoe Feedlot and 1,608 metres for Wilga Feedlot) were applied to determine if any sensitive receptors would be subject to cumulative impacts (Figure 5).

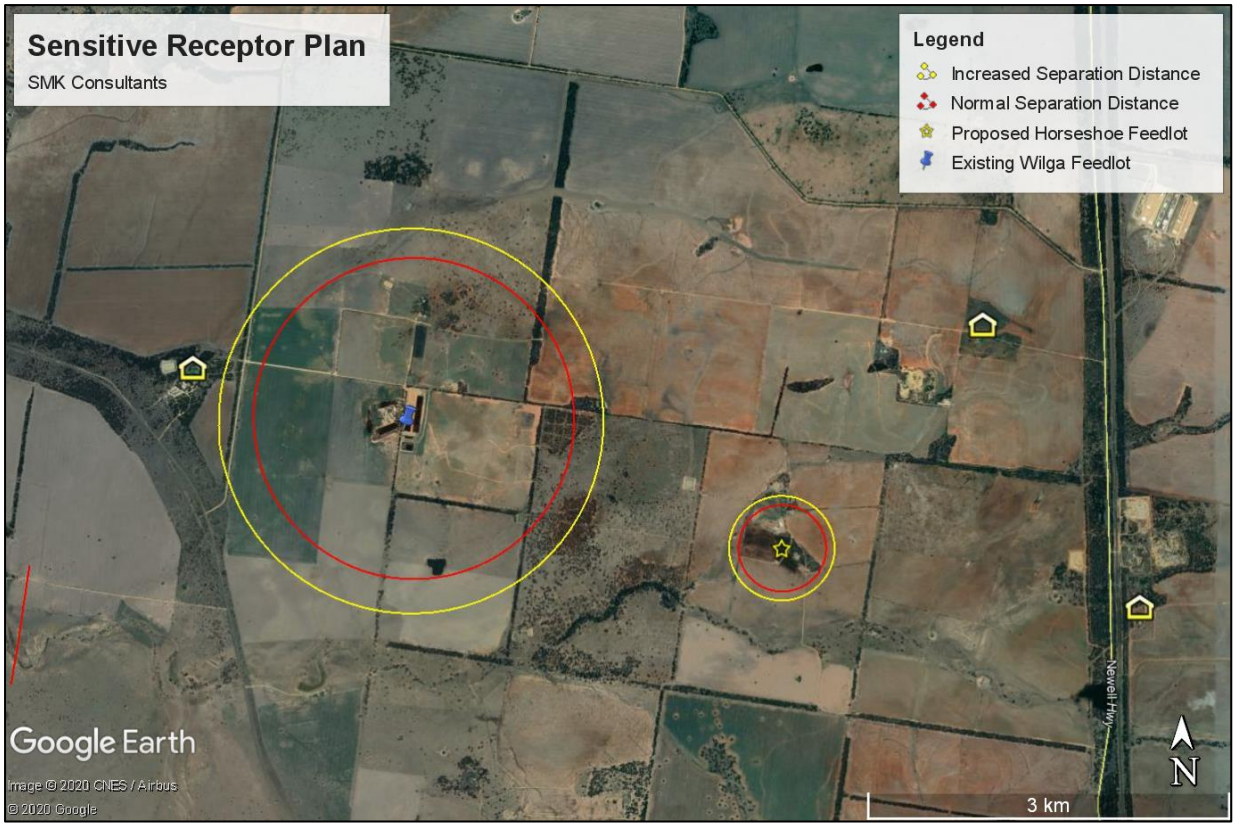

Figure 5: Combined Separation Distances between Feedlots

The feedlots are sufficiently separated to ensure that no overlap occurs between the required separation distances. Further the closest receptor is located approximately 2,260 metres from the proposed Horseshoe Feedlot and no receptors are located within a direct path between the two feedlots.

Given the minimal potential for cumulative impacts to occur, it was concluded that is no further assessment was required.

7 Conclusions

The proposed development and associated activities are considered to meet the required separation distances, based on the Level 1 Odour Assessment method from NSW Odour Framework and Notes. In particular, this assessment addresses the potential for “offensive odour” and demonstrates full compliance with relevant legislation including the provisions for offensive odours contained in Section 129 of the POEO Act. The analysis has identified the proposed development can be given a “pass” under the framework of the relevant Guidelines and recommendations.

Appendix 7 – Traffic Calculations

Traffic Calculations at Maximum Capacity (100% Occupancy)

Overall Assumptions
Movement is One-Way: ie. A truck entering then leaving is considered 2 Movements
Cattle Trucks Enter and Leave Full
Feed Trucks Enter Full and Leave Empty

Staging			
Full Capacity	**SCU**	**Mill Feed Production (Head)**	**On-Farm Feed Production (tonne/year)**
Completed Feedlot	999	999	2,090

General Assumptions			
	SCU on Site	999	
	1 SCU	425	Kg
	Pens	2	
	Number of Head Bred on Farm	0	head/year
	Average Time at Feedlot	4.0	Months
	Pen Occupancy	100%	
	Feed/Head Required (Kg)	12.75	Kg
Average Weight	IN	350	Kg
	OUT	500	Kg
	Polled	Yes	

Transport Assumptions			
Deck Space	Semi-Trailer (12.25 m x 2.4 m)	29.40	m^2
	Dual Deck - B-Double 2 x (18.8 m x 2.4 m)	90.24	m^2
	Dual Deck - 2 Trailer Road Train 2 x (36.5 m x 2.4 m)	175.20	m^2
	3 Trailer Road Train (53.5 m x 2.4 m)	128.40	m^2
Number of Head	Semi-Trailer (IN)	30	head
	Semi-Trailer (OUT)	24	head
	Dual-Decker B-Double (IN)	92	head
	Dual-Decker B-Double (OUT)	73	head
	Dual-Decker 2-Trailer Road Train(IN)	179	head
	Dual Decker 2-Trailer Road Train(OUT)	142	head
	3-Trailer Road Train (IN)	131	head
	3-Trailer Road Train(OUT)	104	head
Vehicle Breakdown	Semi-Trailer		
	B-Doubles	50%	
	2-Trailer Road Trains	50%	
	3-Trailer Road Trains		

Feed Assumptions			
	Feed Required	12.75	Kg/day/head
	Average on Feed	999	head
	Total Feed Required	4,649	tonne/year

Feed Required to be Trucked in		2,559 tonne/year
Vehicle Capacity	Semi-Trailer	25 tonne/truck
	B-Double	55 tonne/truck
	2-Trailer Road-Train	72 tonne/truck
	3-Trailer Road-Train	115 tonne/truck
Vehicle Breakdown	Semi-Trailer	
	B-Doubles	50%
	2-Trailer Road-Train	50%
	3-Trailer Road-Train	

Loading Density		
Mean Live Weight	**Minimum Floor Area (m2/head) standing**	**Number of Head per 12.25 m x 2.4 m deck**
100	0.31	94
150	0.42	70
200	0.53	55
250	0.77	38
300	0.86	34
350	0.98	30
400	1.05	28
450	1.13	26
500	1.23	24
550	1.34	22
600	1.47	20
650	1.63	18
Source: Australian Animal Welfare Standards and Guidelines: Land		

Completed Feedlot		
Head Processed	2,997.0	Annually
Cattle Truck Movements	55.6	Annually
	1.1	Weekly
	0.15	Daily
Feed Truck Movements	82.1	Annually
	1.6	Weekly
	0.22	Daily
Total Truck Movements	**137.7**	**Annually**
	2.6	**Weekly**
	0.38	**Daily**

Traffic Calculations at Maximum Capacity (80% Occupancy)

Overall Assumptions
Movement is One-Way: ie. A truck entering then leaving is considered 2 Movements
Cattle Trucks Enter and Leave Full
Feed Trucks Enter Full and Leave Empty

Staging			
Full Capacity	**SCU**	**Mill Feed Production (Head)**	**On-Farm Feed Production**
Completed Feedlot	999	999	2,090

General Assumptions			
	SCU on Site	999	
	1 SCU	425	Kg
	Pens	2	
	Number of Head Bred on Farm	0	head/year
	Average Time at Feedlot	4.0	Months
	Pen Occupancy	80%	
	Feed/Head Required (Kg)	12.75	Kg
Average Weight	IN	350	Kg
	OUT	500	Kg
	Polled	Yes	

Transport Assumptions			
Deck Space	Semi-Trailer (12.25 m x 2.4 m)	29.40	m^2
	Dual Deck - B-Double 2 x (18.8 m x 2.4 m)	90.24	m^2
	Dual Deck - 2 Trailer Road Train 2 x (36.5 m x 2.4 m)	175.20	m^2
	3 Trailer Road Train (53.5 m x 2.4 m)	128.40	m^2
Number of Head	Semi-Trailer (IN)	30	head
	Semi-Trailer (OUT)	24	head
	Dual-Decker B-Double (IN)	92	head
	Dual-Decker B-Double (OUT)	73	head
	Dual-Decker 2-Trailer Road Train(IN)	179	head
	Dual Decker 2-Trailer Road Train(OUT)	142	head
	3-Trailer Road Train (IN)	131	head
	3-Trailer Road Train(OUT)	104	head
Vehicle Breakdown	Semi-Trailer		
	B-Doubles	50%	
	2-Trailer Road Trains	50%	
	3-Trailer Road Trains		

Feed Assumptions			
	Feed Required	12.75	Kg/day/head
	Average on Feed	799	head
	Total Feed Required	3,719	tonne/year
	Feed Required to be Trucked in	**1,629**	**tonne/year**

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Vehicle Capacity	Semi-Trailer	25	tonne/truck
	B-Double	55	tonne/truck
	2-Trailer Road-Train	72	tonne/truck
	3-Trailer Road-Train	115	tonne/truck
Vehicle Breakdown	Semi-Trailer		
	B-Doubles	50%	
	2-Trailer Road-Train	50%	
	3-Trailer Road-Train		

Loading Density

Mean Live Weight	Minimum Floor Area (m2/head) standing	Number of Head per 12.25 m x 2.4 m deck
100	0.31	94
150	0.42	70
200	0.53	55
250	0.77	38
300	0.86	34
350	0.98	30
400	1.05	28
450	1.13	26
500	1.23	24
550	1.34	22
600	1.47	20
650	1.63	18

Source: Australian Animal Welfare Standards and Guidelines: Land Transport of Livestock

Completed Feedlot		
Head Processed	2,397.0	Annually
Cattle Truck Movements	44.5	Annually
	0.9	Weekly
	0.12	Daily
Feed Truck Movements	52.3	Annually
	1.0	Weekly
	0.14	Daily
Total Truck Movements	**96.7**	**Annually**
	1.9	**Weekly**
	0.26	**Daily**

Appendix 8 – Heat Load Analysis

RAP Version 2.1 | 4th August 2020

The risk assessment program or RAP is a tool to help feedlot operators assess their potential risk of a heat event at their site based on historical climatic conditions, cattle characteristics and feedlot management practices.

Results

Results calculated on 2020-08-04 03:26:20 PM

HLI threshold: 89

AHLU Risk Level: 89

Years analysed: 18

Event duration	Frequency of High	Frequency of Extreme
2 days	Less than 1 event in 18 years	Less than 1 event in 18 years
3 days	Less than 1 event in 18 years	Less than 1 event in 18 years
4 days	Less than 1 event in 18 years	Less than 1 event in 18 years
5 days	Less than 1 event in 18 years	Less than 1 event in 18 years
6 days	Less than 1 event in 18 years	Less than 1 event in 18 years
7 or more days	Less than 1 event in 18 years	Less than 1 event in 18 years

Over a 10 year period, this site would be expected to experience:

At least 0 days of high or greater risk that includes 0 days of extreme risk

Parameters

Parameter	Value
Site	Narrabri
Period analysed	Long Term
Cattle type	Bos taurus
Coat colour	Black
Health status	Healthy
Number of days on feed	80 - 130
Amount of shade	1.5 - 2.0
Trough water temperature	20 - 30 degrees
Pen class	Class 1
Extra water troughs installed	No
Heat load ration fed	No

Wet manure removal	**No**

User Notes