ENVIRONMENTAL IMPACT STATEMENT

7680 HEAD BEEF CATTLE FEEDLOT

Prepared for

Beefcorp Farms Pty Ltd
"Palm Grove"
587 Rolfe Road
Finley NSW 2713

Completed by

ZINGA & ASSOCIATES PTY LTD
Enviro-Ag Consultants
PO Box 2233
ORANGE NSW 2800

SUBMISSION OF
ENVIRONMENTAL IMPACT STATEMENT

Environmental Impact Statement prepared by

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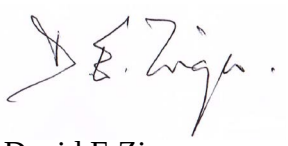
Address	PO Box 2233 ORANGE NSW 2800
in respect of	7680 Head Beef Cattle Feedlot

Development Application

Applicant Name	Beefcorp Farms Pty Ltd
Applicants Address	PO Box 141 Finley NSW 2713
Land to be developed:	"Palm Grove" 587 Rolfe Road Finley NSW 2713
Lot no, DP No	Lots 1-4 DP 120110 and Lot 1 DP 393315
	Parish: Booroobanilly County: Urana
	Shire: Murrumbidgee

Environmental Impact Statement An Environmental Impact Statement (EIS) is attached

Signature	
Name	David E Zinga
Date	18 November 2019

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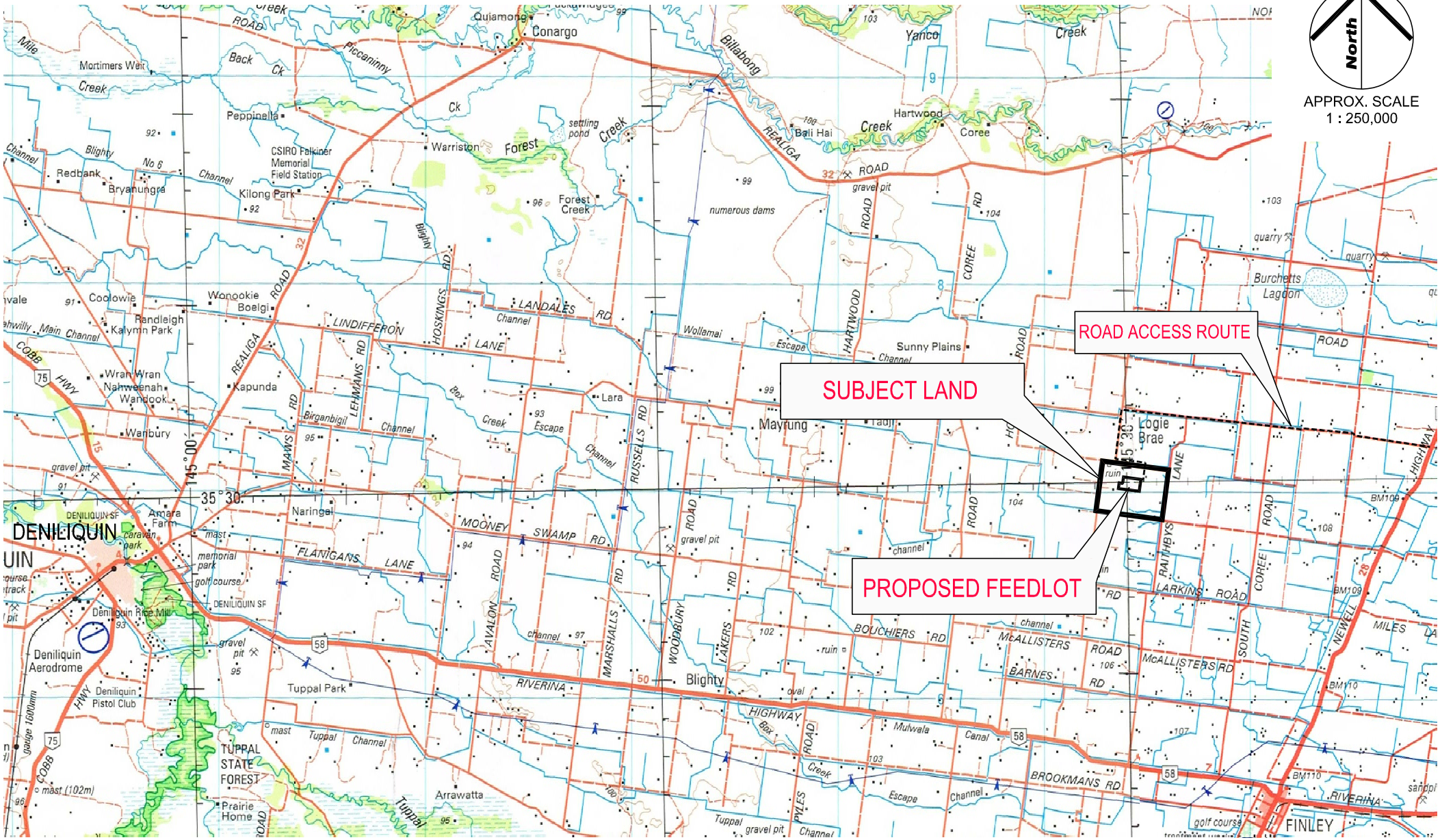

FIGURE 1
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SOURCE: DENILIQUIN & JERILDERIE 1:250,000 TOPO

Locality Map - 7680 HEAD CATTLE FEEDLOT
BEEFCORP FARMS PTY LTD "PALM GROVE" FINLEY

Executive Summary

"Palm Grove" is situated in the Logie Brae locality about twenty (20) kilometres north west of Finley and is part of an aggregation with "Oak Park" that took place some years ago. It was recently acquired by the proponent Beefcorp Farms Pty Ltd in April 2019.

The proponent intends to apply for development consent for a beef cattle feedlot with a capacity of 7680 beef cattle. This proposal constitutes a significant expansion and vertical integration of existing cattle operations by the proponent and will create positive economic benefits and employment opportunities in the local district.

Importantly, the proponent has significant agricultural experience having successfully operated a large commercial cattle enterprise for over twenty five years.

It is proposed that the "Palm Grove" feedlot comprise ninety one (91) cattle feeding pens with a capacity of 80 head each to accommodate 7280 head and 10 feeding pens to hold 40 head each and therefore provide a total feedlot capacity of 7680 cattle.

Note that small "hospital" pens with shade will be included enabling more intense animal husbandry practices and better management of any sick animals.

The feedlot is designed to the Class 1 Standard outlined in the *National Guidelines for Beef Cattle Feedlots in Australia* (Meat & Livestock Australia, 2012). Construction will include building a raised earthen pad, feeding pens with an even surface of about 2% slope gradient and compaction of the clayey sub-material and clay lined feeding pen surfaces.

The feedlot will be properly maintained ie. with a maximum of 13 weeks between pen cleaning and a maximum dry manure depth of 50 mm and will comply with the *National Beef Cattle Feedlot Environmental Code of Practice* (MLA, 2011) and be operated to industry "best management practices".

The feedlot has been designed to comply with the *NSW Feedlot Manual* (NSW Ag, 1997). The proponent intends to gain accreditation for the feedlot under the National Feedlot Accreditation Scheme (NFAS) and undergo routine independent *AUS-MEAT* audits.

The actual site of the proposed feedlot and ancillary works is located on part of the flat Riverine plain with a long history of cropping and livestock grazing. Currently the land is growing an oat crop planted shortly after the proponent took possession of the landholding in April this year.

After independent expert review by accredited assessors it is considered unlikely that there will be adverse impact on any endangered or threatened species, their habitat or Aboriginal cultural heritage.

The site satisfies many of the preferred feedlot locational criteria eg. relatively low rainfall and high evaporation, adequate buffer distances to the nearest residences, Mayrung and Finley, adequate water supply, suitable soils, not in an area of shallow groundwater and on flood free land.

The odour assessment, based on the Environment Protection Authority methodology and requirements, indicated that there is adequate buffer to the nearest neighbouring residences and towns to protect the community from the impacts of odour emissions. Additionally, the proponent has indicated that industry "best management practices" in odour minimization will be adopted.

The feedlot and its component parts actually comprise a "controlled drainage area" where the stormwater runoff is fully contained on site. Feedlot runoff is directed via catch drains and sedimentation structures to the effluent evaporation structures.

These feedlot structures are designed according to industry guidelines, effectively contain the feedlot and prevent inundation from any run-on waters.

With the significant evaporation rates experienced in this hot and dry climate the decision has been made that any feedlot effluent is to be directed to the specially constructed clay lined and multi-cell evaporation dam. It is proposed that any sludge that accumulates in this structure would be disposed of by spreading at environmentally sustainable rates over the available cropping paddocks on this relatively large farm area.

The soils investigation revealed that with proper construction methodology, including compaction of the clayey soil material in layers and at appropriate moisture content, soil amelioration where needed and with optimal and selective use of the relatively impermeable clayey subsoils then the feedlot can be effectively sealed to minimize the risk of accessions to groundwater.

Manure from the feeding pens is to be aerobically composted into a moist and crumbly soil-like product and applied to cropping paddocks. Sustainable applications of composted solids to the soils of the utilization area will help to increase the carbon content and generally improve both the physical and chemical fertility of these soils.

The expected small number of animal mortalities in any year will be managed by carcasses being removed by a licensed knacker or if not possible by burial into a designated windrow of feedlot manure undergoing composting. Composting windrows are to be regularly turned using front end loader and specialized windrowing machinery.

The site will be operated according to an approved environmental management plan and an on-going environmental monitoring program.

The proposed development will create local employment and opportunities for a diverse range of local businesses and support services including livestock carriers, grain and hay producers and suppliers of veterinary and agronomic products. The feedlot development will bring significant benefits to the local community and local economy as well as the broader regional area of southern NSW.

There will be a relatively small increase in traffic on local and regional roads.

Overall the document outlines that with "best practice" feedlot operations and with appropriate and practical management of the key environmental risks any adverse impact of the development on the environment will be minimal.

1.0 INTRODUCTION

1.1 Overview of the Proposal

The 775 hectare landholding comprises an aggregation of "Palm Grove" of approximately 561 hectares and "Oak Park" of approximately 214 hectares. Beefcorp Farms Pty Ltd purchased and took possession of the landholding in April 2019 with a plan to apply for consent from Murrumbidgee Council to establish a beef cattle feedlot. The proposed lotfeeding operation intends to focus on long feed cattle with the derived beef product generally destined for export markets.

The landholding is located approximately twenty (20) kilometres north west of Finley with frontage to Rolfe Road and Logie Brae Road. The site of the proposed feedlot is located centrally within the landholding approximately six hundred and fifty metres (650 m) South of Rolfe road.

The proponent has consulted with the key government agencies including Murrumbidgee, Berrigan and Edward River Councils to discuss the development and obtain information on requirements for the proposed feedlot operation. A part of the consultation included an on-site Planning Focus Meeting held on 16th April 2019.

Representatives of Council and other key government agencies met and inspected the site of the proposed feedlot. The proposal was described by the proponent and then the important environmental issues were discussed including that the proposal was "designated and integrated" development.

The Department of Planning & Environment has been consulted to obtain the Secretary's Environmental Assessment Requirements (SEAR) for the Environmental Impact Statement (EIS).

The site for the feedlot satisfies a number of the preferred locational criteria outlined in *The NSW Feedlot Manual* (NSW Agriculture, 1997) including:-

- Semi-arid climate with low rainfall (~400mm) & high evaporation (~1800mm)
- Good separation from creeks and rivers
- Feedlot not on flood prone land and an absence of shallow groundwater
- Sufficient land available for composted solids/manure utilisation
- Adequate water supply
- Suitable clayey soils
- Adequate buffer distance to neighbours and Finley as per NSW Government guidelines
- Abundant grain and fodder supplies

Note that the proponent intends to gain accreditation for the proposed feedlot under the National Feedlot Accreditation Scheme.

The feedlot will also comply with the *National Beef Cattle Feedlot Environmental Code of Practice* (MLA, 2011) and routinely undergo independent *AUS-MEAT* audits.

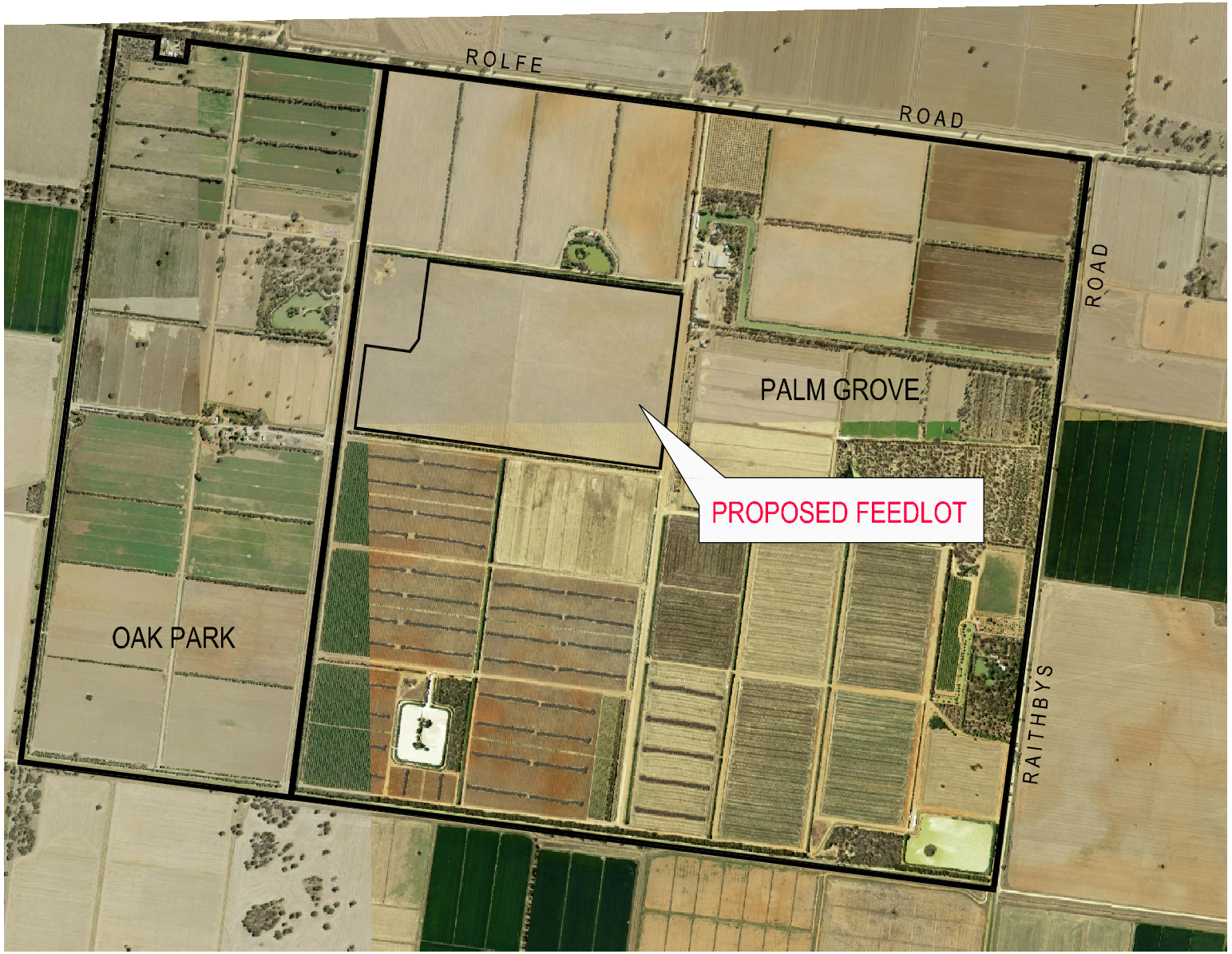


FIGURE 2

Palm Grove & Oak Park Photoplan - 7680 HEAD CATTLE FEEDLOT

BEEFCORP FARMS PTY LTD "PALM GROVE" FINLEY

The proposed feedlot has generally been designed to comply with requirements of the:-

National Guidelines for Beef Cattle Feedlots in Australia. 3rd Edition
(Meat & Livestock Australia, 2012)

The New South Wales Feedlot Manual (NSW Agriculture, 1997)

An odour impact assessment was carried out to determine the likely impact of odours produced by the feedlot on surrounding residences. The methodology for the assessment was based on the requirements of the Environment Protection Authority.

The assessment found that the feedlot complies with requirements regarding the minimum separation distance required between the feedlot and nearest neighbour ie. calculated as a minimum distance of 997 metres. (Refer to Appendix 3.)

With the nearest relevant residence approximately 2200 metres south west of the proposed site and separated by numerous dense tree-lots it is considered that there will be minimal adverse odour or noise impact on this neighbour or other residents located further away in the locality.

Figures 1, 2 & 3 graphically illustrate the location of the proposed lotfeeding operation and give an appreciation of the scale of the operations in relation to the property generally, local drainage and the surrounding environment.

1.2 The Applicant

Name:	Beefcorp Farms Pty Ltd
Property:	"Palm Grove"
Address:	587 Rolfe Road, Finley NSW 2713

1.3 Property Details

Palm Grove

Lots & DP :	Lot 1-3 DP 120110 & Lot 1 DP 393315
Parish :	Booroobanilly
County :	Urana

Oak Park

Lots & DP :	Lots 12 & 35 DP 756391 & Lot 108 DP 756391
Parish :	Booroobanilly
County :	Urana

1.4 The Feedlot Manager

Name:	Andrew Carey
Address:	"Palm Grove" Finley NSW 2713
Phone:	03 5885 9200

1.5 Objectives of the Development

The proponent has been successfully operating a large cattle and branded beef marketing enterprise for over 25 years. The proposal is to establish a beef feedlot to help achieve more consistent and reliable finishing of livestock to market specifications.

The aim is to produce prime quality branded beef, by value adding grain, hay and/or silage produced both on farm and in the local district, for a range of markets including the domestic and export markets.

The proponent is aware that for livestock to perform in the feedlot the welfare of the animals is paramount and animals will be properly handled and cared for in accordance with standards set in NSW Government animal welfare legislation and the NFAS.

Another key objective is state-of-the-art feedlot design and that on-going feedlot operations be managed on a sustainable basis to minimise adverse environmental impacts.

Also recognised are the significant positive impacts for the district community and local and wider regional economies through provision of services to an intensive livestock agriculture development. It is estimated that eight (8) staff will be employed to run the proposed feedlot operation and there will be significant additional local employment opportunities supported from the feedlot development.

1.6 Consultation

Throughout the preparation of the EIS there has been extensive consultation with various local and state government agencies and other interested parties concerning this feedlot development. The objective was to identify the issues, gather relevant background information and then address these matters in the EIS. Following is a list of agencies and others that have been consulted:-

. Murrumbidgee, Edward River & Berrigan Council's
. NSW Dept. of Primary Industries
. NSW Dept. of Industry - Crown Lands
. Roads & Maritime Services
. Bureau of Meteorology - National Climate Centre
. Environment Protection Authority – Griffith & Wagga Wagga
. Dept. of Planning
. Water NSW & NSW Office of Water
. Murray Irrigation Limited
. *AUS-MEAT Limited*
. Office of Environment & Heritage - Albury
. Meat & Livestock Australia
. Local Aboriginal representatives – Yarkuwa Indigenous Knowledge Centre
. Deniliquin Local Aboriginal Land Council & Yorta Yorta Aboriginal Corp.
. Local Land Services – Deniliquin & Rural Fire Service
. Adjoining & close neighbours

Table 1 outlines the key issues identified in the Secretary's Environmental Assessment Requirements (SEAR), during the planning phase for the development and from consultation with the various government agencies.

Table 1 Summary of Key Issues

Specific Issues Identified	DPE	EPA	DPI Ag	DPI Water	OEH	MC	Section
Justification of the project & consistency with planning instruments & list of approvals	x					x	1.7, 6
Waste management incl: proposed handling, stockpiling, reuse & disposal measures	x	x					2.2.2, 2.3, 4, 5.1
Animal welfare, biosecurity & disease management, compliance with relevant codes of practice & guidelines, disease control measures & contingency measures	x		x				1.1, 2.0, 2.2, 2.3, 2.4, 5.6
Disposal & management of mortalities & managing mass death conditions		x	x				5.1.2, 5.1.3, 5.4.1
Air quality, odour & dust incl: potential sources, odour impact assessment consistent with EPA Guidelines & proposed mitigation & monitoring	x	x					3.5.4, 5.1, 5.2 Appendix 3
Noise incl: potential impacts during construction, operation & traffic sources according to relevant guidelines & proposed mitigation & monitoring	x	x				x	5.2, 5.8
Water resources incl: licensing & approvals under relevant legislation	x		x	x			2.1.3, 2.3.1
Soil & water incl: description of soils, water management, effluent system. Assessment of potential for on-site contamination & proposed mitigation measures	x	x		x			3.4, 4.2.2, 4.2.3, 4.3, 5.4, Appendix 1 & 2
Groundwater incl: potential impacts on water sources & dependant ecosystems. Details of clay lining requirements to meet minimum permeability requirements		x		x			3.3, 3.4, 5.4, Appendix 1 & 2

Surface water incl: management systems to protect surface & groundwater from pen runoff, effluent evaporation dams & manure application, to prevent offsite discharge		x		x			4.2.2, 4.3, 5.4, 5.5 Appendix 1
Traffic & transport incl: details on road transport routes & access to the site, traffic predictions & an assessment of the safety & function of the existing road network	x					x	Figure 1 & 2, 2.1.4, 5.8
Biodiversity incl: an assessment of potential impact on threatened species	x				x		3.7, 5.7, 6.3, Appendix 5
Heritage impacts incl: Aboriginal & non-Aboriginal cultural heritage	x				x		3.8, 5.7, Appendix 6

1.7 Statutory Matters

This section of the EIS describes how the proposed feedlot development will address and/or comply with the key and relevant local planning policies, state and federal legislation and guidelines.

The proposed development is classified as Designated Development under the *Environmental Planning & Assessment Act*, 1979. As such the development requires consent and an Environmental Impact Statement must be prepared and accompany a Development Application and be advertised and exhibited by the consent authority for a minimum of 28 days for public input.

The proposal also requires an Environmental Protection Licence issued by the Environment Protection Authority under the *Protection of the Environment Operations Act*, 1997 and is therefore also Integrated Development.

1.7.1 Local Environmental Plan (LEP)

The Murrumbidgee Shire was proclaimed in May 2016 after the former local government areas of Murrumbidgee and Jerilderie were merged by the State government.

The landholding purchased by Beefcorp Farms Pty Ltd in April 2019 lies at the south west corner of the former Jerilderie Shire and the Jerilderie LEP 2012 is the current local government planning policy, which guides the planning decisions of Council through zoning and development controls, for this part of the Murrumbidgee Shire.

The proposed development is considered consistent with the aims of the LEP and, for example, will facilitate economic growth within the region through the support of surrounding grazing and cropping enterprises and existing service providers.

The landholding is located in Zone RU1 – Primary Production in the local government area. The particular aims of the RU1 Zone are as follows:-

- 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.

Note that the proposed feedlot development is defined as "Intensive Livestock Agriculture" and meets all the objectives as prescribed in the LEP for Zone RU1 and under the LEP is permissible with consent.

The proposed development is not considered to conflict with the adjoining land uses but is compatible with and likely to enhance the potential of local farming and grazing enterprises.

1.7.2 Environmentally Sensitive Areas

Part of the LEP comprises maps that identify key sensitive areas including terrestrial biodiversity assets, wetlands, land with groundwater vulnerability and riparian land and watercourses.

The LEP identifies terrestrial biodiversity areas ie. areas of vegetation planted by the previous owner, and wetlands which essentially comprise existing irrigation water storages, on the subject landholding.

The proposed development is not in the vicinity of these sensitive areas located on other parts of the 775 hectare farm and it is considered that feedlot activities will not disturb these areas.

Note that the LEP identifies no land with groundwater vulnerability, nor riparian land or watercourses on the landholding.

1.7.3 Murrumbidgee Council - Development Contributions Plan

The Development Contributions Plan, commenced in May 2017 with a primary purpose to assist Council in providing the appropriate public facilities to maintain and enhance amenity and service delivery within the Murrumbidgee local government area.

Council has indicated that the Development Contributions Plan is relevant to this proposal.

1.7.4 State Legislation

Key matters re State legislation relevant to the proposal are discussed as per the following:-

- Biodiversity Assessment
- Aboriginal Cultural Heritage
- Primary Production & Rural Development
- Rural Fires Act 1997
- Remediation of Land
- Hazardous & Offensive Development
- Rural Lands
- Infrastructure

Biodiversity Assessment

Biosis Pty Ltd (an accredited consultant) was commissioned to undertake a native vegetation due diligence assessment and complete a biodiversity assessment to determine the presence of any threatened flora, fauna, populations or ecological communities (biota) within the area affected by the proposed feedlot.

Where applicable, additional work was to be undertaken to assess the impacts of the project on any such species or their habitats listed under either the NSW *Biodiversity Conservation Act 2016* or the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999.*

Refer to the biodiversity assessment report from Biosis Pty Ltd included as Appendix 5.

It was identified that the entire study area has been significantly modified through land clearing and a long history of agricultural uses including cropping and livestock grazing. No trees exist on the proposed feedlot site.

The feedlot site contains no suitable habitat for any threatened species listed under the *Biodiversity Conservation Act 2016* or the *Environmental Protection and Biodiversity Conservation Act 1999* and Biosis Pty Ltd considered that the likelihood of any threatened species using the site is low.

Importantly, Biosis Pty Ltd considered that:-

- given the lack of native vegetation and suitable habitat for threatened species then consideration of the project under the Biodiversity Assessment Method was unwarranted, and,

- the proposed feedlot project is not likely to result in a significant impact to species or communities listed under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999*, and as such a referral to the Minister for the Environment is not required.

Aboriginal Cultural Heritage

The Office of Environment & Heritage required that a detailed Aboriginal cultural heritage assessment of the proposed project site be carried out according to the *Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW* (OEH, 2010).

After discussions with David Crew, Manager of Yarkuwa Indigenous Knowledge Centre Aboriginal Corporation the organisation was commissioned to undertake the assessment.

The assessment included a desktop assessment as well as a site inspection to identify and record any cultural heritage sites within the project site and completion of an Aboriginal Cultural Heritage Assessment Report. Refer to Appendix 6.

The results of the assessment was that no cultural material was observed during the inspection nor expected to be found within the area to be impacted by the development.

It was concluded that "the Due Diligence Code of Practice has been met and …. that the proposed development be allowed to proceed without constraint on archaeological and Aboriginal heritage grounds…."

Consultation was undertaken with the Yorta Yorta Aboriginal Corporation, Deniliquin Local Aboriginal Land Council and the Yarkuwa Indigenous Knowledge Centre Board.

Primary Production & Rural Development – State Environmental Planning Policy (2019)

The aims of this Policy include:-

- to facilitate the orderly economic use and development of lands for primary production,
- to reduce land use conflict and sterilisation of rural land by balancing primary production, residential development and the protection of native vegetation, biodiversity and water resources,
- to encourage sustainable agriculture

The Murrumbidgee Council supports the use of land for intensive livestock agriculture within Zone RU1 Primary Production under the Jerilderie LEP 2012. The development does not include the erection of buildings, dwellings or subdivision of land.

Note that the following environmental planning instruments are repealed:-

- State Environmental Planning Policy (Rural Lands, 2008)
- State Environmental Planning Policy No. 30 – Intensive Agriculture

Rural Fires Act 1997

One of the main objectives of the *Rural Fires Act 1997* is to help provide for the prevention, mitigation and suppression of bush and other fires in local government areas.

There are a few key points relevant to the issue of rural fires as follows:-

- Proposed development does not involve the erection of any buildings or dwellings and is to be located on an existing cleared area of land
- It is proposed that a firebreak be maintained around the development footprint
- All weather roads will provide access for fire-fighting equipment
- Existing on-site storages will supply water for fire-fighting purposes

Remediation of Land – State Environmental Planning Policy (SEPP 55)

The purpose of this policy is to provide a state-wide planning approach to the remediation of land. In particular, the policy aims to promote the remediation of contaminated land to reduce the risk of harm to human health or other aspects of the environment.

The proposed development site is used for agricultural purposes including cropping and grazing and it is unlikely that this land use would have resulted in contamination of the site.

Therefore it is considered that no further investigation under SEPP 55 is required.

Hazardous & Offensive Development - State Environmental Planning Policy (SEPP 33)

This SEPP applies to any proposals which fall under the policy's definitions of "potentially hazardous industry" or "potentially offensive industry".

The proposed development is designed and will be operated according to the *National Guidelines for Beef Cattle Feedlots in Australia* (MLA, 2012) and *The New South Wales Feedlot Manual* (NSW Ag, 1997). No hazardous waste products will be produced by the feedlot.

Therefore it is not considered to be "potentially hazardous industry" as it does not pose a significant risk to human health, life or property nor to the biophysical environment.

The proposal could be considered a "potentially offensive industry" due to the potential to generate adverse odour emissions. It is considered that the state-of-the-art designs and proposed industry best practice operations and environmental management (including accreditation and regular audits under the National Feedlot Accreditation Scheme) will minimise any adverse odour impacts.

Additional protection is provided through adequate separation distances between the site and the closest residences.

The SEPP aims to ensure that the merits of a proposed development are properly assessed and aims to ensure that developments can proceed if they are suitably sited and that they will be built and operated with an adequate level of safety.

Note that the proposed feedlot complies with the EPA Level 1 Odour Assessment requirement for separation distance to the nearest residence. Refer to Section 5.1.

Rural Lands - State Environmental Planning Policy (2008)

The aims of this Policy include:-

- The facilitation of orderly and economic use and development of rural lands for rural and related purposes
- To identify the Rural Planning Principles and the Rural Subdivision Principles so as to assist in proper management, develop and protection of rural lands for the purpose of promoting social, economic and environmental welfare of the State
- To implement measures designed to reduce land use conflicts

Note that this planning instrument is repealed.

Infrastructure - State Environmental Planning Policy (2007)

The aim of this Policy is to facilitate the effective delivery of infrastructure across the State by, for example:-

- Improving regulatory certainty and efficiency through a consistent planning regime for infrastructure and the provision of services
- Providing greater flexibility in the location of infrastructure and service facilities
- Identifying the environmental assessment category into which different types of infrastructure and services development fall (including identifying certain development of minimal environmental impact as exempt development)
- Providing for consultation with relevant public authorities about certain development during the assessment process or prior to the development commencing

The proposed development meets the criteria for Integrated Development and the EIS has addressed the key policy aims of this State Policy on Infrastructure. The feedlot will use state roads as per details provided in Section 2.1.4 and Section 5.8 as well as use existing power infrastructure.

FIGURE 3

Schematic Layout - 7680 HEAD CATTLE FEEDLOT
BEEFCORP FARMS PTY LTD "PALM GROVE" FINLEY

2.0 THE FEEDLOT

The proposed feedlot will generally comply with the relevant industry guidelines ie.

- *National Guidelines for Beef Cattle Feedlots in Australia* (Meat & Livestock Australia, 2012)

- *The New South Wales Feedlot Manual* (NSW Agriculture, 1997)

Note that the proponent also intends that the feedlot will be accredited under the National Feedlot Accreditation Scheme (NFAS) which is the feedlot industry quality assurance system. Under this government and industry managed program accredited feedlots are independently audited each year.

It will also comply with the National Beef Cattle Feedlot Environmental Code of Practice as part of the NFAS.

2.1 Feedlot Design

The attached Schematic Layout plan (Refer to Figure 3) shows the proposed layout of the feedlot and its component parts. Details are outlined in the following sections.

2.1.1 Feeding Pens

It is planned that the feedlot will include four (4) modules each comprised of two (2) rows of face to face feeding pens with a common feeding alley. Seven rows will have twelve (12) pens each with the remaining row to comprise seven (7) full size pens and ten (10) smaller feeding pens.

The fully developed feedlot will accommodate 7680 cattle.

Cattle feeding pens will generally be thirty (30) metres wide and forty five (45) metres deep to accommodate 80 head at 16.875 metres^2 per beast. The ten (10) smaller pens will be 15 x 45 metres and hold 40 head at 16.875 metres^2 per beast.

The feedlot including feeding pens, feed roads, cattle laneways, drainage works, sedimentation terraces and effluent evaporation dams will cover an area of approx. 33 hectares. Refer to Figures 3 & 5 – Schematic Layout and Typical Feedlot Cross Sections.

Note that it is intended that shade will be installed in at least 50% of all pens. The hospital pens ie. pens for more intensive husbandry and care of unwell cattle, will all have shade structures.

The feeding pens are to be constructed mainly using steel pipe and strainer assemblies and steel cable.

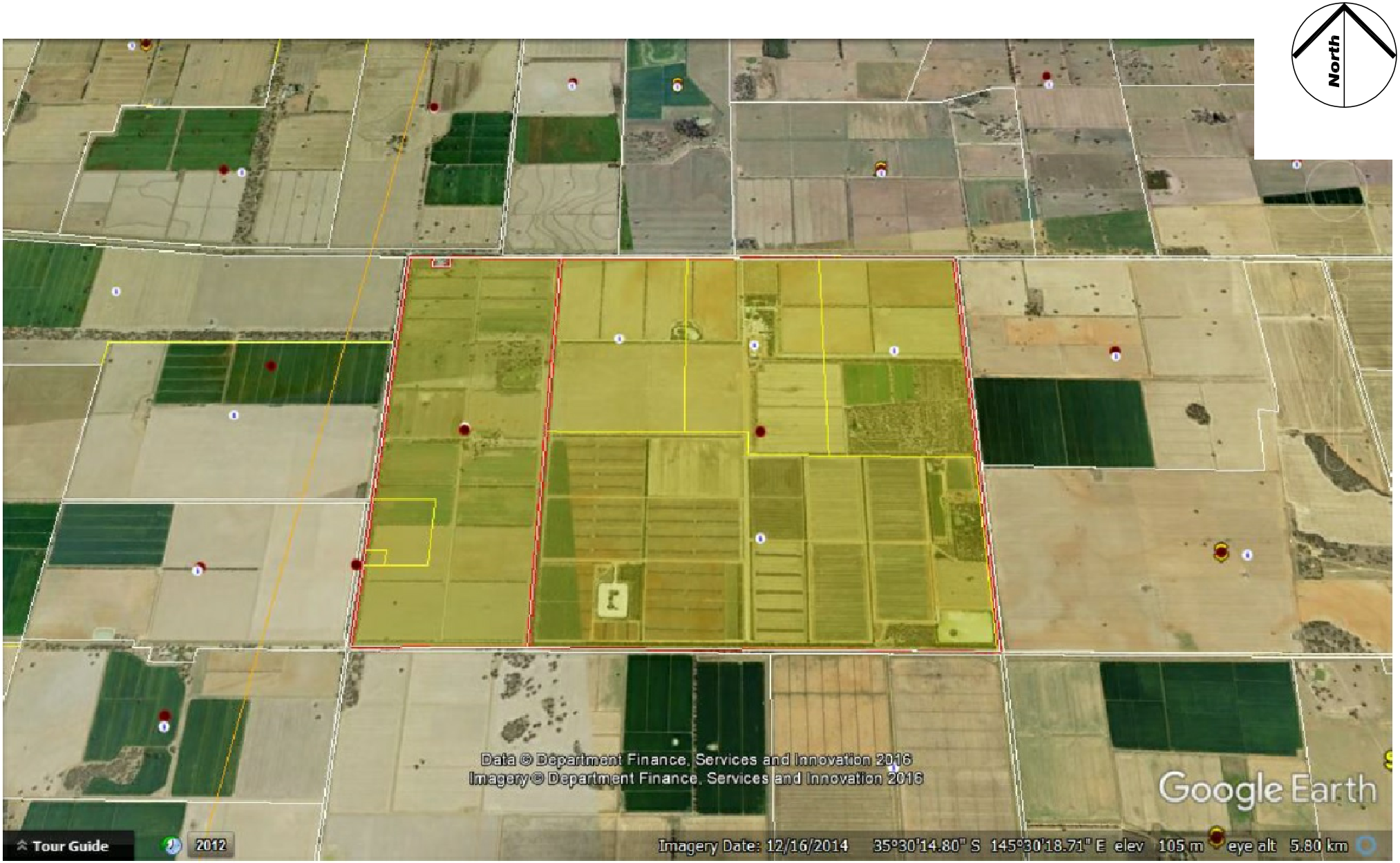


FIGURE 4

Palm Grove & Oak Park Photoplan - 7680 HEAD CATTLE FEEDLOT

BEEFCORP FARMS PTY LTD "PALM GROVE" FINLEY

The site of the feedlot is to be prepared using large earthmoving machinery such as elevating scrapers, dozer/grader and compaction equipment. The flat local terrain and the need to have adequate feedlot drainage will necessarily require raising the northern end of the earthen feedlot pad above natural ground level.

Excavation, filling and compaction operations will be undertaken to achieve a good slope gradient in the feeding pens. There will be less than 1% crossfall between feeding pens.

The feed pens will be regularly cleaned as necessary and at least quarterly. Manure is to be stockpiled on the composting pad in windrows and regularly turned. The composting area will include a compacted clay lined and contained area draining to a sedimentation structure and ultimately to the nearby evaporation dam.

The site of the feedlot will be fully contained by diversionary embankments and in places part of the elevated earthen pad and side batters. Internal feedlot catch drains will direct storm runoff via the sedimentation structures to the multi-cell effluent evaporation dam.

These works will ensure that the feedlot effectively comprises a "controlled drainage area" and the feedlot runoff generated by rain events is fully contained.

2.1.2 Feed Preparation & Feeding

The mainly grain and hay feed ration is to be prepared on site using the existing milling infrastructure and commodity storage facilities. The feed ration preparation area includes a large shed complex (2457 metres^2) to be used for storage of various commodities, numerous grain silos including 6 x 55 tonne silos, a 6 tonne overhead bin/silo, 1 x 10 tonne load out silo as well as workshop, office and store room.

The feed ration will be delivered to the feed bunks using truck powered feed mixers and/or tractor drawn feed-wagons. The rows of feeding pens will have specially designed modular concrete feed bunks running along the high-end of the pens.

It is proposed that three (3) metre wide concrete aprons will be constructed adjacent to the feed bunk to ensure firm access for feeder animals.

2.1.3 Water Supply

Water is a feature of the landholding including a number of delivery weirs from Murray Irrigation Limited (MIL) supply channels, numerous large water storage dams with greater than 300 Megalitres of storage, tailwater recycle systems and access to the MIL district drainage system. Water supplies include:-

- MIL Water Delivery Entitlements - 1221 ML & 609 ML
- Lower Murray Groundwater Source - 380 ML

The water supply for the proposed feedlot will comprise groundwater complemented with channel water.

Note that discussions have been held with the water authorities at Deniliquin and it was agreed that existing water entitlements can be used as water supply to the feedlot.

The water supply system will include a 500,000 litre steel tank located on an elevated earth mound with gravity supply to feed yards via a ring main supply system and high flow delivery to troughs.

The existing water storage dam just north of the feedyard area (Refer to Figure 2) will be converted to a backup cattle drinking water storage. To ensure animals are well watered a minimum of three (3) days water supply will be stored. This proposed three (3) extra days storage supply is a risk management measure in the case of an emergency eg. pump breakdowns or other water supply issues.

Water troughs will be located well away from the feed bunk and at the lower end of the pens with three (3) metre wide concrete aprons to ensure firm access for feeder animals.

The 500,000 litre tank holds the average daily drinking water supply for the feedlot in the summer months ie. 7680 cattle @ 65 L/head (Davis, R. & Watts, P., 2000).

An overall estimate of the total annual water requirements for the feedlot, based on the generally accepted water requirement for beef feedlots in the QDPI Reference Manual, is 24 ML/1000 head on feed.

Assuming an average of 80% utilisation of feedlot capacity (NSW Agriculture, 2001) it is estimated that the total annual water requirement is approximately148 ML.

2.1.4 Access

Good and well maintained access is available to the site of the proposed feedlot off the Newell Highway onto Mayrung Road, Logie Brae Road and then Rolfe Road. These roads are currently the main routes for local and heavy vehicle traffic and ensure all weather access to "Palm Grove". Refer to Figure 1 – Locality Map.

The proponent has held discussions with Council and the Roads & Maritime Authority regarding this main access route to the proposed feedlot development.

Council has inspected the proposed route to and from the site and has indicated it has no objections to approving heavy vehicle access based on the estimated road traffic.

2.2 Animal Husbandry and Feedlot Management

Having successfully operated a large and comprehensive beef cattle enterprise including exporting of branded beef products mainly to Asia for many years the proponent is acutely aware that many factors contribute to the success and financial viability of a lotfeeding operation including:-

- Environmental considerations eg. properly planned and executed manure handling and utilisation, regular pen cleaning, sediment management, etc.

- Animal welfare and management ie. health, husbandry and feeding management
- Financial planning, budgeting and marketing of finished livestock and beef

Due consideration will to be given to the above at all times and this will contribute to the long term environmental sustainability and financial viability of the proposed feedlot.

Feedlot design incorporates dedicated hospital pens with shade to be used for more intensive cattle husbandry practices and management for unwell animals.

As indicated above it is intended that livestock handling methods and care of animals will comply with "industry best practice".

Management practices in relation to animal husbandry, feed pens and feeding are outlined in the following sections.

2.2.1 Cattle Management

Livestock entering the feedlot will undergo all commonly undertaken health and animal husbandry practices eg. internal and external parasite control, identification and vaccination.

Feeder animals will be introduced to a starter ration of mainly high quality hay. The grain component of the ration is gradually increased over about 20 – 30 days until animals can safely metabolise the finishing ration.

Finishing rations generally comprising approx. 30% grain, 40% roughage plus additives such as protein meal and minerals.

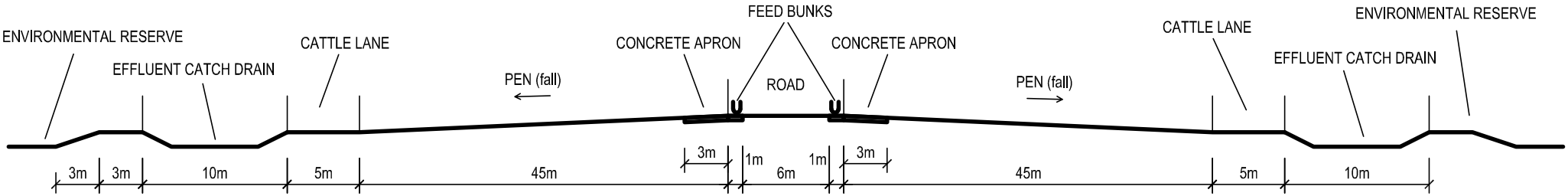
Feed is to be prepared daily and generally cattle will be fed twice daily. The objective being to ensure that fresh feed is continuously available to stock on an ad lib basis. Experience has shown that this helps overcome animal stress, caters for shy feeders and ensures optimal livestock performance.

Animals will be inspected daily to monitor wellbeing and health.

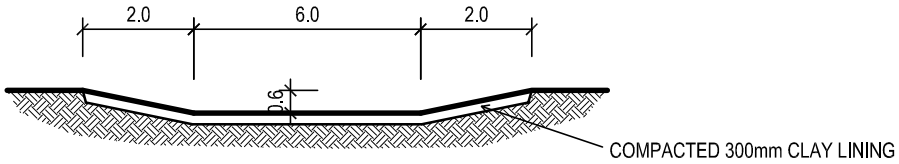
2.2.2 Feed Pen Management

A fundamental issue with feed pens is pen surface management. The proponent is aware of the desirability of preventing excessive build-up of manure and thereby keeping the pen floor dry but moist for reasons including the minimisation of odours, minimisation of dust and improved animal performance.

The design slope gradient in the feed pens will be achieved during earthwork construction operations. This design gradient will facilitate good drainage and the runoff of excessive rainfall during wet weather, thus helping to dry the pens.



TYPICAL FEEDLOT SECTION (not to scale)



EFFLUENT CATCH DRAIN (TYPICAL)

FIGURE 5

Typical Sections - 7680 HEAD CATTLE FEEDLOT
BEEFCORP FARMS PTY LTD "PALM GROVE" FINLEY

A key objective is to retain most of the manure in the feeding pens to enable better manure management and minimise solids moving out of the pens.

Manure will be regularly scrapped from pens ie. at least quarterly, with the objective of not exceeding a 50 mm layer of dry manure. The proponent is aware of the need for pens to be in good condition going into winter and summer.

Great care will be taken not to disturb the 40 - 50 mm compacted manure-soil interfacial layer as it provides an effective moisture seal and prevents downward movement of wastes and leaching of nutrients (Sweeten, Undated).

Runoff from the pens will be captured in the catch drains running the length of the rows of pens to sedimentation structures and finally into effluent evaporation dams. Note that feedlot effluent is to be disposed of by evaporation.

The sludge that accumulates will be disposed of by spreading onto cropping paddocks at environmentally sustainable application rates. The timing of sludge removal will occur prior to 20% reduction in capacity of the pond.

2.2.3 Feeding Management

The proponent understands the importance of correct nutrition for animal welfare, optimum growth rates & feedlot profitability.

It is intended that ration formulation will be very thorough and a scientific approach will be adopted including sampling and laboratory analysis of all ingredients. A professional nutritionist will be used to formulate rations.

As indicated earlier feed rations are to be delivered to the bunk by means of truck powered or tractor drawn feed mixers to ensure that animals have feed available at all times.

2.3 Managing Heat Load

As indicated earlier the proponent intends to have the proposed feedlot accredited under the National Feedlot Accreditation Scheme.

The NFAS requires that feedlots have a heat stress management plan in place to cope with weather events that can lead to excessive heat loads in feedlot cattle.

Excessive heat load occurs where a combination of local environmental conditions and animal factors lead to an increase in body heat beyond the animals normal physiological range and its ability to cope with this.

Cattle function optimally by maintaining their core body temperature within a reasonably narrow range ie. in warm conditions normally in the range 38.5 – 39.5 degrees C.

Excessive heat load (EHL) in ruminants is the result of a number of complex interacting factors including:-

- Physical climatic conditions including heat, humidity, radiation & air movement
- Issues such as breed, coat colour, body condition & health status
- Nutrition eg. metabolic heat of nutrients, diet, time of feeding, water availability
- Management practices such as livestock care, staff experience & work practices

Similar to other lotfeeding areas around the world Australia experiences periodic hot summer weather. The risk of EHL and sub-optimal animal health and animal deaths during excessive hot weather is exacerbated by high humidity and low wind conditions.

Naturally these circumstances give rise to concerns about animal welfare as well as the associated production losses.

Importantly shade will be provided in at least 50% of all pens. Access to shade, particularly for heavier cattle towards the end of the feeding period, has a significant positive effect in managing heat load.

The proponent will also subscribe to the MLA Katestone developed weather forecasting system which provides early warning of potential major heat load events. This cattle climate weather forecasting service allows feedlot operators to undertake appropriate actions to mitigate the risk of heat stress in cattle.

2.3.1 Risk Analysis Program (RAP)

To address the issues around EHL in feedlot cattle a Risk Analysis Program (RAP) was developed by *Meat & Livestock Australia* and the *Australian Lot Feeders Association.*

The remainder of this section has a focus on the risk assessment as per the MLA Risk Analysis Program for cattle (Meat & Livestock Australia, 2006).

The RAP for the feedlot was undertaken choosing the Deniliquin option in the calculator.

The results indicate that the frequency of an extreme-event of 3 or more days duration is as follows:-

< 1 events in 22 years - days on feed > 130 days

The results of the RAP are attached as Appendix.7.

Regardless of the RAP outcome the proponent will comply with the requirements of the NSW DPI and the National Feedlot Accreditation Scheme Standards.

The proponent will implement the following management strategies or "Summer Action Plan" to address any potential heat load problem including:-

- Generally comply with the principles outlined in the MLA document titled Heat Load in Feedlot Cattle (MLA, 2006)
- Regular cleaning of feeding pens to help ensure that the pad is clean and dry and to help in controlling humidity, especially during the hotter summer months
- Install an underground trough wastewater system to contain overflow of water supply and drainage water associated with the regular cleaning of water troughs
- Routinely keep a check on weather conditions (using the MLA Katestone System) & livestock during the critical hotter months & especially following summer rain
- When conditions indicate a need, special heat stress rations will be used to minimise animal heat load ie. feeding highly digestible, high energy rations including the use of high energy substitutes eg. molasses, and more easily digested roughages as well as ensuring adequacy of vitamins and minerals
- More regular feeding of smaller sized fresh feed deliveries to help spread the heat load in livestock which rises during and after feeding
- Where feasible, feeding to be more oriented to afternoon or early evening to better align heat production peaks with cooler night-time conditions
- Ensure a good supply of clean and cool water to livestock at all times including adequate backup supplies in case of emergency situations
- Provide approved type shade in hospital pens and at risk cattle pens

These proposed "best management practices" comply with the recommendations outlined in the publication titled Heat Load in Feedlot Cattle (MLA, 2006).

2.4 AUS-MEAT Accreditation

The proponent intends to obtain feedlot accreditation under the beef cattle grain feeding industry initiated National Feedlot Accreditation Scheme (NFAS). Note that independent auditors annually inspect and audit feedlots for compliance with the required NFAS rules and Standards. Under the NFAS accredited feedlots have:-

- exclusive use of the *AUS-MEAT* grain-fed beef descriptions
- official and public recognition as operating an *AUS-MEAT* approved Quality Assurance System to produce "grain fed" beef
- a guarantee that beef has been produced according to approved procedures & lotfeeding operations managed according to sound environmental principles
- effective systems and efficient practices.

3.0 EXISTING ENVIRONMENT

3.1 Land Use

The landholding is located centrally within the earlier referred to Berriquin Irrigation District, part of the Murray Irrigation Area that extends from Tocumwal, Berrigan and Jerilderie in the east to west of Deniliquin and extending past Moulamein taking in the Wakool Land and Water Management district.

Similar to many farmers across the district the proponent operates mixed irrigation and dryland cropping and a cattle grazing enterprise. Historically the major irrigated enterprise in the district was rice growing in rotation with winter cereals and improved pastures. More recently cotton is being grown.

The main grazing enterprises in the district include prime lamb production with Merino sheep and beef cattle grazing generally on the more extensive areas of the district.

The site of the proposed feedlot has a long history of cropping and grazing and is currently under a crop of forage oats planted in April. The landholding is generally surrounded by developed irrigated cropping paddocks. Refer to Figure 4 - Palm Grove & Oak Park Photoplan sourced from Google Earth.

3.2 Landform

"Palm Grove" and "Oak Park" are located within the broad Riverine Plain of New South Wales, a depositional landform which is traversed by the westerly flowing Murray and Murrumbidgee River systems.

The land is at an elevation of approximately 104 metres AHD and is relatively flat with slopes of about 1 in 2000 and generally drains in a north westerly direction.

The landholding is centrally located within the Berriquin Irrigation District which is bounded by Billabong Creek in the north and the River Murray in the south. The District is dissected by a system of existing floodplain modifications comprising MIL water supply channels, drainage channels and stormwater escape structures.

3.3 Hydrogeology

A hydrogeological assessment was undertaken to identify geological aspects relating to local water resources and is described in Appendix 1 of the EIS. The following sections summarise the key information from the hydrogeological assessment.

3.3.1 Regional Geology

The geology of the region has been described in numerous reports written by officers of the former Dept. of Land and Water Conservation, Dept. Natural Resources and Dept. of Primary Industries.

Following is a groundwater description paraphrased from the document titled the *Lower Murray Alluvium: Groundwater Management Area 016 – Groundwater Status Report 2010* (NSW DPI, Office of Water, 2010).

The proposed feedlot lies within the eastern Riverine Plains of the Murray Geological Basin. The Murray Basin is a saucer shaped depression underlain by bedrock. Since its formation, the basin has gradually been filled with sediments, both fluvial and marine in origin. These sedimentary deposits can be divided into three main geological units ie. in order from oldest to youngest :-

- *Renmark Group*, the oldest & deepest zone, 140 – 350 m deep
- *Calival Group*, the intermediate formation consisting of sand, gravel & clay layers, 90 – 140 m deep
- *Shepparton*, the shallow, near surface aquifer with poorly sorted sandy & clay layers, the most recent formation, 0 - ~70 m deep

Within the Deniliquin area the thickness of sediments is generally about 200 - 250 meters, increasing in the west near Balranald to around 350 - 400 metres and reducing in the east to about 120 meters eg. near Corowa where the Murray River enters the Murray Geological Basin.

The sandy layers referred to as the shallow aquifers mostly occur in the top 30 metres.

The departmental description is summarised in Appendix 1 of the EIS.

3.3.2 Groundwater Information and Trends

The various groundwater status and behaviour reports mentioned earlier provide a good description of groundwater information including usage and trends. Key points from the reports include:-

<u>Deep Groundwater</u>

- Better quality groundwater (<1000EC) is generally found within the Calivil Formation ie. the main productive aquifer
- The better quality groundwater is used for irrigation, town water supply and industrial uses

<u>Recharge</u>

- The main recharge for the Shepparton aquifers is direct rainfall infiltration and basal leakage from the Murray River and its anabranches, and irrigation accessions
- Recharge appears to occur slowly and continuously from the effects of floods and high rainfall events

Shallow Groundwater

- In the shallow aquifer low salinity water (<500 EC) generally occurs closer to the rivers and streams
- Observation bores around Mayrung – Logie Brae indicate a general deepening trend in groundwater depth over the last twenty or so years with a slight rising trend becoming evident since 2010/11
- A general deepening trend is now being observed as the 2017 – 2019 drought worsens

3.3.3 Electromagnetic Survey

An electromagnetic survey (EM) was undertaken by Lloyd Angove Soil Survey & Drilling Pty Ltd to measure the conductivity of the soil across approximately 60 hectares of land at the site of the proposed feedlot. Refer to Appendix 1.

This EM survey maps and measures soil conductivity to provide information such as the likelihood of porous/sandy soils or heavy clay soils, prior stream detection, suitability for storage dams, channel seepage detection, suitability for rice growing, etc.

In this case the proposed feedlot includes a raised earthen pad for the feeding pens, runoff sedimentation terraces, evaporation dams, composting pad, etc. Knowledge of subsoil conditions is considered to be useful in the planning and design of this infrastructure.

The survey results indicate that across the subject areas there are medium and heavy clay subsoils.

Interpretation of the results indicates that the area is suitable for the proposed feedlot development.

Note that earlier Murray Irrigation Limited classification of the soils across the site determined that the subsoils are relatively dense medium – heavy clays and therefore classed as suitable for rice growing.

3.3.4 Local Hydrogeology

Key points relating to local hydrogeology are listed as follows:-

- Murray Irrigation Limited provided data relating to the depth to pressure levels (DTPL) in monitoring bores in relative close proximity to the site of the proposed feedlot

- The DTPL in 2008/09 ranged between approximately 4.9 – 8.1 metres below ground level but generally rose to approximately 2.8 – 4.3 meters in the intervening period to 2013/14

- The data reveals a general deepening trend in DTPL evident since 2013/14 from approximately 3.0 – 3.9 metres as the 2017 – 2019 drought worsens

- Three (3) piezometers were installed surrounding the site of the proposed feedlot to a depth approximately 7 – 8 metres below ground level

- The borelogs show a strong clayey profile ie. grey brown medium & heavy clay overlying yellow brown fine sandy clay, indicative of a solid protective barrier between the proposed feedlot and localised groundwater

- The recorded DTPL in these piezometers in May 2019 range from 4.12 – 5.03 metres deep

- Initial laboratory testing results indicate mildly alkaline water pH 7.62 – 7.79

- Results for available nitrogen (<0.01 – 0.15 mg/L) and phosphorus (<0.01 – 0.98 MG/l) are generally at a low level and electrical conductivity data indicates relatively high salinity (11600 – 15400 mS/cm), typical in the local district

3.4 Soil Resources

A reconnaissance soils investigation was undertaken across the site and this is fully described in Appendix 2 of the EIS.

Note that the feedlot is centrally located within the landholding on relatively flat country essentially within a series of channel banks and drains.

The soils are described as follows:-

LIGHT GREY BROWN SILTY CLAY SOILS

The land in the vicinity of the proposed feedlot is generally comprised of light greyish brown silty clay soils of medium to heavy clay down the soil profile.

The area typically has a thin layer (3-5cm) of lighter clay loamy soil on the surface which displayed a degree of surface sealing that cracks upon drying.

The near surface soil to approximately 25 cm depth is dull yellow brown and of light clayey texture with moderate soil structure or pedality. Pedality describes the size, shape and condition of the natural soil aggregates. Generally 10 – 20 mm polyhedral aggregates are dominant and 5 – 10 mm aggregates are sub-dominant.

They tested in the field as being neutral to slightly alkaline ie. pH 6.6 - 7.5.

The deeper subsoil ie. ~ 0.7 – >2.5 metres depth, was observed to be dull yellow brown medium to heavy clay of stronger pedality with similar aggregation to the soil above with a few aggregates observed to be shiny and smooth faced.

A few fine roots were observed down to at least 65 cm.

Light creamy coloured acid detectable carbonates occurring as blotches and discolorations 2 – 3 mm in size were common and a few larger 5 – 15 mm soft masses were also evident from about 70 – >250 cm. This deeper soil tested in the field as strongly alkaline ie. pH 8 – 8.5.

3.4.1 Laboratory Analysis

Representative soil samples were collected for laboratory physical testing and following is a brief summary of the findings:-

Unified Soil Classification System (USCS)

The soils have been classified using the widely adopted Unified Soil Classification System (USCS). It is based on the size of the particles, the amounts of the various sizes and the characteristics of the very fine particles (Charman and Murphy, 1991).

Useful information on the engineering properties of soils eg. compaction characteristics, permeability, shear strength and cracking resistance when compacted, can be interpreted and inferred from USCS soil groups. The USCS classification and its interpretation are applicable in the design of dams and earthworks.

The soils across the site of the proposed development are classified as USCS class CH ie. high plasticity clay.

Note that the laboratory results generally indicate high clay content in the subsoil. The laboratory results from the Macquarie Geotech Laboratory generally indicate that these soils are suitable for the proposed development where optimal use of the available clayey soil material in clay linings is carried out by using special compactive efforts and undertaking soil amelioration with gypsum,

Feeding Pens

The laboratory test results indicate that the clayey subsoils of the borrow areas for the raised earthen pad upon which the feedlot is proposed to be constructed can achieve a hydraulic conductivity of $<1 \times 10^{-10}$ metres/second when properly compacted at near optimum moisture content. This indicates that the EPA design criteria for compacted clay linings can be satisfactorily achieved.

Compacted clay linings, in conjunction with the dense and compacted manure pad which develops in feeding pens at the soil interface, form a barrier to downward water movement thus minimising the risk of groundwater pollution.

Feedlot management will ensure that the compacted manure/soil interfacial layer that develops is not disturbed during scraping and cleaning of manure from feeding yards.

The above information similarly applies to other key feedlot structures such as the manure storage/composting pad.

Sedimentation Structures and Evaporation Dams

The laboratory results indicate that when the sedimentation structures and evaporation dams are properly constructed they should seal well and be relatively impermeable ie.

- Selective utilization of the best soil material for clay lining
- Placement of clayey subsoil in layers <15 cm in thickness
- Moisture content to be not more or less than 2% of optimum moisture content
- Compaction of the 50 cm clay lining to 95% of Proctor maximum dry density

Note that the feedlot, which comprises an area of approximately 33 hectares will normally only generate relatively small volumes of storm runoff derived effluent.

In this semi-arid climate, with an average rainfall of only ~400 mm and evaporation of ~1800 mm per annum, it is proposed to dispose of feedlot effluent by evaporation.

The proponent has indicated that the feeding pens will be regularly cleaned of built up manure. It is thus assumed that there would normally only be a limited amount of manure entrained in feedlot runoff.

It is planned that entrained runoff sediment will only be stored in the sedimentation settling structures for a relatively short period of time until it is cleaned out, mixed with composted solids and, subject to agronomic considerations, be spread onto the extensive area across the landholding used for cropping.

3.4.2 Manure Utilisation Area

In terms of their physical and chemical characteristics the soils across the holding have been shown to be relatively fertile and suitable for growing a range of improved pastures, fodder and cereal crops.

With good on-farm soil management practices these cropping areas have the capacity to sustainably utilise the composted solids generated from the feedlot in the short to medium term. It is also planned that composted manure be transported off site to farms in the local district for incorporation into soils used for irrigated cropping.

It should be noted that feedlot manure is a valuable soil additive with beneficial effects on soil physical characteristics such as infiltration rate, soil structure, soil porosity and soil moisture retention. Sustainable applications of composted manure will supply significant amounts of organic matter (carbon) to soils.

When the composted solids are applied to cropping land as proposed in this EIS the nutrients contained within this valuable feedlot by-product make a substantial contribution to improved fodder and or grain production.

A routine soil monitoring program will be carried out to help manage these operations in an environmentally sustainable manner and to enhance agricultural productivity.

3.5 Climate

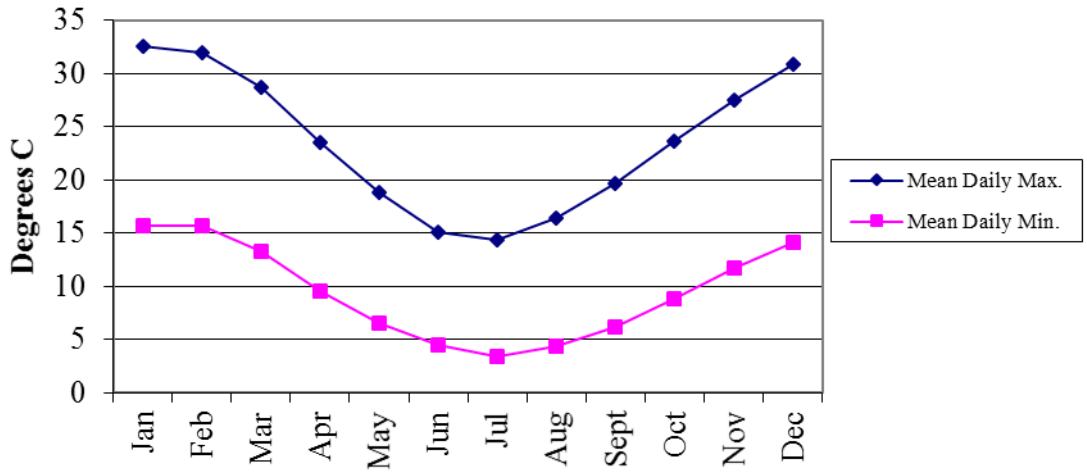
The proposed development lies approximately fifty (50) kilometres east of Deniliquin in south western NSW. Bureau of Meteorology data recorded over a period of 145 years at Deniliquin has been used to give an indication of the local climate.

Key climatic information sourced mainly from the Bureau of Meteorology is summarised and discussed below.

3.5.1 Temperature

Mean daily temperatures in the district range between a maximum of 32.5° C in January and 14.4° C in July. It is not uncommon to record temperatures in excess of 40°C for seven days or more during the summer months.

Figure 6. Mean Daily Maximum & Minimum Temperatures



In winter, mean daily minimum temperatures are as low as 3.4° C in July and 15.7°C in January (Refer to Figure 6). On average mild frosts occur once every five to six days mainly throughout the July/August period.

3.5.2 Rainfall and Evaporation

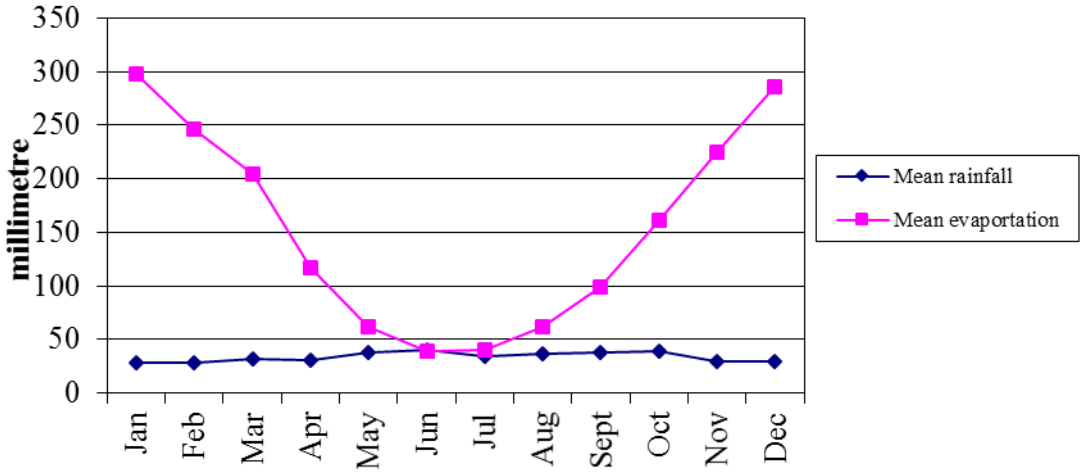
Rainfall in the Deniliquin region exhibits a variable summer dominant rainfall regime. Summer rainfall generally occurs as higher intensity falls compared to the rain events during the cooler winter months.

Figure 7 shows the relationship between average annual rainfall and evaporation. The average annual rainfall of ~400 mm is fairly evenly distributed throughout the year with a slight increase in winter months.

As a consequence of the warm to hot summers evaporation is greater than in more easterly areas (with higher altitude and milder climates) at approximately 1839 mm/year.

Evaporation usually reaches a maximum in January of approximately 9.6mm/day and a minimum in June/July at 1.3mm/day. Rainfall is similar to evaporation in winter months.

Figure 7. Average monthly Rainfall & Evaporation

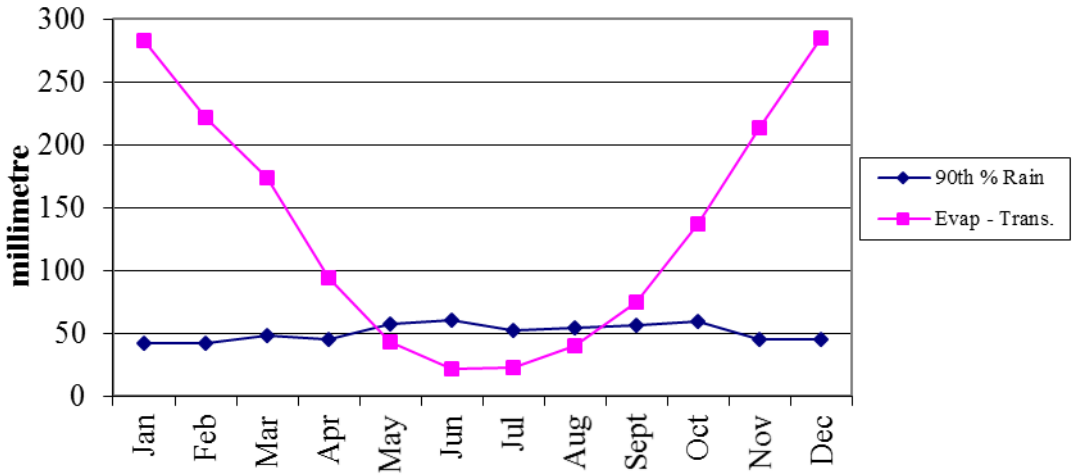


3.5.3 Wettest Year in 10 Rain & Evaporation

The value for design precipitation is determined on the basis of a frequency analysis of wetter than normal years.

The wettest year in ten ie. the 90th percentile or decile 9 rainfall, is recommended for use in design calculations. Figure 8 graphically illustrates the above normal rainfall in a 90th percentile year.

Figure 8. Estimated 90th Percentile Rain & Evapo-Transpiration



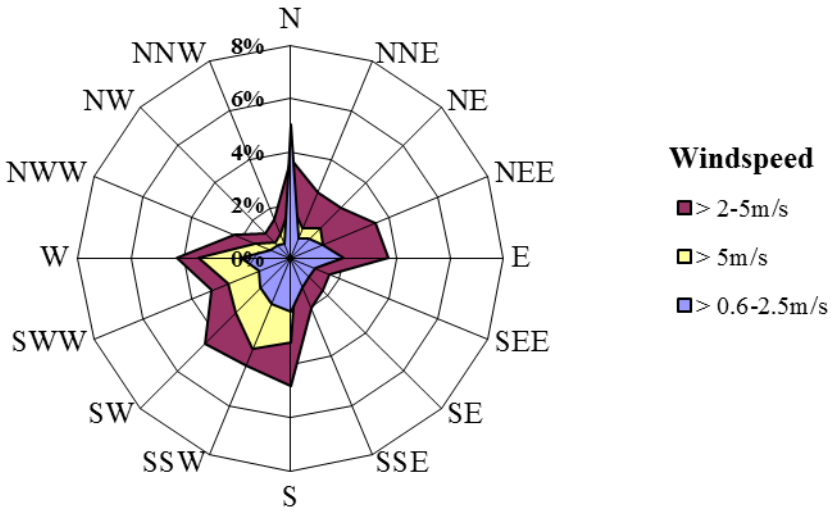
3.5.4 Wind

The wind speed and direction of local wind throughout the year has been obtained by reference to Bureau of Meteorology records for Deniliquin.

Average wind speed tends to peak in November at approximately 12km/hr, and reduces in May/June to approximately 8km/hr.

Figure 9 shows a summary of wind speed and direction data recorded for Deniliquin. As illustrated the Deniliquin district predominantly experiences south-westerly winds averaging a speed of 2 - 5m/s throughout the year.

Figure 9. Wind Rose for the Deniliquin District



3.6 Soil Erosion

Similar to large parts of the Riverine Plain the property comprises relatively flat land which is not predisposed to water erosion like areas with more sloping land. The site of the proposed feedlot is a relatively flat paddock with minor falls to the north-west and is assessed as having no appreciable erosion.

The existing and proposed land use and management practices employed on the property, including sustainable soil management and rotational cropping, can be described as relatively conservative and consistent with the inherent capability of the land.

Soil erosion hazards arising from the proposed lotfeeding operations are minor due to:-

- the relatively flat terrain in the vicinity where even after heavy rainfall the runoff is characterised by widespread shallow laminar flows ie. not concentrated runoff with increased depth and velocity and thus erosivity

- the relatively small area of land to be disturbed at any time

- construction works to be carried out to the standards of the Soil Conservation Service (a division of Dept. of Primary Industries) eg. the plan to install diversionary works as needed to direct any run-on water safely to natural drainage

- full containment of the development site
- the intention, where practical, to revegetate disturbed areas, including using temporarily stockpiled topsoil

3.7 Biodiversity

The Office of Environment & Heritage (OEH) identified that the site of the proposed feedlot is entirely cropping land (Fisher, A. 2019). Nevertheless, the EIS describes the existing environment including threatened species habitat and aspects of the proposed development that may impact on biodiversity.

To meet this requirement a biodiversity assessment to describe the biodiversity values associated with the proposed feedlot was undertaken by Biosis Pty Ltd, Ecology and Heritage Consultants from Albury, NSW. Refer to Appendix 5 for the report.

The objective of the biodiversity assessment was to determine the presence of any threatened flora, fauna, populations or ecological communities (biota) within the study area.

Where applicable, the intention was to assess the impacts of the project on any such species or their habitats, listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), NSW *Biodiversity Conservation Act 2017* (BC Act) and NSW *Fisheries Management Act 1994* (FM Act).

The findings and conclusions of the biodiversity assessment are summarised as follows:-

- the study area has been modified by land clearing, with a long history of cropping and livestock grazing
- no threatened flora or fauna species were recorded during the on-site investigations
- no threatened ecological communities are located on the site
- the site of the proposed feedlot is bordered on all sides by well-formed farm roads and surrounded by planted native trees which will not be removed
- the site contains no native species of vegetation and has no suitable habitat for threatened species and the likelihood of threatened species using the site is low
- consideration of the project under the Biodiversity Assessment Method (BAM) is considered unwarranted
- the project is not considered likely to result in significant impact to species or communities listed under the Commonwealth EPBC Act and as such a referral to the Minister for the Environment is not warranted

3.8 Aboriginal Cultural Heritage (ACH)

The Office of Environment & Heritage (OEH) considers that the location of the proposed feedlot to be appropriate and that the risk to ACH is likely to be low given the prior disturbance/modification of the site (Fisher, A. 2019).

Nevertheless, an Aboriginal cultural heritage assessment has been undertaken by representatives of the Yarkuwa Indigenous Knowledge Centre Aboriginal Corporation based in Deniliquin.

A desktop assessment and an inspection of the site of the proposed cattle feedlot to identify any cultural heritage sites within the works area was undertaken. Refer to Appendix 6 for the Yarkuwa Indigenous Knowledge Centre Aboriginal Corporation report.

The findings and conclusions of the ACH assessment are summarised as follows:-

- no ACH material was observed nor expected to be found within the area to be impacted by the proposed cattle feedlot
- it was concluded that the Due Diligence Code of Practice has been met
- even though development activity will disturb the ground, no identified sites or culturally modified trees will be disturbed
- all contractors be aware of their responsibilities under the NSW National Parks and Wildlife Act 1974
- contractors working on site should proceed with caution and if any Aboriginal cultural heritage objects are found work should stop immediately and the appropriate authorities be notified
- the proposed development be allowed to proceed without constraint on archaeological and Aboriginal heritage grounds
- Importantly, the above findings and conclusions of the ACH assessment have been discussed with representatives of Yorta Yorta Aboriginal Corporation, the Deniliquin Local Aboriginal Land Council and the Yarkuwa Indigenous Knowledge Centre Board

4.0 FEEDLOT MANURE AND EFFLUENT

4.1 Introduction

Feedlot wastes include the manure regularly cleaned from the feeding pens during the year and any rainfall runoff water or feedlot effluent.

The manure and effluent contain a variety of valuable nutrients including nitrogen and phosphorus and they have significant beneficial effects when sustainably applied to land.

In addition, feedlot manure is rich in organic matter and when applied to the light brown silty clayey soils found locally, and commonly occurring across the Riverina region, can significantly increase organic matter/carbon content and thereby help to improve soil structure, increase rainfall infiltration into soils and enhance water holding capacity.

The principles applied in developing the manure and effluent management systems for the proposed feedlot are:-

- to compost the manure and treat it as a valuable resource to be spread both on-farm and on nearby land to supply nutrients and organic matter in cropping programs
- to apply the philosophy of sustainability to the land application of manure
- to safely dispose of the effluent by evaporation
- to spread any collected solids from the effluent evaporation system on an environmentally sustainable basis
- to design the effluent evaporation system for the 96^{th} percentile rainfall

The proposed composting and *beneficial reuse system* for the manure fulfils the important criterion of ecologically sustainable development (ESD) as it does not pollute natural watercourses or groundwater and does not degrade soils where it is spread.

Another important attribute of the proposed reuse system is that it does not permanently degrade natural resources and thereby ensures that alternative land use options are available for future generations.

These operations will be undertaken according to the requirements and guidelines of government agencies and be reported upon on an annual basis ie. according to EPA Licence requirements, annual reporting and the environmental monitoring program.

4.2 Feedlot Manure

There are many factors that contribute to the amount of manure cleaned from the feed pens in a year. They include the number and size of animals, ration content, ration digestibility and climatic factors.

The NSW Feedlot Manual (NSW Agriculture, 1997) states that in open feedlots there is considerable loss between the production of fresh manure and removal from feed pens.

These arise from evaporation, bio-degradation of volatile solids, losses as dust and other mechanical factors such as runoff and incorporation into the manure "pad".

When considering the losses mentioned above it is useful to understand the key parts of the nitrogen cycle.

The Nitrogen Cycle

The inorganic forms of nitrogen ie. that nitrogen available for plant uptake, are produced by mineralisation of the organic nitrogen eg. nitrogen in feedlot manure.

Significant nitrogen losses result from a series of reactions catalysed by micro-organisms and there are two main reactions ie. nitrification and denitrification.

Nitrification is a two stage process in which ammonia is oxidised to nitrite and nitrite into nitrate ie.

$$2NH_4 + 3O_2 \xrightarrow{\text{Nitrosomonas}} 2NO_2 + 4H + 2H_2O$$

$$2NO_2 + O_2 \xrightarrow{\text{Nitrobacter}} 2NO_3$$

Denitrification involves the conversion of nitrate to nitrogen gas.

Both ammonium and nitrate are subject to gaseous loss ie. volatilisation and denitrification, respectively.

Manure Composition

It is convenient in understanding fresh manure characteristics and cattle feedlot by-products to partition the matter into its component parts. Refer to Table 2 and 3 which outline typical average composition of feedlot wastes and fresh manure.

Feedlot manure can vary depending on factors such as:-

- weight & class of animal
- stocking density of pens
- the feedlot ration
- the time between cleaning out of feedlot pens
- rainfall
- length of time of stockpiling of manure, etc.

Table 2. Typical Average Composition of Feedlot Wastes

Parameter	Symbol	Units	Average
Wet Excreta Waste	WW	%lwt/day	3.6
Total Solids	TS	%WW	29.7
Volatile Solids	VS	%TS	84.7
Biochem.O2Demand	BOD	%TS	8.8
Nitrogen	N	%TS	4
Phosphorus	P	%TS	1.4
Potassium	K	%TS	2.9

Ref: Taiganides (1977)

Table 3. Mean Fresh Manure Production and Characteristics per 1000 Kg Live Animal Mass Per Day

Parameter	Units	Beef Cattle
Total manure	Kg	58
Urine	Kg	18
Density	Kg/m^3	1000
Total Solids	Kg	8.5
Volatile Solids	Kg	7.2
Biochemical Oxygen Demand, 5-day	Kg	1.6
Chemical Oxygen Demand	Kg	7.8
pH		7.0
Total Kjeldahl Nitrogen	Kg	0.34
Ammonia Nitrogen	Kg	0.086
Total Phosphorus	Kg	0.092
Orthophosphorus	Kg	0.030
Potassium	Kg	0.21
Calcium	Kg	0.14
Magnesium	Kg	0.049
Sulfur	Kg	0.045
Sodium	Kg	0.030
Chloride	Kg	**
Iron	G	7.8
Manganese	G	1.2

Ref: ASAE Standards 2000

4.2.1 Manure Generated

In the Australian beef feedlot industry there are significant data available regarding the manure generated in feedlots. A convenient method of classifying cattle in feedlots and then calculating manure generation is to make a comparison to a Standard Cattle Unit (SCU) ie. an animal with a liveweight of 600 kg, (Meat & Livestock Australia, 2012).

A few key factors which contribute to manure generation including animal metabolism were listed above. Metabolism being defined as "the sum of both physical and chemical changes by which animals process food into simpler compounds to enable the animal to function and including the generation and exchange of energy".

It has been stated earlier that it is intended that the proposed feedlot will long-feed cattle (ie. up to about 450 days). In this case in calculating manure generation an average animal weight of 600 kg, equivalent to the SCU, is assumed.

The mass of manure generated per year is calculated for 7680 beef cattle as follows :-

Manure Generated = L x C x D x U x 0.0075

= 600 x 7680 x 365 x 0.8 x 0.0075

= 10091.52 tonnes

= 1.314 tonnes/head

Where
L - median liveweight on feed
C - Feedlot capacity
D - No. days feedlot operates annually
U - Average utilisation of capacity
0.0075 - Multiplication factor (NSW Ag, 2001)

The collected weight of feedlot manure expressed as the multiplication factor in the above equation includes assumptions re dry matter content of manure collected, a recovery factor of 70% and a daily production of manure as 6% of liveweight.

As indicated above it was calculated that up to approximately 1.314 tonnes of reasonably dry manure is generated per head per year.

4.2.2 Sustainable Manure Utilisation

It is planned that the manure cleaned from the feed pens be aerobically composted onsite ie. manure will be placed into stockpiles, regularly turned and processed into a moist and crumbly dark soil-like product. Refer to Figure 3 - Schematic Layout plan for the site of manure composting pad.

The composted feedlot manure is to be spread at sustainable rates onto nearby cropping paddocks of the property as well as being transported to other farmers in the local district.

Note that there will be up to approximately 220 tonnes and 80 tonnes of nitrogen and phosphorus, respectively, in the manure generated by the proposed feedlot.

An allowable loading rate onto soils generally equates to:-

- the removal of a nutrient in grain and/or vegetative plant matter, and
- storages in the soil profile

Table 4. Estimated Mass of Nutrients in Feedlot Manure

Parameter	% Content [1.]	Nutrients/ Tonne	Manure Generated	Nutrient Generated
Nitrogen	2.18	21.8 Kg	~10090 t/year	219.96 t
Phosphorus	0.8	8 Kg	~10090 t/year	80.72 t

Note 1. Ref: Powell, 1994 (MRC Project M.087)

The allowable feedlot manure loading rates are generally based on phosphorus and nitrogen concentrations. Salinity levels are rarely sufficiently high to limit plant growth (Gardiner & Casey, 1995).

Where composted manure is spread on farm the proponent intends that the amount of manure applied will not exceed the ability of the crop-soil system to use and store the nutrients. Regular laboratory analysis of soils and composted manure samples, part of the on-going environmental monitoring program, will help in management of this activity.

Table 5. Manure Nutrient Utilisation

Parameter	Nutrient Uptake[1.] %	Average Yield (tonnes/ha)	Nutrients Required[2.] (Kgs/ha)	Nutrients Available[3.] (Kgs)	Nutrient Balance (ha)
Lucerne					
Nitrogen	3.5	20	700	220000	314
Phosphorus	0.4	20	80 + 100[4.]	80000	**444**
Barley					
Nitrogen	1.8 grain 0.5 stubble	3.5 4	63 20	220000	**2651**
Phosphorus	0.4 grain 0.1 stubble	3.5 4	14 4 + 100[4.]	80000	678
Forage Maize					
Nitrogen	1.1	20	220	220000	**1000**
Phosphorus	0.2	20	40 + 100[4.]	80000	571

Note
1. Ref: NSW Feedlot Manual (NSW Agriculture, 1997)
2. Nutrients taken up by lucerne, barley & forage maize to achieve yield per hectare
3. Refer to Table 4.
4. 100 Kg P/ha sorbed by clayey subsoils.

4.2.3 Land Area Requirement - Feedlot Manure

Typical cropping operations in the district include lucerne hay and winter cereals such as wheat and barley, and forage maize. The landholding includes in excess of 450 hectares of cropping land and the planned cropping program will focus on growing hay, fodder and grain for the lotfeeding operations. Composted manure can be beneficially used in the growing of these crops.

Table 5. outlines the area of lucerne, barley or forage maize required for each of the key nutrients ie. nitrogen & phosphorus.

Note for example that an area of irrigated lucerne of 444 hectares, based on phosphorus applied plus sorption of 100 kg of P (ie. where composted manure was applied at a rate of 22.7 tonnes per hectare) would be sustainable for many years.

A number of assumptions are made in the calculations:-

- no allowance has been made re the immediate or delayed availability of nitrogen in manure ie. mineralisation of organic N by microorganisms is required before manure N becomes available to plants and this occurs over a number of years

  Note – For environmentally sustainable reuse of feedlot manure it is essential to understand the delayed availability of nitrogen in manure. Therefore it is proposed that composted manure product be subject to laboratory analysis prior to its spreading on cropping paddocks

- an allowance has been made for 100 kg of phosphorus sorption per hectare and fixing by the clayey subsoil (See following sub-section)

<u>Phosphorus Sorption</u>

Soil storage, based on the phosphorus sorption capacity of a soil, rather than plant uptake is the major sink for phosphorus (Gardiner & Casey, 1995)

Significantly, the light brown clayey soils common across the local district have a substantial capacity to immobilise phosphorus eg. by adsorbing or fixing water soluble inorganic phosphorus by soil minerals (Young. R.T., 1995)

Given the depth of the clayey subsoil, identified on-site by pit exposure and investigatory drilling, the phosphorus sorption capacity is assessed as substantial.

The calculations indicate that a rate of phosphorus application of 180 kgs/hectare ie. the P required for the lucerne crop plus 100 kg/ha P sorption in the example given above, could be applied to this land for many years before any P leaching from the soil profile occurs.

In conclusion:

With the primary objective being to compost feedlot manure into a stable, non-odorous and crumbly, soil-like product for spreading on farm the capability for beneficial utilisation of the nutrients in feedlot manure has been demonstrated.

Managing feedlot manure as indicated above and applying manure, both on and off farm, at a long term sustainable rate will minimise adverse environmental impacts.

Note that a significant amount of interest has been shown by a number of local farmers in using composted manure in their cropping programs.

The proposed soil monitoring program will be useful in managing applications of feedlot manure on a long term sustainable basis.

4.3 Feedlot Effluent

Feedlot effluent mainly comprises pen runoff from heavy or prolonged rainfall.

The proposed design of the feedlot including feed pens, feed alley and laneways comprises an area of approximately 33 hectares ie. the "controlled drainage area".

It is intended that the effluent collected from the proposed feedlot will be directed via sedimentation structures to multi-celled evaporation dams. The high evaporation rates experienced in the district (>1800 mm/year) will greatly assist in this disposal method. Refer to Table 6 for rainfall and evaporation data.

It is proposed that if excessive sludge accumulates ie. prior to the capacity of the structure being reduced by 20%, the sludge will be laboratory tested and disposed of as follows:-

- Spread on agricultural land at sustainable rates, or
- Mixed with composted manure and spread on land at sustainable rates

Design details re the drainage system and effluent evaporation system are outlined in the following sections. The works comply with the requirements of the *National Guidelines for Beef Cattle Feedlots in Australia* (Meat & Livestock Australia, 2012)

4.3.1 Diversion Banks and Effluent Catch Drains

<u>Diversionary Works</u>

The normal method of addressing any surface water run-on issues is to construct appropriately designed diversion banks to divert and prevent run-on water entering the feedlot. In this case diversion banks will not be required.

The site is located centrally within the 775 hectare landholding and is isolated by MIL supply channels, a complex internal system of irrigation channels and drains and bordered to the west by the relatively deep district drain.

As well the proposed feedlot site is on very flat terrain with a slope gradient < 0.05%, falling generally in a north westerly direction.

Given that the proponent intends that feedlot designs and drainage works comply with the requirements of the *National Guidelines* (MLA, 2012) the site characteristics require that a substantial elevated earthen pad be constructed to accommodate the feedlot including effluent catch drains.

As the proposed design of the feedlot including effluent catch drains and sedimentation structures comprises a "controlled drainage area" the extremities of the raised earthen pad and associated earthworks such as the road surrounding the feedlot site will be battered (1V: 3.5H) to natural ground level and prevent the minimal localised runoff water from entering the feedlot.

Reference to Figures 1, 2 & 3 will help in gaining an appreciation of the very low sloping land in the vicinity of the proposed feedlot and the system of irrigation supply and drainage works which effectively isolate the site.

Effluent Catch Drains

It is planned that the internal effluent catch drains associated with each of the rows of feed pens be constructed to the following specifications:-

Drainage Reserve	-	Trapezoidal shape
Dimensions	-	10 m width x 400 m long
Batter grades	-	gently sloping trafficable drain
Drain base width	-	4 - 6 m
Cross Sectional Area	-	Av. 2.5 m^2

The catch drains have been designed to convey the runoff in a 1 – 20 year design storm and will be trafficable to help facilitate cleaning of deposited manure. Refer to Figure 5 illustrating typical sections for drainage works.

4.3.2 Sedimentation System

The purpose of the sedimentation system ie. comprising trafficable sedimentation terraces, is to detain and remove settleable solids from feedlot runoff and prevent them entering the multi-cell evaporation dam.

To optimise feedlot drainage, the settling of solids and to facilitate cleaning, multi-celled structures are proposed. Throttle weir structures will be installed at the discharge end of each cell to help reduce flow velocity and thereby promote the settling out of solids/manure.

Each of four (4) sedimentation terraces will be located down gradient of the lower feeding pens in the respective module of rows and be incorporated into the effluent catch drainage system. Refer to Figure 3 - Schematic Layout (Site) plan.

The terraces will be trafficable ie. including compacted gravel floors, to facilitate cleaning out of accumulated solids which will be incorporated into manure stockpiles prior to composted manure being spread on-farm.

The design of sedimentation terraces comprises a calculation of the volume required to achieve significant settling of solids.

The following calculation applies to one row of feeding pens:-

V = Qp x (L/W) x Z / V

= 0.146 x 9 x 1/0.005

= 263 metres³ x 2 rows of feed pens

= ~600 metres³ (Volume for each module)

where:

	V	=	volumetric capacity of sedimentation terrace
	Qp	=	peak inflow rate (m^3/s) 20 year ARI
	L/W	=	length to width ratio (L is length of direction of flow)
	Z	=	a scaling factor (1.0 for this site)
	V	=	maximum flow velocity 0.005 m/s.

The design volumetric capacity of the sedimentation terraces ie. for each of the four modules is ~ 600 metres³ including additional capacity for the feed road drainage.

It is proposed that the sedimentation terraces conform with the following specifications:-

Bank height	-	1.0 m
Batter grades	-	1V:3.5H
Crest width	-	2 m
Terrace base width	-	9 m
Design depth	-	0.6 m
Terrace length (base)	-	115 m

As mentioned above it is intended that the discharge from the terraces be regulated by throttle weirs at the outlet into the effluent evaporation dam. The design of the throttle weirs allows the terraces to drain completely ie. down to bed level, complying with the requirements of the *National Guidelines* (MLA 2012)

Table 6. Rainfall and Evaporation – Deniliquin

Month	Mean Monthly Rainfall[1] (mm)	Estimated 95 % Rainfall[2] (mm)	Average Raindays[1]	Mean Monthly Evaporation[3] (mm)
Jan	22.6	36.2	3.0	298
Feb	30.9	49.4	2.8	246
Mar	23.0	36.8	2.5	205
Apr	23.9	38.2	3.3	117
May	27.9	44.6	4.1	62
Jun	29.3	46.9	4.7	39
Jul	28.1	45.0	6.0	40
Aug	33.6	53.8	6.1	62
Sep	34.4	55.0	5.3	99
Oct	33.2	53.1	4.4	161
Nov	44.6	71.4	4.7	225
Dec	30.5	48.8	3.8	285
	362.0	**579.2**	**50.7**	**1839**

Note 1. Ref. Bureau of Meteorology (Deniliquin Airport 1997 – 2019)
2. Ref. NSW Agriculture, 2001
3. Ref. Bureau of Meteorology

4.3.3 Effluent Evaporation Dams

Multi-celled evaporation structures are proposed with volumetric capacity based on calculations of the annual water balance in a 95th percentile wet year. The structures are designed to contain the runoff/effluent from the feedlot site. The system is designed with 0.6 metres of freeboard so that any excessive effluent generated is stored and does not normally spill.

The extra storage is provided by the 0.6 metres of air space above the design storage level which is approximately 0.6 metres below ground level (derived by the base level of the sedimentation terraces).

Two (2) emergency spillways will be constructed ie. one per evaporation dam, which will only function in the event of an extreme rainfall event or very prolonged rainfall. It is proposed that the controlled drainage area of the feedlot be enclosed by earthworks at a level of one (1.0) metres above the level of district drain embankments.

Dam Spillway Design

The following details are provided:-

Spillway width	-	6 m
Freeboard	-	0.5 m
Embankment height	-	1.0 m
Batter grades	-	1V:3H

4.3.4 Annual Water Balance

This section includes the determination of the water balance and storage requirements for the evaporation dams. Note that there is a small variation between these structures, one captures runoff from the manure composting pad and one environmental area, the eastern structure captures runoff from two environmental areas.

Table 7. Feedlot Effluent – Western Section

Month	Estimated 95 % Rain (mm)	Feedlot Effluent (m^3)	Road Effluent (m^3)	Environmental Area Effluent (m^3)	Total Effluent (m^3)
Jan	36.2	1,450	261	356	2,067
Feb	49.4	1,978	356	486	2,820
Mar	36.8	1,474	265	362	2,101
Apr	38.2	1,530	275	376	2,181
May	44.6	1,786	321	439	2,546
Jun	46.9	1,878	338	461	2,678
Jul	45	1,802	324	443	2,569
Aug	53.8	2,155	387	529	3,071
Sep	55	2,203	396	541	3,140
Oct	53.1	2,127	382	523	3,031
Nov	71.4	2,860	514	703	4,076
Dec	48.8	1,954	351	480	2,786
Total	**579.2**	**23,197**	**4,170**	**5,699**	**33,067**

Table 6. shows mean monthly rainfall, calculated 95th percentile wet year rainfall, average rain days and monthly evaporation for the district.

The effluent generated on a monthly basis for the 95th percentile rainfall from the feedlot is shown in Tables 7. & 8.

Note that the Coefficient of Runoff used in the calculations varies as follows:-

C = 0.8 Feed pens & compost pad
C = 0.9 Feed road
C = 0.4 Environmental areas

The effluent storage demand and cumulative storage requirement are presented in Tables 9. & 10. In viewing the data on cumulative storage in the evaporation pond it is important to note that the evaporation pond has a design depth of ~1.0 metres plus an allowance of 0.6 metres of freeboard.

Table 8. **Feedlot Effluent – Eastern Section**

Month	Estimated 95 % Rain (mm)	Feedlot Effluent (m^3)	Road Effluent (m^3)	Environmental Area Effluent (m^3)	Total Effluent (m^3)
Jan	36.2	1,043	261	712	2,016
Feb	49.4	1,423	356	972	2,751
Mar	36.8	1,060	265	724	2,049
Apr	38.2	1,100	275	752	2,127
May	44.6	1,284	321	878	2,483
Jun	46.9	1,351	338	923	2,611
Jul	45	1,296	324	886	2,506
Aug	53.8	1,549	387	1,059	2,996
Sep	55	1,584	396	1,082	3,062
Oct	53.1	1,529	382	1,045	2,957
Nov	71.4	2,056	514	1,405	3,976
Dec	48.8	1,405	351	960	2,717
Total	**579.2**	**16,681**	**4,170**	**11,399**	**32,250**

It is proposed that the evaporation ponds have the following specifications:-

Volumetric Capacity **13000 metres^3**

Bank height - 1.0 m
Batter grades - 1V:3H
Base Length - ~250 m
Base Width - ~52 m
Depth - 1.0 m

The controlled drainage area of the feedlot including feeding pens, effluent catch drains, sedimentation structures and manure composting pads will all be contained and drain to the multi-celled evaporation dams.

The very nature of the feedlot design ie. raised compacted pad, embankments around key structures such as composting pads and the evaporation dam all prevent the ingress of any extraneous surface water to the feedlot.

Table 9. **Water Balance - Western**

Month	95th % Rainfall (mm)	Feedlot Effluent (metres3)	Effluent to Storage1. (mm)	Mean Monthly Evap (mm)	Storage Demand (mm)	Cumulative Storage (mm)
Jan	36.2	2,067	159	297.6	0	0
Feb	49.4	2,820	217	246.4	0	0
Mar	36.8	2,101	162	204.6	0	0
Apr	38.2	2,181	168	117	51	51
May	44.6	2,546	196	62	134	185
Jun	46.9	2,678	206	39	167	352
Jul	45	2,569	198	40.3	157	509
Aug	53.8	3,071	236	62	174	683
Sep	55	3,140	242	99	143	826
Oct	53.1	3,031	233	161.2	72	898
Nov	71.4	4,076	314	225	89	987
Dec	48.8	2,786	214	285.2	-71	916
	579.2	**33,067**	**2544**	**1839.3**	**916**	

1. 13 ML Evaporation Dam (Multi-celled)

Table 10. **Water Balance - Eastern**

Month	95th % Rainfall (mm)	Feedlot Effluent (metres3)	Effluent to Storage1. (mm)	Mean Monthly Evap (mm)	Storage Demand (mm)	Cumulative Storage (mm)
Jan	36.2	2,016	158	297.6	0	0
Feb	49.4	2,751	216	246.4	0	0
Mar	36.8	2,049	161	204.6	0	0
Apr	38.2	2,127	167	117	50	50
May	44.6	2,483	195	62	133	183
Jun	46.9	2,611	205	39	166	348
Jul	45	2,506	197	40.3	156	505
Aug	53.8	2,996	235	62	173	678
Sep	55	3,062	240	99	141	819
Oct	53.1	2,957	232	161.2	71	889
Nov	71.4	3,976	312	225	87	976
Dec	48.8	2,717	213	285.2	-72	904
	579.2	**32,250**	**2529**	**1839.3**	**904**	

1. 12.75 ML Evaporation Dam (Multi-celled)

5.0 ENVIRONMENTAL IMPACTS & MITIGATION

A significant number of organisations and persons have been consulted in relation to the proposed development and with a view to identify the key environmental issues needing to be addressed in this document. These include State government departments, Local government, Aboriginal organisations and the owners of neighbouring properties. Refer to Section 1.6.

The Planning Secretary's Environmental Assessment Requirements (SEAR) provided by the Dept of Planning & Environment identifies the key issues and requirements for the preparation of the Environmental Impact Statement (Refer to Appendix 8.).

The proponent contacted Murrumbidgee Council and an on-site Planning Focus Meeting was held to describe the proposed feedlot and obtain useful input from Council and the key government agencies.

It is considered important that none of the government agencies suggested that the site was not capable of supporting the proposed development but that it was necessary that all the issues be adequately addressed in the EIS, including the design, management and on-going environmental monitoring of the proposed feedlot.

Risk Assessment

A qualitative risk assessment of the potential environmental impacts of the proposal has been undertaken by the author based on many years of experience, both within government (Senior Land Resource Planner with Soil Conservation Service of NSW) and for the past 20 years as an Enviro-Ag Consultant.

The following list identifies the important issues relating to the potential environmental impacts of the proposal :-

- Odour
- Noise & Dust
- Soil Erosion Hazards
- Groundwater
- Surface Drainage
- Animal Welfare & Diseases
- Biodiversity
- Aboriginal Cultural Heritage
- Road Access & Traffic
- Greenhouse Gas
- Cumulative Impacts

The following sections outline matters relating to these issues including the measures to mitigate the effects on the environment.

5.1 Feedlot Odour

Cattle feedlots are classified in the diffuse source category (versus a point source such as a chimney stack) as odour emissions are predominantly from area sources such as the livestock feeding pens & the manure composting pad. These fugitive emissions are impossible to capture or contain and the use of appropriate separation distance is the well-established means of mitigating the impacts of feedlot odours on community amenity.

The proponent is aware that the most effective way of reducing and minimising odour impact from a feedlot is to:-

- Choose a site with appropriate separation distances to neighbours and towns
- Adopt good feedlot and drainage design, and
- Employ best odour management practices

5.1.1 Odour Assessment

An assessment of the potential odour emissions from the proposed feedlot was undertaken. Refer to Appendix 3.

The assessment of minimum separation distance was based on the Environment Protection Authority methodology outlined in the *National Guidelines* (MLA, 2012).

The stated goal in developing a comprehensive odour policy is to promote fair and equitable outcomes not only for potential odour receptors but also for the owners of the feedlot development (DEC, 2006).

A screening level assessment was completed in accordance with the guidelines to calculate the minimum separation distances from the feedlot to the nearest small town (3988 m), and a single rural residence (997 m).

The results of the minimum separation distance calculations show that:-

"the screening level of assessment for the nearest relevant residence and nearest small town has been determined to have passed"

The justification for this approach include the following:-

- Adequate separation distance from the feedlot to the nearest town ie. the site is located ~20 kilometres north west of Finley (Refer to Figure 1)
- nearest relevant residence is approx. 2.2 kilometres south west
- feedlot design includes containment of the site with no inundation by extraneous surface water
- the feedlot site will be subject to extensive earthworks to achieve good drainage with an adequate slope gradient

- collected manure will be stockpiled, regularly turned and "composted" on site into a moist, crumbly, dark soil-like product which has a generally acceptable nice earthy smell, prior to spreading on soils to be cropped
- the proponents propose to employ what are regarded as "best management practices" in all feedlot operations
- there is no other intensive feedlot or dairy in close proximity to the proposed development and therefore it is unlikely that a cumulative impact would occur

The findings of the odour impact assessment can be summarised as follows:-

- The calculated minimum separation distance requirement between the feedlot and the nearest residence is 997 metres

- The separation distance to the nearest relevant residence is approximately 2200 metres

- The nearest residence is therefore at a greater distance than the calculated extent of the odour impact using the accepted EPA methodology

- The feedlot is located in a typical rural farming area with a significant land buffer between it and the nearest residences and Finley township (minimum separation distance 3988 km)

- It is therefore reasonable to assume that adverse environmental impact on potential odour receptors will be minimal

In understanding the calculations undertaken in determining the minimum separation distance and reaching the above conclusions it is important to note the significance of both the vegetation cover factor and the wind direction factor. (Refer to Appendix 3)

Vegetation cover factor (Site Factor component S_4)

Vegetation cover is a major factor in creating more turbulent air flow at and near the ground surface and thus more mixing and dilution of the air and any feedlot odours. S_4 values for vegetation cover have a significant affect when calculating the required minimum separation distance to receptors.

In this case it is highly relevant that this landholding has had extensive tree planting activity over many years and an extensive system of tree-lots and vegetated shelter belts exists across the property. The majority of paddock fence lines across the property have been planted and a range of tree species have been used.

Figures 2 & 3 show the extent of the system of tree-lots across the property as well as the numerous existing tree-lots surrounding the feedlot site. These play an important role in mixing of airflow and in dissipation of any feedlot odours.

Wind direction factor (Site Factor component S_5)

As stated in the *National Guidelines for Beef Cattle Feedlots in Australia* (Meat & Livestock Aust. 2012) wind direction has the potential to increase the exposure of a receptor located in the downwind path.

It is considered significant that local wind direction and wind speed records for the period 1858 – 2019 indicate that the predominant winds in both the morning and afternoon are southerly and south westerly. Refer to Appendix 3.

As mentioned earlier the nearest relevant neighbouring residence to the site is approximately 2200 metres to the south west. Importantly, the recorded data indicates that no wind direction is dominant or has a high frequency for a fractional period exceeding 60%.

5.1.2 Odour & Air Quality Management Plan

A number of consultations have taken place with officers of the EPA regarding the proposed feedlot and in particular re the odour impact assessment.

In response to these discussions the proponent has completed an Odour & Air Quality Management Plan (OMP). (Refer to Appendix 4 of the EIS).

The ODM defines how the potential generation of odour and dust from the proposed feedlot will be managed and controlled to levels acceptable to both the community and regulators.

The OMP has been prepared as a guiding document which can complement other operational manuals and the environmental management procedures contained in the feedlot NFAS QA Manual.

It is proposed that the OMP will be reviewed and updated annually.

5.1.3 Best Management Practices in Odour Reduction

Further to the above mentioned OMP the proponent has indicated that they will adopt *best management practices* recognising that this approach is one of the best ways to minimise feedlot odours.

The following *best management practices* in odour reduction will be adopted:-

- prevent encroachment of surface waters into the contained area comprising the site of the feedlot

- safely convey surface runoff ie. effluent, from the feedlot via sedimentation structures into the clay lined effluent evaporation dam

- regularly maintain surface drainage works
- remove solids deposited in the sedimentation system as soon as practical after a storm event
- clean out feeding pens at appropriate intervals & at least 4 times per year
- take note of wind direction relative to neighbouring residences when planning pen cleaning operations to minimise potential adverse impact on neighbours
- regularly turn stockpiled manure to facilitate composting and aerobic decomposition into a relatively stable moist, crumbly, dark soil-like product which has a generally acceptable nice earthy smell
- ensure that any spilt feed is cleaned up without delay
- regularly maintain feed bunks, water troughs and the reticulated water supply system generally, to help prevent spillage
- promptly dispose of any dead animals by removal by a licensed knacker or if not possible be placed into designated animal composting manure stockpiles located on the clay lined composting pad, be well covered with manure and be disposed of by composting

5.2 Noise and Dust

It is generally accepted by government agencies and the industry that provided the separation distance, calculated using the S-factor equation, is sufficient to limit odour nuisance on neighbours, adverse impacts due to other factors such as noise and dust are more than adequately addressed (MLA, 2012).

The NSW Industrial Noise Policy 2000 provides acceptable ambient noise levels (L_{Aeq}) that can be received by "rural receivers". Existing Ambient noise is defined as "the all-encompassing noise associated within a given environment. It is the composite of sounds from many sources both near and far" (EPA, 2000). These are outlined in Table 11.

Table 11. Recommended Noise Levels

Type of receiver	Indicative Noise Amenity Area	Time of Day	Recommended L_{Aeq} Noise Level dB(A)	
			Acceptable	Recommended Maximum
Residence	Rural	Day	50	55
		Evening	45	50
		Night	40	45

Source: EPA, 2000

Meeting the acceptable noise levels at the boundary of the premises, as specified above, will protect against noise impacts such as speech interference and community annoyance generally (EPA, 2000).

The distance to the nearest receptor is greater than the EPA required minimum separation distance for odour impact.

Noise attenuation between the feedlot site and the closest receptor is considered to be sufficient based on the available buffer distance and noise and dust are not considered to be a significant problem.

During the construction phase the operation of earthmoving machinery will be a noise source. However, the noise impact will not be dissimilar to noise generated by tractor operations, laser bucket operations during land forming and irrigation development, construction of on-farm storage dams, etc. These all generate noise that is generally familiar and considered normal in the local farming area.

These construction activities all normally occur during daylight hours and importantly have a finite timeframe.

On an on-going basis it is considered that with proper management of lotfeeding operations and with the proponent's compliance with the *National Beef Cattle Feedlot – Environmental Code of Practice* (MLA, 2012), the potential for unacceptable noise impact should be minimal.

Nevertheless, management will take cognisance of the need to consider the noise impact of feedlot activities on the locality eg. the operation of machinery and the movement and loading of livestock will normally be undertaken during daylight working hours.

Farm plant and equipment will be operated as per manufacturers recommendations and will be regularly serviced.

It has been stated earlier (See Section 2.0 and 2.4) that the proponent intends to have the feedlot accredited under the *National Feedlot Accreditation Scheme*.

As required under the NFAS, feedlots comply with and implement Best Environmental Management Practice to prevent the occurrence of environmental harm and nuisance from sources such as:-

- odour, noise & dust
- fly and vermin
- stormwaters
- composted manure utilisation.

Figure 10

RICE SUITABILITY

Legend

- Suitable
- Marginal
- Unsuitable
- Water use

DC Logie Brae 14 2

DC Logie Brae 14

E330
208.74

E329
552.79

Finley 5A2

DC Logie Brae West

Finley 5A Ext

Finley 5A

DC Logie Brae 13

N

0 290 580 1,160

Meters

Created by	Jason Tasker	**Disclaimer** All data, specifically including the geographic data herein are provided "as is" without warranty of any kind Murray Irrigation Limited does not accept liability for any damages or misrepresentation caused by inaccuracies in the data or as a result of changes to the data caused by system transfers or other transformations or conversions, nor is there responsibility assumed to maintain the data in any manner or form or for any period of time. Although efforts have been made to ensure that the data are accurate and reliable, errors and omissions are possible and variable conditions originating from physical sources used to develop the database may be reflected in the data supplied. Users must be aware of these conditions and bear sole responsibility for the appropriate use of the information with respect to possible errors, scale, resolution, rectification, positional accuracy, development methodology, time period, environmental and climatic conditions, and other circumstances specific to these data. The user is solely responsible for understanding the accuracy limitations of the digital data provided herein. Distribution of these data is intended for information purposes and should not be considered authoritative for navigational, engineering, legal and other site-specific uses.
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Date created	Monday, 15 April 2019	

Murray Irrigation

5.3 Soil Erosion Hazards

The issue of soil erosion was covered in Section 3.6 and the existing soil erosion on the proposed feedlot site is assessed as nil appreciable erosion.

Considering the design of the feedlot as well as proposed management of the controlled drainage area of the feedlot, soil erosion hazards are assessed as minor eg.

- extraneous runoff is to be prevented from entering the feedlot
- diversion of the very limited run-on water helps to prevent uncontrolled drainage and soil erosion across the site
- key drainage works will be designed according to *National Guidelines* (MLA, 2012) and installed to a standard that complies with the requirements of government agencies
- the feedlot will be fully contained by drainage works and embankment including a sedimentation system and effluent evaporation dams designed as per *National Guidelines* (MLA, 2012) and advice from the key government agencies
- where practical, disturbed areas will be topsoiled and revegetated
- sustainable applications of manure on properly managed cropping land creates negligible soil erosion hazards

5.4 Accessions to Groundwater

Feedlots have the potential to pollute groundwater from only three main sources ie.

- animal feeding pens
- structures used in collecting or storing feedlot runoff or solid manure
- land used in irrigating effluent or spreading manure.

The potential degradation of groundwater resources can be prevented by the implementation of generally accepted principles and procedures. These include proper siting, design, construction, operation, management and monitoring of the feedlot.

Correct use and management of soils is intrinsic to achieving sustainable groundwater protection. The soil mantle has many characteristics making it an excellent medium for protecting groundwater quality eg. medium and heavy clay subsoils provide a relatively impermeable barrier to the groundwater.

Other soil properties allow suspended solids to be filtered out, soluble matter to be dispersed and a range of chemicals can be removed from water in the soil profile by adsorption to clay and humus in the soil.

The soil medium is also host to a range of micro and macro soil organisms, which process biodegradable material.

Many other parts of this document have provided details on soils and feedlot management that are relevant to the issue of groundwater protection.

The following sections discuss the minimal risk of adverse impact of this proposed feedlot development on groundwater resources.

5.4.1 Groundwater Impact

It is assessed from the information provided in this document that the groundwater pollution risk arising from the proposed development is low.

The site in general is resistant to deep downward percolation of water eg. the soil survey data, borehole drilling and borelog data, soil profile descriptions and saturated hydraulic conductivity testing carried out in the laboratory indicate the general impermeability of the clayey subsoils. Further, the site is classed by MIL as "suitable for rice growing". Refer to Figure 10.

Feeding Pens

In relation to feeding pens the compacted, dense manure pad and manure/soil interfacial layer which develops in feedlots is generally accepted as forming an effective barrier to downward water movement (Sweeten, Undated).

Avoiding disturbance to the manure/soil interface is clearly the fundamental consideration when harvesting manure from the feeding pens. The proponent is aware of this and disturbance to the manure/soil interfacial layer (~50 mm in thickness) during pen cleaning will be minimised.

In addition to this, feeding pens are to be properly lined with compacted clay to the specifications contained in the *National Guidelines* (MLA, 2012).

Sedimentation System & Evaporation Dams

Seepage from effluent ponds has been studied for many years and it is generally accepted that bacterial cells and fine organic matter clog pore spaces in the walls and floor of these structures, effectively sealing them (Barrington *etal*, 1985).

In addition, the soils investigation indicated that with proper construction methods, including constructing compacted clay linings to EPA specifications, these structures can be effectively sealed to minimise seepage ie. saturated hydraulic conductivity $<1 \times 10^{-9}$ metres/second.

Given the location in a semi-arid area and the scale of the proposed feedlot, only limited effluent is generated and considering the proposed design, construction methodology and intended management of this lotfeeding operation, potential adverse groundwater impact will be minimised.

Manure Utilisation Areas

It is generally known that manure is a good soil conditioner and that it can significantly improve soil physical properties.

The proponent intends to stockpile and compost the feedlot manure and spread it at a sustainable rate on cropping paddocks. Refer to Figure 3.

Calculations in Section 4.2 indicate that where the manure generated by the proposed feedlot is applied to the cropping land as indicated that this would be sustainable in the short to medium term. The proponent is well aware that the key to sustainable utilisation of feedlot manure is in balancing nutrient application rates with plant uptake and thus minimising the potential for leaching of nutrients to groundwater.

Discussions with local farmers indicate a general interest in using composted manure in cropping programs so it is intended that this option of transporting compost off site for spreading in the local district will be pursued in the future.

Importantly, hydrogeological data in Appendix 1. indicates that the groundwater depth in this locality is well below the effective rooting zone of the pastures and crops.

Carcass Disposal

The proponent has indicated that any livestock that die will be removed by a licenced knacker or if not possible be placed into the manure windrows located on the clay lined composting pad, be well covered with manure and be disposed of by composting.

Soils data outlined in Appendix 2. indicates the impermeable nature of the clayey subsoils in the vicinity of the development site and that properly constructed clay linings will have a saturated hydraulic conductivity of $<1 \times 10^{-9}$ metres/second.

As with many other feedlots, in the event of an emergency where a large number of deaths occurred, earthmoving equipment would be used to construct a clay lined pit to bury the carcasses in the deep clayey soils.

It is proposed that this pit would be located within the controlled drainage area and south west of the feedlot. Note that soils investigations indicate that this is an area of relatively deep medium to heavy clay subsoils.

5.5 Surface Drainage

A key issue with the proposed development is to ensure that there is minimal adverse impact from the feedlot on local surface water resources.

As indicated earlier in the document eg. Section 3.2, the proposed development site is relatively flat land and has similar topographic relief as a large part of the local district ie. land slopes at approximately 1 vertical:2000 horizontal in a general north-west direction.

These slope and terrain characteristics contributed to historical problems such as rising watertables and accelerating soil salinity.

The following information discusses the district drainage system and feedlot design features which ensure containment of feedlot stormwater runoff.

5.5.1 District Drainage

To help address the problem associated with rising groundwater and soil salinity the local community worked closely with government agencies to implement the Berriquin Land and Water Management Plan, a key part of which was installing a district wide surface drainage system.

The Berriquin L&WMP was completed about 10 years ago.

The District drainage system managed by Murray Irrigation helps to drain water from landholdings following heavy rainfall events eg. the system is designed to remove stormwater from landholdings within four (4) days following a 57mm rainfall event occurring in 24 hours.

On-farm infrastructure such as irrigation reuse and drainage systems (installed to help address inundation of land from heavy rainfall, waterlogging and recharge of the watertable) link to the District drainage infrastructure.

5.5.2 Feedlot Design Features

It has been stated in Section 2 of this document that the proposed feedlot has been designed to comply with government and industry requirements. The following points support the opinion that the fully contained feedlot development should have minimal adverse impact on district surface water resources.

- As per the *National Guidelines* (MLA, 2012) the feedlot site (approx. 33 hectares) has been designed to comprise a controlled drainage system with all key feedlot components being fully contained within substantial embankments and dams

- The feedlot runoff drains via pen catch drains and sedimentation structures into relatively shallow evaporation dams all contained by earthen embankments

- The evaporation dams have a design depth of 1.0 metre and a capacity of ~13 mL each but in effect are in excess of double this volumetric capacity as the inlet to these structures is about 1 metre below natural ground level and the dams have >13000 m^3 of air space above the design top water level

- The controlled drainage area is to be contained within a properly compacted earthen embankment elevated at least 0.6 metres above natural ground and upon which will be a 4 metre wide encircling access road

- The necessary substantial clay borrow area to source clay required for the raised feedlot pad and, intended to play a role as an irrigation drainage sump in the future, could also be useful to store excess feedlot runoff from an extreme rainfall event

5.6 Animal Welfare & Disease Management

Where a feedlot is accredited under the National Feedlot Accreditation Scheme animal welfare and disease management issues are covered in an independently audited and approved Quality Assurance System.

As stated earlier in the EIS the proponent intends to:-

- gain accreditation for the proposed feedlot under the National Feedlot Accreditation Scheme
- comply with the animal welfare & disease management protocols, and,
- be inspected and audited annually by independent *AUS-MEAT* approved auditors

With many years experience in successfully operating a large cattle enterprise the proponent is well aware that healthy, well fed and watered, and contented animals perform better than those under stress.

At all times the proponent strives to meet these animal husbandry objectives.

It is intended that the proposed feedlot will comply with the following:-

- *Australian Model Code of Practice for the Welfare of Animals* (PISC, 2004)
- *Responsible Use of Veterinary Medicines on Farms* (Australian Veterinary Association, 2010)
- *National Beef Cattle Feedlot Environmental Code of Practice* (Meat & Livestock Australia, 2012)

5.7 Flora, Fauna & Cultural Heritage

As indicated in Section 1.7.4 and Section 3.7 the site of the proposed feedlot is approximately 33 hectares of cleared agricultural land that has been used for cropping and livestock grazing for many decades.

The current state of the proposed feedlot site ie. a winter oat crop, does not support any of the preferred habitat requirements for threatened species of fauna and there are no threatened or endangered flora species present.

Given this past and present usage, the scale of the development and proposed feedlot management practices it is considered that there will be minimal adverse environmental impact on local native flora and fauna from lotfeeding operations.

Additionally, it was considered that it is unlikely that the proposal will have a significant impact on eg.

- RAMSAR Wetlands eg. Riverland along the Billabong Creek system
- Koala Habitat
- Endangered Ecological Communities
- Endangered Ecological Populations

Refer to Appendix 5. for further details.

Cultural Heritage

The search of the Aboriginal Heritage Information Management System has shown that no aboriginal sites or places are recorded in or near the proposed feedlot location.

The local aboriginal community ie. representatives from the local Yarkuwa Indigenous Knowledge Centre, were consulted and they have indicated that no recorded aboriginal sites exist within the study area, no cultural material was observed during the site inspection and that none are expected to be found. Refer to Appendix 6.

5.8 Road Access & Traffic Movements

Various access road routes to the site of the proposed feedlot have been assessed including the Newell Highway and the Riverina Highway.

Options included exiting the Newell Highway between Finley and Jerilderie onto Mayrung Road and/or exiting the Riverina Highway between Finley and Deniliquin onto South Coree Road.

After due consideration and consultations with representatives of Murrumbidgee Council, Berrigan Council and the Roads and Maritime Services the proponent has indicated a preference to exit off the Newell Highway and access the feedlot development site via Mayrung Road, Logie Brae Road and Rolfe Road.

Following the Traffic Impact Assessment a few key factors regarding the Newell Highway ie. Route A39, are as follows:-

- A39 is a national heavy duty truck route
- It is the main inland direct road link from Victoria to Queensland
- A39 runs from Tocumwal on the NSW/Victorian border to Goondiwindi on the NSW /QLD border
- It is an important road link for freight and B-Double trucks are permitted on this route

- The highway at Mayrung Road is typically flat with a long, straight section of road and an extended line of sight
- RMS has indicated that exiting onto Mayrung Road, approximately 19 kms north of Finley, will be satisfactory as it appears that road infrastructure is adequate including Axillary Left and Right turning
- The route from the Newell Highway to Rolfe Road and into Palm Grove, a distance of approximately 18 kms, provides all weather access

Following discussions between the proponent and Council's Engineering staff, Council inspected the proposed access route and indicated that it had no objections to approving heavy vehicle access based on the estimated road traffic provided by the proponent.

However, Council has stipulated the following requirements to which the proponent agrees:-

- There to be no heavy vehicle movements during wet weather
- A minimum of 48 hours after rain has ceased before heavy vehicle movements
- No heavy vehicle movements during school bus hours
- A speed limit of 80 km/hour on sealed roads
- A speed limit of 70 km/hour on unsealed roads

It is relevant that a season restriction on B Double truck movements on Logie Brae Road and Rolfe Road applies from 1st June to 31st October and that Council indicated that as these roads are under Council's control this would be addressed.

As the subject roads are outside of the approved B-Double network the proponent has applied for a B-Double permit to the National Heavy Vehicle Regulator.

Note that the existing local road network satisfactorily accommodates the traffic volumes associated with general rural and agricultural activities for the localised area as well as through traffic and given the proponent's intention to comply with Council's conditions any adverse impact from the proposed feedlot development is considered minimal.

5.8.1 Traffic Movements

Even though the proposed feedlot will create a significant amount of truck and smaller passenger type vehicle movements (Refer to Table 12) this must be considered against the traffic movements which have historically originated from this large and agriculturally productive property.

Importantly these numbers assume the maximum number of traffic movements at full capacity. However, similar to general industry experience, it is assumed that the feedlot will operate at approximately 80% occupancy due to a range of factors including procurement of feeder cattle, transport of cattle into and out of the facilities, the logistics of transporting feedstuff, etc.

Table 12. Weekly Traffic Movements

Feedlot Operations	Motor Vehicles Weekly			Trucks Weekly				
	Staff	Services	Total	Feed Distant	Feed Local	Cattle	Other	Total
100%	20	2	22	10.8	6.4	3.2	0.5	20.9
80%	20	2	22	8.6	5.1	2.5	0.4	16.7

In practice a significant proportion of the fodder making up the ration is to be produced on farm and will not contribute to off farm traffic. It is intended that hay and grain will be sourced from local farms which would reduce long haul commodities out of the local district.

The long feeding program (450 days) of cattle significantly reduces the stock movements in comparison to "regular" short fed cattle.

It is acknowledged that there will be additional traffic movements during feedlot construction activities but these will obviously be only for a relatively short period and the local road network is capable of handling these movements.

Importantly, it is intended that most traffic movements will take place during the daytime. Livestock will normally arrive and depart during daylight hours to facilitate supervision of loading and unloading as well as induction and processing into the feedlot.

5.9 Greenhouse Gas Emissions

The Australian Greenhouse Office estimates that agriculture contributes approximately 16% of Australia's total greenhouse gas emissions. The bulk of these emissions result from vegetation clearing, and breakdown and loss of organic matter in soils, livestock (ruminants mainly), agricultural usage of fuel and more indirectly the processing and use of agricultural inputs such as fertilisers.

Ruminants directly emit methane gas through the breakdown and digestion of cellulose and other complex carbohydrates in the rumen. Cattle in feedlots, including the anaerobic breakdown of feedlot manure, are estimated to contribute approximately 2% of total livestock greenhouse emissions in Australia (AGO, 2007).

The contribution of GHG by cattle is estimated at approximately 75 kg/head/year and manure derived emissions are approximately 1.3 kg/head/year. Based on the number of equivalent SCU it is estimated that approximately 576 tonnes of methane will be produced by the feedlot per year.

With regard to the contribution of the proposed feedlot to greenhouse gas emissions it is arguable that there will be minimal difference to the total livestock emissions in NSW whether the feedlot proceeds or not. The cattle going through the feedlot would still be emitting GHG whilst grazing on pasture and/or fodder crops instead of being lotfed.

The proponent has a strong commitment to reduce carbon emissions and intends to explore renewable energy (solar) as well as farming practices to mitigate and reduce the overall carbon footprint of the operation.

The overall aim is for the cattle operation to become carbon neutral by 2030. Note that this is in line with the objectives of Meat & Livestock Australia.

5.10 Cumulative Impacts

Typical land use in the locality of the proposed development includes dryland and irrigated cropping, extensive livestock grazing ie. both sheep and cattle, and dairying with the associated intensive pasture and fodder production.

These land use activities are generally compatible with the inherent rural capability of the biophysical resources of the area and there is generally only negligible to minor adverse environmental impacts from these activities eg. there is little soil and land degradation.

Arguably, one of the biggest impacts from the proposed development will be in traffic generation, although significant tonnages of grain and fodder that were historically transported off site will in the future be converted to livestock weight gain.

The improvement in the organic matter content of soils where composted feedlot manure is to be spread is a positive impact from the proposed intensive feedlot development.

The local impacts from increased employment opportunities and multiplier effects across the local and regional economy are significant positive impacts.

Importantly the proposed feedlot operations will be licensed by the EPA with on-going environmental monitoring and annual performance reporting and the feedlot will comply with the *National Beef Cattle Feedlot Environmental Code of Practice* (MLA, 2011).

Further, it is intended that the feedlot will be accredited under the National Feedlot Accreditation Scheme and routinely undergo independent *AUS-MEAT* audits.

Overall this intensive livestock feeding operation can be managed on an environmentally sustainable basis with minimal adverse impacts by the proponent implementing the range of measures discussed in many sections of this document.

6.0 JUSTIFICATION FOR THE PROPOSAL

Under the EP&A Act Regulation it is a requirement to justify the proposed development having regard to biophysical, social and economic considerations, and the principles of ecologically sustainable development. The following justification considers the potential impacts and compliance.

6.1 Biophysical Considerations

Matters covering the biophysical aspects of the proposal are discussed in detail in earlier sections of the document. It is assessed that the proposal, taking into account the industry compliant feedlot design, intended best management practices and on-going environmental monitoring program, has no unacceptable or significant adverse environmental impact.

Importantly, the key government agencies inspected the site and generally considered that there were no obvious environmental issues to prevent the proposed feedlot development from proceeding as long as the key issues were adequately addressed and appropriate mitigation measures were identified in the EIS.

6.2 Social and Economic Considerations

A number of social and economic benefits for the local economy help to justify this proposal.

These include:-

- employment opportunities, both during construction and on an on-going basis,
- on-going expenditure on the range of production inputs for this significant intensive agricultural operation, and
- the positive benefits from the "multiplier" effects in the local economy and wider regional economy.

The proponent estimates that a minimum of six (6) additional full time and some part time employees will be needed to operate the feedlot when fully operational.

Apart from the substantial earthmoving operation in constructing the feedlot and associated drainage system and effluent evaporation dams, a significant financial input will be required in building the feeding pens, cattle working yards, water supply system and other ancillary works.

It is proposed that, where practical, the local service industry will be contracted in establishing these works.

In addition, inputs in grain and roughage as well as other feed additives to successfully finish animals to market specifications comprise a significant on-going financial outlay.

Economic benefits flow not only to the owners and operators of the proposed feedlot but to other rural service industries including local grain and hay producers, livestock and freight carriers, veterinary and agronomic suppliers and the meat processing industry.

6.3 Ecologically Sustainable Development

The principles of ecologically sustainable development (ESD) have been considered in all aspects of the proposed feedlot including:-

- choosing the site
- planning, designing and formulating construction methodology
- on-going feedlot operational management
- sustainable utilization of feedlot manure
- disposal of feedlot effluent
- on-going environmental monitoring.

The following key points are made regarding each of the principles of ESD:-

- <u>precautionary principle re possibility of environmental degradation</u>

  The existence of the lotfeeding industry across Australia for decades now and the scientific knowledge available, readily identifies the potential environmental impacts from feedlots along with "best management practices" to help mitigate these potential adverse impacts.

  The environmental impact assessment, including input from various government agencies and Council, both at the on-site meeting and since, indicates no serious threat of irreversible environmental degradation.

  Nevertheless, any uncertainty or deficiencies in full scientific understanding of adverse environmental impacts has not been used as a reason for not implementing appropriate impact mitigation or environmental monitoring measures. Industry best practice is to be implemented in an on-going manner.

- <u>maintenance of inter-generational equity</u>

  The proponent agrees to implement appropriate feedlot operational practices including adoption of industry "best management practices" and environmental monitoring to help ensure that the proposed development is environmentally sustainable and does not adversely affect the health, diversity and productivity of the environment for future generations.

  There are some benefits such as sustainable reuse of feedlot manure which provide environmental benefits and improvement to the local environment.

- conservation of biological diversity and ecological integrity

  The development site is located on a relatively small area of the Riverine plain that has no mature trees or native vegetation and through a long history of cropping and livestock grazing, similar to most of the wider district, any native flora and fauna has been significantly altered.

  As a result of the state-of-the-art feedlot design, the proposed best practice operational procedures and the sustainable environmental management practices to be employed it is assessed that there will be minimal adverse effect on the bio-diversity and ecological integrity of the local environment.

  The feedlot will have little effect on biodiversity nor should it compromise the integrity of any local or regional ecological community or system.

- improved valuation, pricing & incentive mechanisms re environmental resources

  This document outlines that the proponent intends to manage the feedlot on a "best practice management" basis and that adverse environmental impact will be minimal and the proponent will bear the cost of containment, avoidance or abatement of any pollution.

  Measures such as the beneficial and sustainable reuse of the composted manure as a soil conditioner and nutrient source supports an improved valuation of environmental resources concerning the proposal.

  The proposed development will be subject to licensing, regulation and compliance with environmental standards by government agencies. The costs of these environmental controls will not be too great a burden on the proponent and cause cessation of the development on financial or economic grounds.

The above factors, in addition to the positive socio-economic benefits to the Finley and Jerilderie district, provide further justification for the carrying out of the development.

6.4 Analysis of Alternatives

Current land use has a focus on irrigated cropping and cattle grazing and it is planned that this will continue. The proposed cattle feedlot will add to the financial viability of the landholding. It is an intrinsic component of the future commercial agricultural and livestock operation planned by the proponent.

Essentially, the alternative to not proceeding with the proposed feedlot development is for the current irrigated cropping and cattle grazing enterprise to continue. If the proposed development does not proceed the district will forego both a significant agricultural development and the substantial social and economic benefits that will accrue.

The obvious conclusion is that these substantial financial and economic benefits (such as the foreshadowed employment opportunities and multiplier effects) that would flow to the local district from the development will not be realized.

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