Appendix H. Traffic Assessment

Traffic Impact Study

Nullamanna Feedlot Expansion

Report Number 30425.82991

Prepared for

Nullamanna Station

1633 Nullamanna Road
Nullamanna NSW 2360
Telephone: 0428 539 163

ABN: 16 786 478 183

Prepared by

3RE

Rural Regional and Remote Engineering

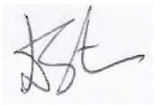
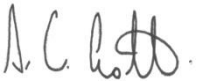
(3RE is a registered trading name of Glenbaire atf Tao Trust. Services delivered by WaterBiz P/L as a 3RE alliance partner.).

PO Box 1197
MILTON QLD 4064
Telephone: (07) 3367 8003

ABN: 20 116 025 864

Document Status Record

Report Type:	Traffic Impact Study
Project Title:	Nullamanna Feedlot Expansion
Client:	Nullamanna Station
Project. Document Number:	30425.82991
File Name:	30425.82991_20160203_Nullamanna Feedlot Expansion_Traffic Study_Rev1

Revision	Date of Issue	Author	Reviewed	Quality Assurance	Approved
0	01/02/2016	Du Toit Strydom	Simon Lott	Steve Webster	Simon Lott
1	03/02/2016	Du Toit Strydom	Simon Lott	Steve Webster	Simon Lott
Signatures					

Notes:

Rev 1 Issued for Use

Distribution:

Recipient	No. Copies
Client	Nullamanna Station 1
Company	WaterBiz Pty Ltd. 1

This document provides information to address the intent of Project Number 30425 as agreed to by Nullamanna Station.

Disclaimer: In preparing this document WaterBiz Pty Limited may have relied upon certain information and data generated and provided by the client as set out in the terms of engagement agreed for the purposes of this document. Under the terms of engagement, WaterBiz is not required to verify or test the accuracy and/or completeness of such client information and data. Accordingly, WaterBiz does not and cannot warrant that the client information and data relied upon for the purpose of this report is accurate and complete. WaterBiz therefore does not and cannot accept any responsibility and disclaims any liability for errors, omissions or misstatements contained in this report, which have resulted from WaterBiz placing reasonable reliance on such client information and data.

Copyright: The contents of this document are copyright and subject to the Copyright Act 1968. Extracts or the entire document may not be reproduced by any process without the written permission of the Directors of WaterBiz Pty Limited.

Executive Summary

As per the guidelines of the *Inverell Development Control Plan 2013*, this study concludes that it is not necessary to undertake formal traffic assessment or modelling of the regional network, Nullamanna intersection, or any intersection on collector and distributor roads in and around Nullamanna village.

The study also concludes that no upgrade of the Nullamanna feedlot intersection is required.

The main findings of this traffic impact study are:

- That the expected increase in traffic to and from the facility is relatively small in the any sense of traffic volumes and no further modelling and/or assessment is required to determine the effect on the local regional roads and intersections;
- The configuration of the Nullamanna Station intersection is regarded as being adequate as no change in combinational truck configuration is proposed to service the development; and

  The small increase in traffic volumes due to construction would only be for the duration of approximately three months.

However, it is recommended that:

- The lines of sight, in both directions at the Nullamanna feedlot intersection be assessed prior to construction and improved if required; and
- Future and construction vehicle operators being made aware of the restrictions on the local roads.

Table of Contents

List of Tables

List of Figures

1. Introduction

Messrs Peter and Mark Lane are proposing to expand the Nullamanna Station feedlot at 1633 Nullamanna Road, Nullamanna NSW. This expansion will triple the current capacity from 1,000 SCU to 3,000 SCU (standard 600kg cattle units). WaterBiz has been engaged by EnviroAg Australia to carry out a Traffic Impact Study to assess the impacts of increased traffic associated with the expansion.

1.1 Scope

The scope of this study is for an experienced Chartered Professional Engineer to provide the relevant regulatory authority(s) with an assessment of:

- The impact of expected increase in traffic volumes to and from the development;
- The potential impact on transport routes; and,
- Any changes to the types of vehicle used.

The assessment will assess the traffic impacts during construction and operation of the expansion, and if required an assessment of the impacts to the safety and function of the road network.

1.2 Site Information

The feedlot development is situated 50 km west-north-west (WNW) of Glenn Innes; 17 km north east of Inverell, and about 2.1 km north of the Nullamanna village (as the crow flies). The location of the property is shown in Figure 1 and Figure 2 below.

Properties immediately surrounding Nullamanna Station are used for grazing, croplands and farming. The village of Nullamanna, 2.1 km south of the current feedlot area, is made up of rural residents. As a result, the development will not be out of character with the surrounding area.

1.3 Outline of Traffic Generating Activities

Traffic to and from the feedlot include:

- Transport of livestock from properties in the region to the feedlot;
- Transportation of feed stock (grain) to the feedlot;
- Transportation of agribusiness consumables onto site (fertilizer, diesel etc.);
- Transportation of livestock offsite for processing;
- Transporting of manure off site; and
- Staffing traffic to and from the development.

The access road to Nullamanna Station, Nullamanna Road, is a bitumen sealed road from the south (Inverell/Nullamanna), but gravel to the north. As shown in Figure 3, information sourced from NSW Roads & Maritime (2015), indicates that general mass limit (up to 50 tonnes) B-Double trucks up to 25/26m can access the road to Nullamanna Station from the south. Nullamanna Road is restricted to general access heavy vehicles the north.

However, due to the lack of towns/infrastructure along the northern route of Nullamanna Road, vehicles are highly unlikely to approach the feedlot from the north. The only heavy vehicle known to travel on this road is Nullamanna Station's compost tip truck, for fertilising their northern crops.

Heavy vehicles mostly come from inland, via Gwydir Highway, Jardine Road, Ring Street, Ashford Road and then into Nullamanna Road (Figure 5). Heavy vehicles coming from the coast (in particular Casino, NSW) are far less common and are typically smaller, single trucks. These trucks access Nullamanna via Gwydir Highway, Runnymede Drive, Swanbrook Road, Killean Street, Ashford Road, and then Nullamanna Road (Figure 4).

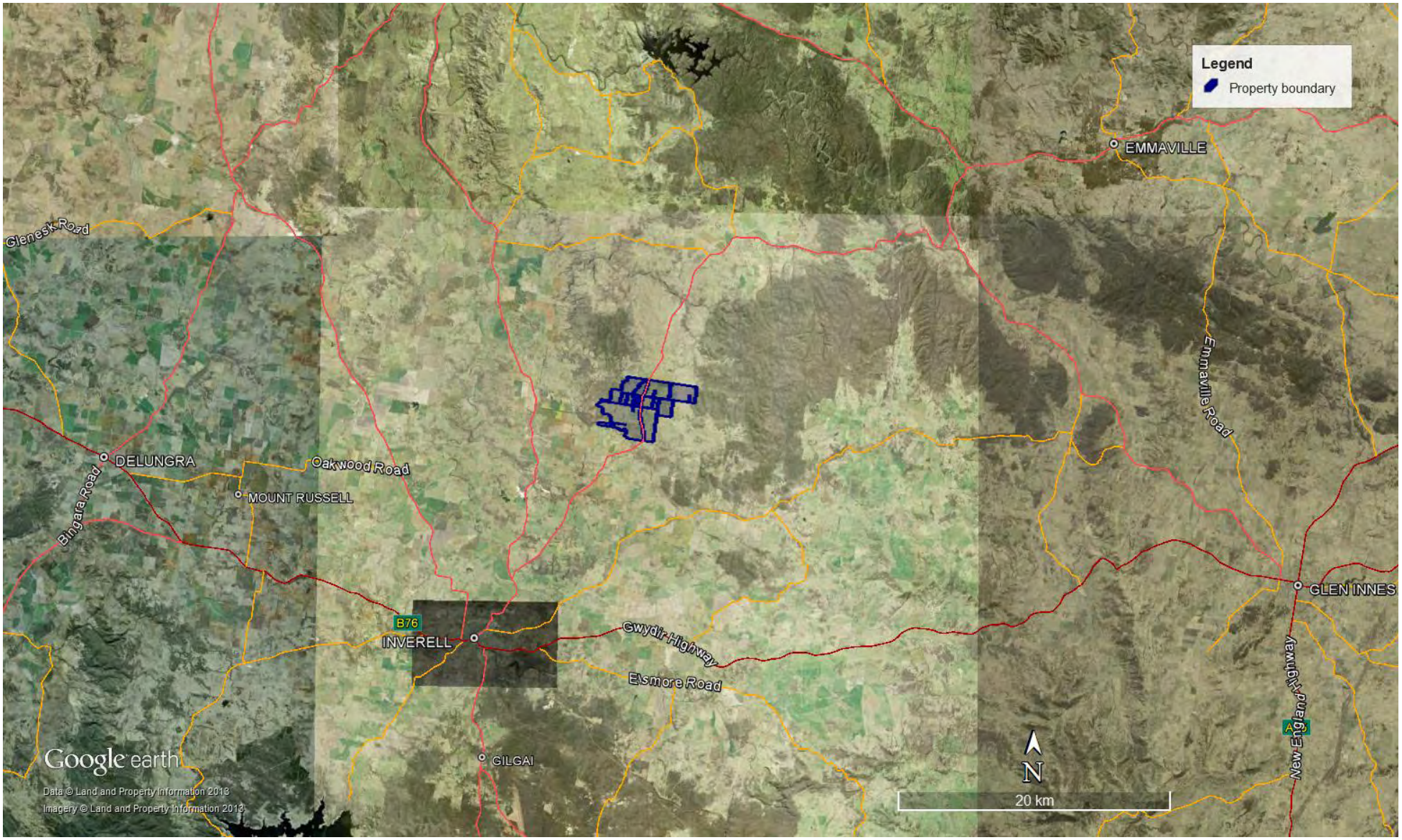


Figure 1 Location of Nullamanna Station

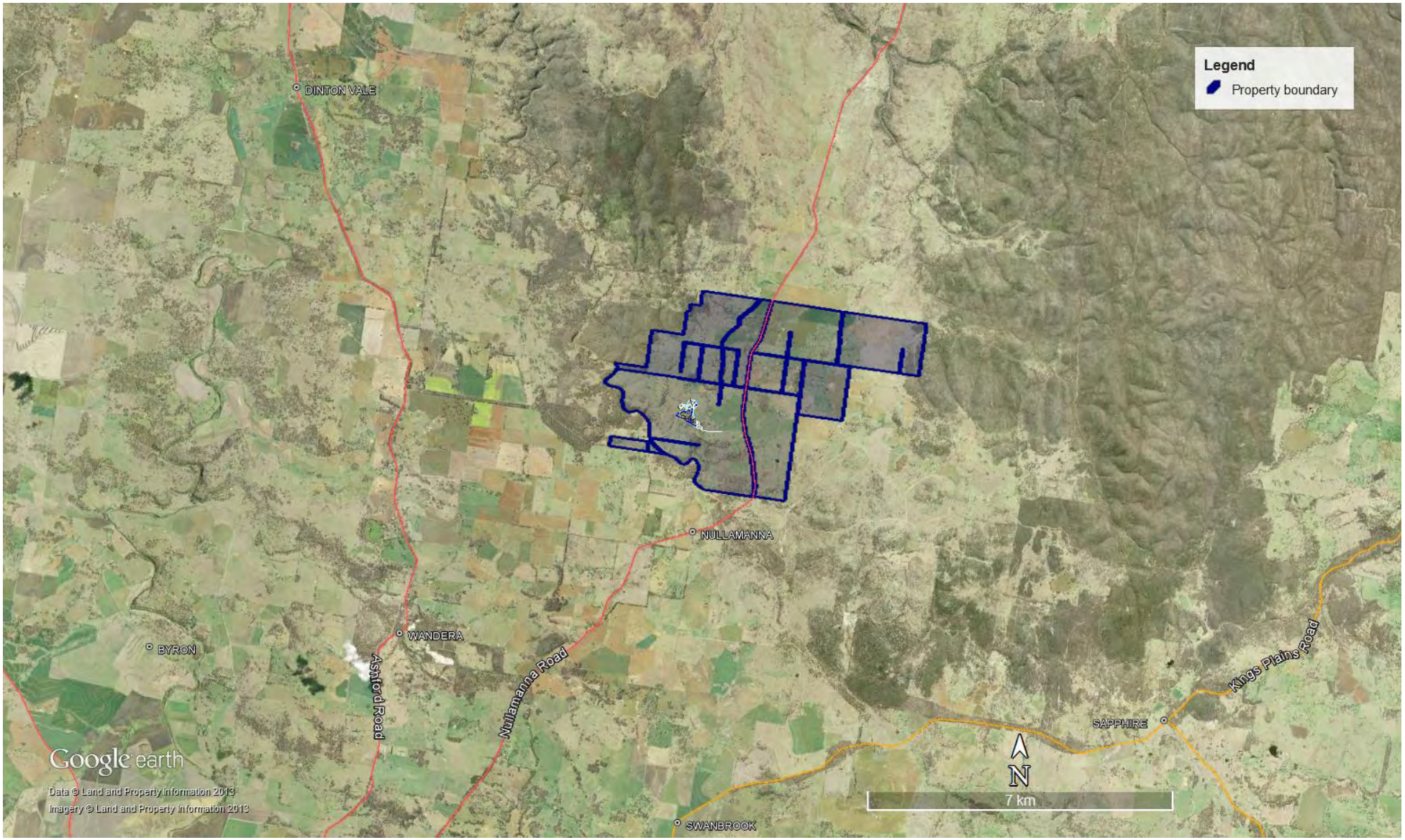


Figure 2 Nullamanna in relation to smaller towns

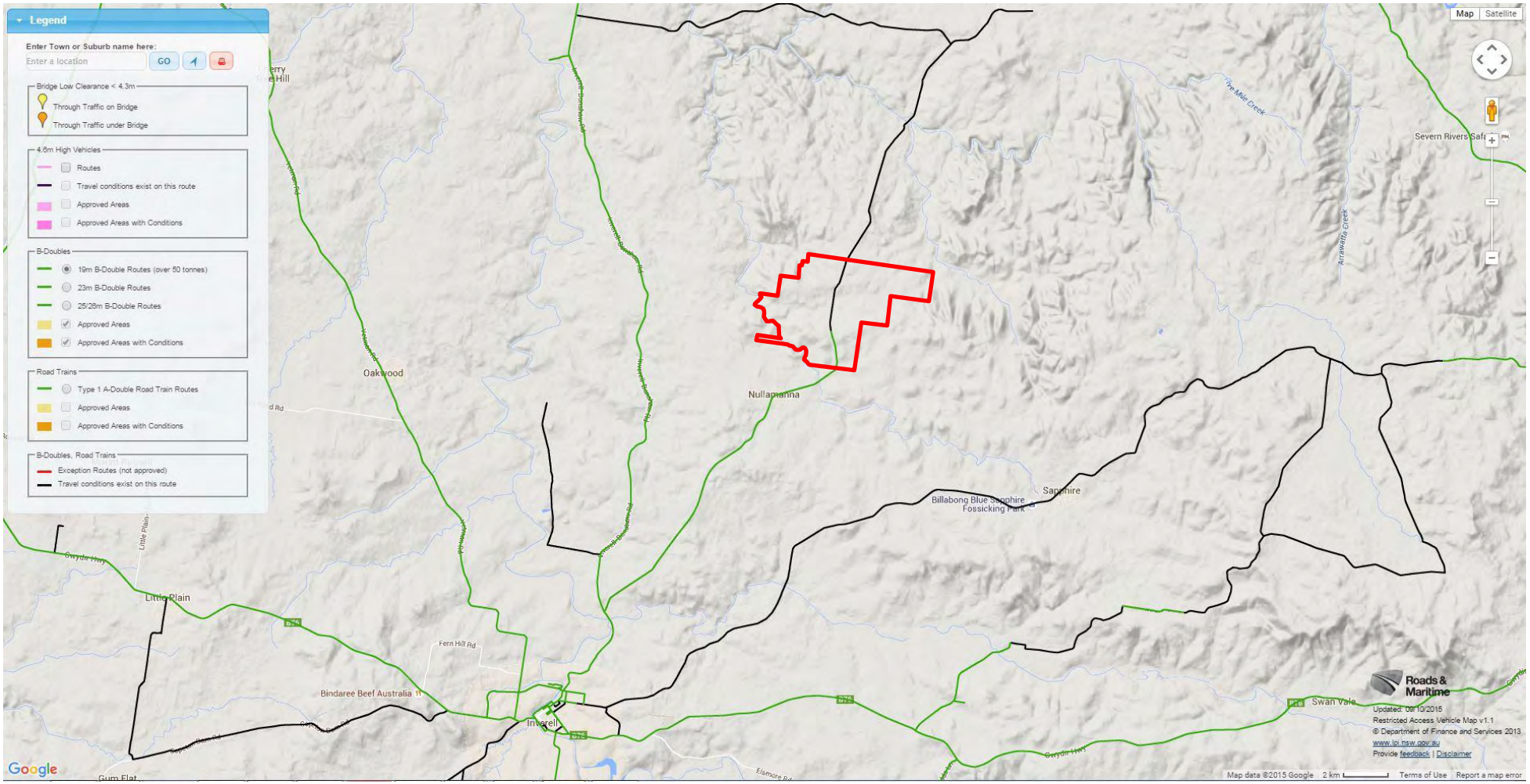


Figure 3 **Roads in green are approved for heavy vehicle access up to 25/26m B-Double vehicles over 50t (NSW Roads & Maritime, 2015)**

Figure 4 Truck route from Casino NSW to Nullamanna

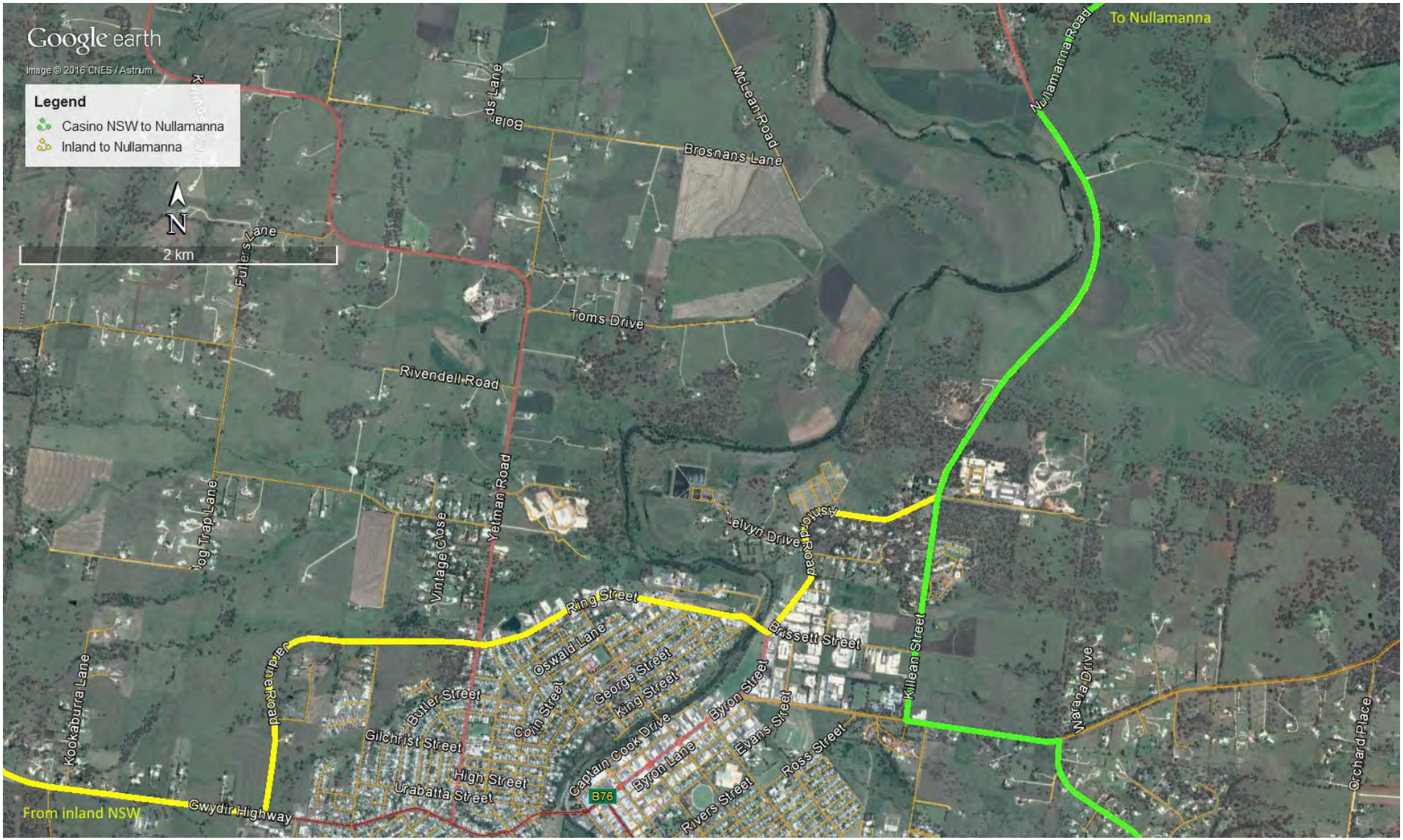


Figure 5 Truck route from inland NSW to Nullamanna

2. Assessment

2.1 Expected Increase in Traffic Volumes

Table 1 shows the current and future heavy vehicle traffic accessing the property. This traffic comes from the south via the village of Nullamanna. This small development will result in a very minor daily traffic increase.

Table 1 Heavy vehicle traffic to and from the Nullamanna feedlot

Reason	Truck type	Frequency	Current Yearly average	3,000 SCU Yearly Average	Anticipated daily average with expansion
Stock movement	B-double	2/week	104	312	1
Grain	B-double	2/week	100	300	1
Lucerne	Single	1/6 weeks	9	27	1 per month
Hay	Single	30/year	30	90	2 per week
Macadamia meal	Single	1/6 weeks	9	27	2 per month
Supplement	Single	1/6 weeks	9	27	2 per month
Cotton seed	B-double	1/6 weeks	9	27	2 per month
Manure	Tip truck	1500t/year	Only travels on Nullamanna Rd to get to northern paddocks of property, i.e. maximum 2km.		

2.2 Traffic Data for Major Contributing Roads in the Region

Road counter traffic studies have been undertaken by Inverell Shire Council in the area. These counters found the following:

16/08/2005 - Taken at intersection with Rickeys lane and east of Nullamanna village:

- Average daily total: 72.552 vehicles
- Heavy vehicles: 19.2%

22/04/2007 - Taken at 80kmh signs western side of Nullamanna village:

- Average daily total: 135.341
- Heavy vehicle: 11.1%

08/09/2010 - Taken west of Nullamanna village:

- Average daily total: 103.8
- Heavy vehicle: 10.2%

08/01/2016 - Taken at end of seal and entrance to Nullamanna Station:

- Average daily total: 62 vehicles
- Heavy vehicles: 29.1%

The 2005 and 2016 counters taken on the eastern side of Nullamanna village show a higher proportion of heavy vehicles than the counters taken on the western side of the village. This is most likely due the farms and businesses on Nullamanna Road past Nullamanna Village that have to use this road for access. Nullamanna Station started operating its feedlot in 2007 and these results show that while traffic numbers have not increased, the proportion of heavy vehicles has.

2.3 Operational Traffic

Apart from the expected increase in trucks as indicated in above Table 1, an additional 2 vehicles, to a total of 4 to 5 staff light vehicles are expected to travel to and back from the site every day.

The increase in number of heavy vehicles, as indicated in Table 1 above, from 1 to 2 per day, to 4 to 5 per day can be regarded as negligible in any sense in the performance of the current feedlot intersection and the contributing and distributing road network.

Therefore, apart from the potentially up to 10 extra vehicles per day on the Nullamanna feedlot road, the 2 to 5 additional vehicles that is expected to use part of the same regional roads would suggest an increase of 5% or more on the overall traffic volume on these roads.

However, the baseline traffic is so small that it is unlikely that any value can be derived from modelling of the network and intersections, and therefore further assessment is not warranted.

2.4 Construction Traffic

The construction works for the expansion feedlot will be undertaken over a period of approximately three months, with vehicle numbers to and from the property estimated as follows:

- Light vehicles = 8 - 12 per day;
- Transporting trucks = 2 - 4 per day
- Service vehicles = 2 to 4 per day

Trip generation is expected to peak between 6:00 and 6:30 am and 5:30 and 6:30pm.

It is recommended that during construction, measures be put in place to make the drivers aware of school zones and other restrictions on the roads in the immediate network around the feedlot.

2.5 Nullamanna Intersection Configuration and Geometry

The road and drainage at intersection is in very good condition and all road signs and furniture appears to be in place.

Currently there is no suggestion that the intersection is inadequate for the type of multi-combination vehicles using it. As there is no expectation that any multi-combination trucks or vehicles other than the current types are scheduled to be used in future, there is no need for an assessment of the geometry of the intersections.

However, prior to the commencement of construction, it would prudent to assess, in conjunction with the local roads authority (Council), the line of sight and clear or remove, impeding vegetation and/or other restrictions (if any).

3. Conclusion and Recommendations

The main findings of this traffic impact study are:

- That the expected increase in traffic to and from the facility is relatively small in the any sense of traffic volumes and no further modelling and/or assessment is required to determine the effect on the local regional roads and intersections;
- The configuration of the Nullamanna Station intersection is regarded as being adequate as no change in combinational truck configuration is proposed to service the development; and
- The small increase in traffic volumes due to construction would only be for the duration of approximately three months.

However, it is recommended that:

- The lines of sight, in both directions at the Nullamanna feedlot intersection be assessed prior to construction and improved if required; and
- Future and construction vehicle operators being made aware of the restrictions on the local roads.

4. References

Inverell Development Control Plan 2013. Inverell Shire Council NSW.

Roads and Maritime (2015). *Restricted access vehicles map.* New South Wales Roads and Maritime. Available at: http://www.rms.nsw.gov.au/business-industry/heavy-vehicles/maps/restricted-access-vehicles-map/map/index.html. Accessed 9/12/2015

Appendix I. Solid and Liquid Waste Management Plan

~ Commercial-in-Confidence ~

Solid and Liquid Waste Management Plan

Nullamanna Feedlot Expansion

Report Number 23876.82016

Prepared for

Nullamanna Station

1633 Nullamanna Road
Nullamanna NSW 2360
Telephone: 0428 539 163

ABN: 16 786 478 183

Prepared by

EnviroAg Australia

PO Box 411
TOOWOOMBA QLD 4350
Telephone: (07) 4638 2228

ABN: 56 135 005 999

Document Status Record

Report Type:	Solid and Liquid Waste Management Plan
Project Title:	Nullamanna Feedlot Expansion
Client:	Nullamanna Station
Project Document Number:	23876.82016
File Name:	23876.82016_151125_Nullamanna Waste Management Plan_Rev0

Revision	Date of Issue	Author	Reviewed	Quality Assurance	Approved
0	03/02/2016	Lindi Olivier	Simon Lott	Barb Calderwood	Simon Lott
Signatures					

Notes:

Rev 0: Final Report

Distribution:

Recipient	No. Copies
Client	Nullamanna Station	1
Company	EnviroAg Australia	1

This document provides information to address the intent of Project Number 23876 as agreed to by Nullamanna Station.

Disclaimer: In preparing this document EnviroAg Australia Pty Limited may have relied upon certain information and data generated and provided by the client as set out in the terms of engagement agreed for the purposes of this document. Under the terms of engagement, EnviroAg Australia is not required to verify or test the accuracy and/or completeness of such client information and data. Accordingly, EnviroAg Australia does not and cannot warrant that the client information and data relied upon for the purpose of this report is accurate and complete. EnviroAg Australia therefore does not and cannot accept any responsibility and disclaims any liability for errors, omissions or misstatements contained in this report, which have resulted from EnviroAg Australia placing reasonable reliance on such client information and data.

Copyright: The contents of this document are copyright and subject to the Copyright Act 1968. Extracts or the entire document may not be reproduced by any process without the written permission of the Directors of EnviroAg Australia Pty Limited.

Table of Contents

List of Tables

List of Figures

List of Appendices

1. Site Description

This Solid and Liquid Waste Management Plan has been developed for the construction and the operation of the proposed feedlot expansion at Nullamanna Station, 1633 Nullamanna Road, Nullamanna NSW 2360.

The feedlot currently has eleven pens with a capacity of 1,000 SCU. This will be increased to a 3,000 SCU capacity. Construction will involve the following:

- Ten (10) additional feedlot pens;
- Sedimentation basin and holding pond for wastewater treatment;
- Cattle lanes;
- Feed truck driving and turning lanes;
- Expansion of 65ML gully dam for freshwater storage; and
- Catchment dams.

Nullamanna Station is located on the western slopes of the Northern Tablelands and is part of the Border Rivers Catchment. The site consists of undulating hills and the proposed feedlot is on a relatively flat hilltop. The site of the expanded feedlot (approximately 676m AHD) is at a lower elevation to the current feedlot (eastern section 686m AHD, western section 681m).

Frazers Creek runs along the western boundary of the property and water onsite drains to the west and south towards the creek (Figure 1). Frazers Creek starts at the town of Sapphire, runs along the eastern boundary of the property and into the Severn River, which then leads into the Macintyre River.

Groundwater testing has been undertaken onsite. The results showed that the groundwater is slightly saline, but still suitable for human and livestock consumption. The bore water also has nitrate levels that exceed the 95% species protection values of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ, 2000) freshwater guidelines, but not drinking water guidelines (NHMRC & NRMMC, 2004). These levels have decreased since tested in 2006. They may be attributed to naturally high back ground levels associated with Brigalow uplands.

Surface water testing of Frazers Creek upstream from the feedlot has been undertaken. This shows no exceedances under the Australian Drinking Water Guidelines (NHMRC, 2011), but does show exceedances for the upland river trigger values for physical and chemical stressors in slightly disturbed ecosystems (ANZECC & ARMCANZ, 2000).

Nitrogen and filterable reactive phosphate trigger values have been exceeded, which aligns with the results found for the *NSW State of the Catchments 2010 Border River-Gwydir Region* (DECCW, 2010). This report had a sample site on Frazers Creek north of the feedlot near Ashford, which exceeded phosphorus trigger values in 86% of samples taken between 2005 and 2008.

These water quality results highlight the importance of waste management, in particular sediment and nutrient management, in the area.

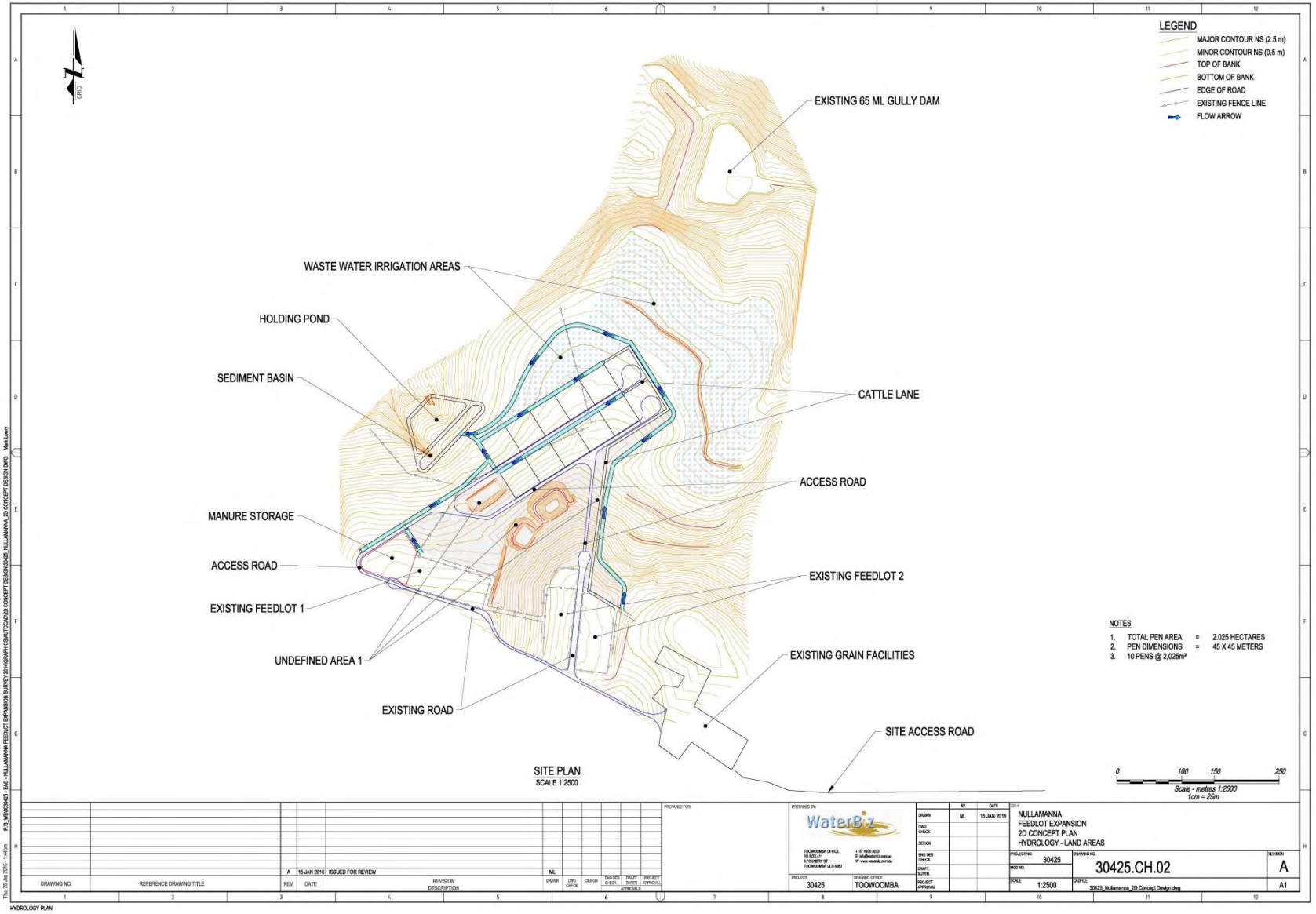


Figure 1 Feedlot conceptual design

2. Purpose

This Solid and Liquid Waste Management Plan (SLWMP) outlines Nullamanna Station's requirements for managing solid and liquid waste at their feedlot. The *Erosion and Sediment Control Plan* and *Groundwater Management Plan* should be read in conjunction with this SLWMP.

The objective of this SLWMP is to ensure Nullamanna Station minimises waste related impacts, protect the environment and health and safety of personnel and the community. This will be achieved through responsible handling and disposal of any waste that may be generated during activities, to minimise impacts on local infrastructure.

The objectives are;

- To ensure that all waste material generated on site is handled in a responsible manner, and in accordance with legislative requirements whilst promoting sustainable resource use.
- To establish procedures and management actions consistent with the waste minimisation hierarchy principles of avoid, reduce, reuse, recycle and dispose.
- To increase employee and subcontractor awareness and their obligations to waste management.
- To maximise the reuse of materials during the project such as spoil reuse in backfilling, establishment of earthen bunds, pad and road construction and rehabilitation works.

2.1 Scope

This document is applicable to all wastes generated during the site preparation, construction and operation of the Nullamanna feedlot, but not limited to:

- The legislative requirement for the management of wastes;
- The waste management hierarchy;
- Activities resulting in the generation of waste;
- The transfer of wastes within and between properties as well as the external transport of wastes from the site;
- Incident management, emergency response, and,
- Record keeping.

2.2 Regulatory Framework

Table 1 below details the State and commonwealth legislation that relates to the generation, handling and disposal of wastes. The table also details the Australian Standards relevant to waste.

Table 1 State and Commonwealth legislation relevant to waste

Commonwealth Legislation
Australian Dangerous Goods Code 2007
New South Wales Legislation
Contaminated Land Management Act 1997
Environmental Hazardous chemicals Act 1985
National Environment Protection Council Act 1985
Pesticides Act 1999
Protection of the Environment Operations Act 1997 & Amendment Act 2011
Protection of the Environment Operations Amendment (Illegal Waste Disposal) Act 2013
Protection of the environment Operations (Waste) Regulation 2014
Waste Avoidance and Resource Recovery Act 2001
Waste Recycling and Processing Corporation Act 2001
Waste Minimisation and management Act 1995
Australian Standards
AS1940:2004 – Storage and handling of flammable and combustible liquids
AS1216:2006 – Class labels for dangerous goods
AS3790:1994 – The storage and handling of corrosive substances
Guidelines
NSW EPA Waste Classification Guidelines (2014)

3. Waste Minimisation

In all cases, the employee and contractors responsible for the construction and operation on the site will be expected to adhere to the legislation above to minimise the amount of waste generated on site, and consequently, achieve the best environmental outcomes.

The following figure presents the Hierarchy that should be followed.

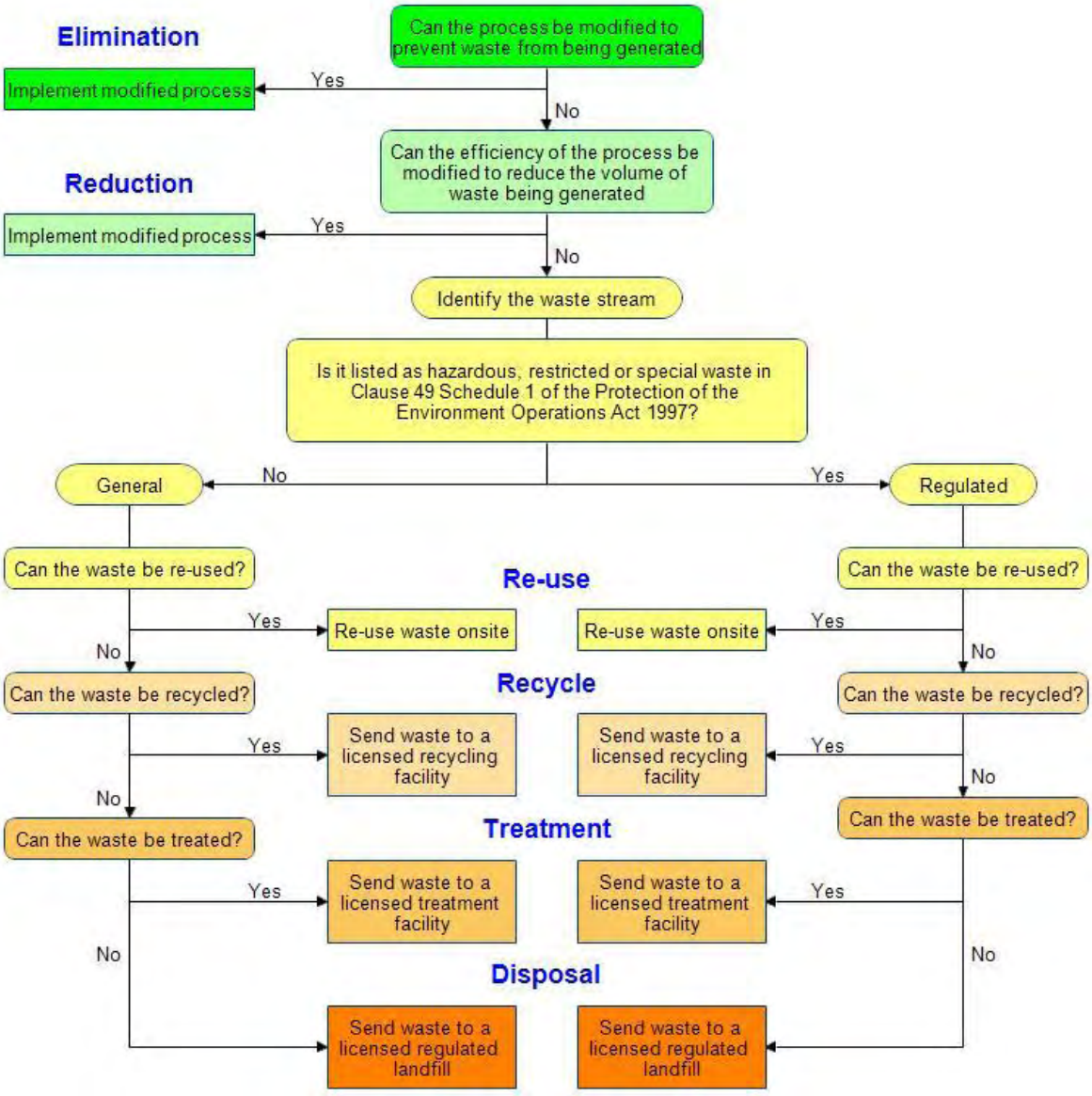


Figure 2 Waste management flow chart

4. Waste Generation

The waste expected to be generated during the construction and operational phases of the feedlot are shown in Table 2 and Table 3 respectively.

Table 2 Construction activities resulting in waste generation

Waste Type	Source(s)	Management Method	Approximate Quantity
Excavated Waste (Soil)	Earthworks, wastewater ponds, feedlot pens, compost manure pad, freshwater supply dam, catchment dams	Top soil reused where possible, unsuitable soils stockpiled for use in earthen bunds	50,000 - 100,000m^3 for the feedlot and wastewater system; < 100, 000 m^3 for freshwater supply and catchment dams
Steel/Metal offcuts	Pen and yard fences, property fences	Reused where possible, taken to licenced landfill for disposal or recycling	<30m^3
General Wastes including putrescibles & organic (food waste), some plastics and paper	Construction office	Where possible recyclables separated and disposed of at the local recycling facility, other wastes to be disposed of at a licenced waste management facility	<30m^3
Sewage Effluent	Construction office	Portable ablutions facilities will be provided on the site during the construction phase	60 litres per person per day

Table 3 Operations activities resulting in waste generation

Waste Type	Source(s)	Management Method	Approximate Quantity per Year
Feed spoilage	Feedmill, pen and yards	Placed into windrows for composting.	<400m^3
Batteries and tyres	Internal cars only	Taken to a licenced landfill for disposal.	<5 batteries <10 tyres
Paints and resins	Water supply pipeline, workshop, buildings	Disposed of at a licence waste management facility.	<10L paints and resins
General Wastes including putrescibles & organic (food waste), some plastics and paper	Operation office, workshops, feedmill	Where possible recyclables separated and disposed of at the local recycling facility, other wastes to be disposed of at a licenced waste management facility.	<400m^3
Sewage Effluent	Operation office, staff amenities	Treated and disposed of onsite using an existing septic system.	164,000L (450L/day based on 5 people)
Effluent	Pens, yards, manure storage pad, truck wash	Liquid effluent from the system will flow into the primary wastewater treatment pond for anaerobic treatment and reuse on the irrigation areas.	5.8 ML
Manure	Pens, yards, trucks, sediment basin, truck wash	Stockpiled and composted onsite. Compost to be sold off site or reused on site for fodder/crop production.	<15,000m^3 of manure/feedstock/ sludge
Biohazardous waste	Veterinary products, blood samples, quarantine products, carcases, out of date chemicals	Disposed of at a certified waste facility.	<1 tonne
Dead carcases	Death by natural causes	To be disposed on site via composting.	<10 per year

5. Implementation

5.1 Waste Management Tracking

Waste listed as hazardous, restricted or special waste under Schedule 1 of the Protection of the Environment Operations Act 1997 must be disposed of at a licenced and regulated landfill. A copy of Clause 49 Schedule 1 is attached in Appendix A.

All waste removed from the site requires a receipt from the facility it is disposed at. Disposal should only be at a licenced facility.

5.2 Waste Storage Requirements

5.2.1 *Manure*

Pens will be cleaned back every 4–6 weeks (maximum 13 weeks between) to reduce manure loads to the drainage systems. Frequent, scheduled pen cleaning will ensure the depth of dry manure is maintained at 50mm or less. Manure waste is to be stored on the manure compost pad on the north of the site. The manure is to be stockpiled in windrows as in Figure 3, and turned over regularly to facilitate the composting process.

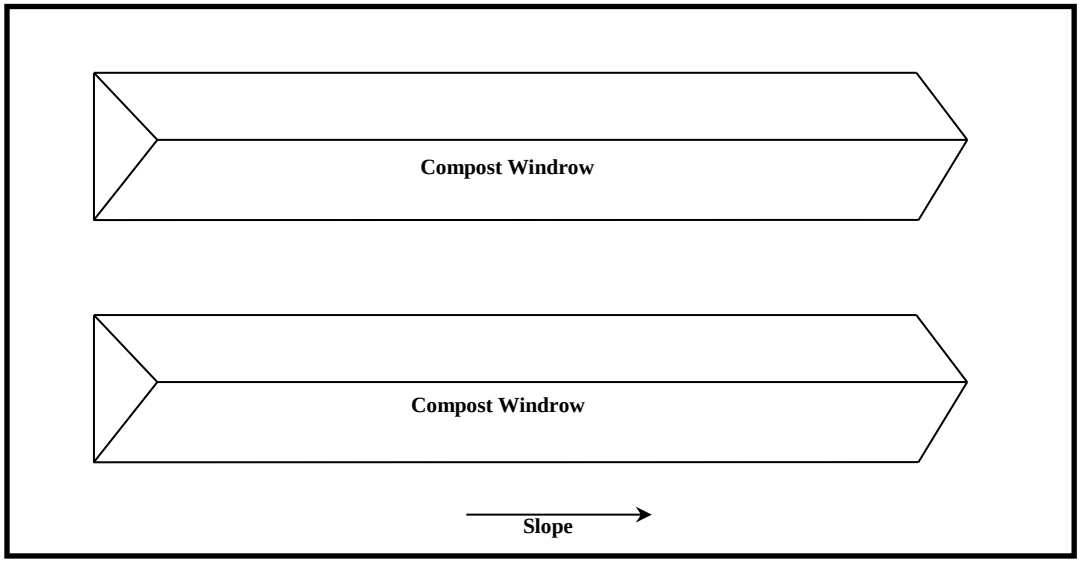


Figure 3 Manure Sedimentation sludge and spoilt feed are placed in a windrow for composting

Table 4 describes the compost conditions that will be maintained to ensure an efficient composting process that does not create undue dust or odour. These conditions will be monitored on a daily basis or as otherwise required based on the compost windrow's age and process performance.

Individual dead carcasses will be composted onsite. Effective carcass composting requirements as described in the MLA Guideline for Beef Cattle Feedlots include:

- Carcasses should be placed in purpose built compost bays;
- They should be placed on at least 300mm of the material being used as a carbon source and covered with the same material to a similar depth on all sides;
- The composting area should be protected from scavenging animals;
- A front end loader should be used to turn the compost pile every 2-3 months; and,
- Compost turning should not occur on windy days, due to dust nuisance.

Table 4 Compost conditions recommended by the National Beef Cattle Feedlot guidelines

Parameter	Acceptable range	Optimum range
Carbon:Nitrogen	15:1 – 40:1	25:1 – 30:1
Moisture levels (%)	45-65	50-60
Oxygen levels (%)	>5	>5
pH	5.5 – 8.0	5.5 – 8.0
Temperature (°C)	40 – 65	55 – 60
Particle size diameter (mm)	5 – 50	5 – 25

5.2.2 *Waste Water Treatment*

All ponds will have compacted clay lining. All ponds will possess 1:3 sloped batters and include a crest that can be accessed by a body truck so that sludge can be removed using a vacuums pump and/or front end loader. Sludge from the sediment basin and drainage systems will be scraped up or vacuumed and added to the manure stockpile for composting.

The treated wastewater in the holding pond will be used on an irrigable area of 6.6 ha of improved pasture. Improper irrigation management may lead to contamination of the local groundwater aquifer by way of nutrient leaching. To minimise the risks of irrigating with wastewater, irrigation rates and frequencies can be closely monitored to account for leaching fractions and nutrient balance.

A total application rate of 87.4mm/ha/year is expected to be applied.

- Soil moisture should be checked prior to application to ensure the soil profile is not over wet;
- Volume of treated wastewater applied to the irrigation block will be recorded;
- Physical and chemical properties of the soils of the irrigation block will be recorded;
- Active plant growth should be maintained;
- Organic matter content should be increased to maximise nutrient holding capacity; and
- Crop should be harvested to increase nutrient removal.

5.2.3 *General Waste*

General waste from the site (including putrescibles and organics (food waste), some plastics and paper) is to be placed in the skip bin, which will be taken to a licenced waste management facility and emptied on a regular basis.

5.2.4 *Construction Waste*

Construction waste is to be separated and stockpiled, where possible, into waste type (eg. Steel, plastic, timber, organic). Where possible, waste is to be reused or recycled in the first instance. In the second instance, waste is to be transported to a licenced waste management facility for disposal.

5.2.5 *Hazardous Waste*

Biohazardous waste is to be contained in one area of the site. All needles are to be disposed of in a certified sharps disposal container. Biological waste and veterinary waste are to be removed from the site by a certified agent. Any application equipment to be cleaned after use in accordance with the product label and or industry guidelines (ensuring soil, groundwater and surface water are not contaminated). Empty chemical, drug, antibiotic, vaccine and disinfectant containers are to be disposed of at an appropriately licensed waste

management facility. Unused chemicals, spilt product or contaminated materials are to be disposed of in a manner approved by the Environment Protection Authority.

5.3 Environmental Monitoring

A groundwater monitoring program will be implemented as part of the Groundwater Management Plan.

Downstream surface water monitoring of Frazers Creek will be undertaken twice in the first year to ensure that design and mitigation measures are effective. After the first year, frequency of monitoring will be reviewed, and it is likely to continue on an event only basis (e.g. dam overflow). The following analytes will be tested: pH, electrical conductivity, nitrate, nitrite, ammonia, total nitrogen, and total phosphorus.

5.4 Roles and Responsibilities

The roles and responsibilities pertaining to this plan are highlighted in Table 5.

Table 5 Responsibilities under the SLWMP

Position	Responsibilities
Manager	Ensure that this SLWMP is implemented and that each type of waste is disposed of properly; Ensure that all personnel are aware of and adhere to SLWMP procedures; Carry out staff training and induction to make staff aware of their obligations under the SLWMP; Review SLWMP annually and additionally when changes occur (including any legislative changes); Ensure that testing of the treated wastewater (nitrogen, phosphorus, potassium, sodium), irrigation block soil (nitrogen, phosphorus, P-sorption capacity, sodium), and piezometers at primary wastewater treatment pond is carried out twice a year; and, Sample the wastewater holding pond and Frazers Creek (downstream) in the event of an overtop event.
Farm workers	Ensure that manure is cleaned at least every 13 weeks, and maintained below 50mm dry manure; Undertake weather monitoring program to ensure odour does not carry to sensitive receptors through wind; Monitoring of compost moisture levels and ensure that these levels are optimal to reduce dust and increase composting efficiency (45-65% moisture content, 40-65°C); Turn compost windrows, but only in low wind conditions and when moisture levels are optimal; Ensure that compost will only be loaded for transport offsite when wind conditions are favourable; Monitor compost piles for presence of vermin; Monitoring of the water levels in the primary wastewater treatment pond and wet weather storage pond on a weekly basis; and, Monitor irrigation schedule to ensure that the irrigation block is not saturated with water.
All employees and contractors	Any cracks or leaks in bunding or dam/pond walls are reported; and Any odours coming from wastewater, compost manure pad and irrigation block are reported.

5.5 Training and Induction

All employees and contractors entering the site to undertake work activities will be inducted prior to commencing work. This will ensure that they are aware of their obligations under the SLWMP. Re-training will be undertaken if there are any changes to the procedures outlined in this plan, or if there are any non-conformances to procedures noted by management or external authorities. Records of training will be keep onsite for a minimum of five years.

5.6 Incident and Emergency Management

Materials and waste related incidents should be recorded. Spill kits will be made available onsite.

5.6.1 *Mass Death*

In an event of a mass death occurs at the sites, then the National AUSVET management plan for the same will be invoked. People that would need to be advised about the mass death issue are the Chief Vet and the Australian Quarantine Inspection Services (AQIS).

The site will be a secure quarantine facility. Entry will be appointment only and the facility will be designed to limit entry by the general public. Al entry and exit points will be monitored by CCTV. The site will be fenced with a 5 barb boundary fence with an electric fence offset from this main fence.

All workers on the site will sign in and out each day. Al contractors will be 'approved' contractors. An office will be located prominently at the main access road. The office will be manned during operating hours.

5.6.2 *Incident Reporting*

If a spill or an environmental incident occurs all relevant people must be notified. Pollution incidents that cause or threaten material harm to the environment must be notified to each of the following authorities:

- The appropriate regulatory authority (ARA)
- The Environment Protection Authority (EPA) if they are not the ARA
- The Ministry of Health
- The WorkCover Authority
- The local authority, e.g. the local council, if this is not the ARA
- Fire and Rescue NSW.

If adequate resources are not available to contain material released in a pollution incident and it threatens public health, property or the environment, Fire and Rescue NSW, NSW Police and the NSW Ambulance Service should be contacted for emergency assistance - phone 000.

5.7 Document Review

This SLWMP applies current management practices, guidelines and policies and will be reviewed annually and when circumstance change that may affect the content of this plan.

6. References

ANZECC & ARMCANZ (2000). *National water quality management strategy. Australian and New Zealand guidelines for fresh and marine water quality*. Australian and New Zealand Conservation Council & Agriculture, and Resource Management Council of Australia and New Zealand.

Department pf Environment, Climate Change and Water (DECCW) (2010). *NSW State of the Catchments 2010 Border River-Gwydir Region*. Available at: www.environment.nsw.gov.au%2Fresources%2Fsoc%2Fborderrivers%2F10352BRGRriver. Accessed 07/10/2015.

NHMRC & NRMMC (2004). *National water quality management strategy. Australian drinking water guidelines.* National Health and Medical Research Council & Natural Resource Management Ministerial Council, Australia.

7. Appendices

Appendix A. Clause 49 Schedule 1 – Waste Management and Pollution Control Regulation

Column 1 Activity	Column 2 Criteria
transportation of category 2 trackable waste (other than tyres)	involves the transportation of more than 200 kilograms of category 2 trackable waste in any load

Part 3 Definitions

Division 1 Waste classifications

49 Definitions of waste classifications

(1) In this Schedule:

general solid waste (non-putrescible) means waste (other than special waste, hazardous waste, restricted solid waste, general solid waste (putrescible) or liquid waste) that includes any of the following:

(a) glass, plastic, rubber, plasterboard, ceramics, bricks, concrete or metal,

(b) paper or cardboard,

(c) household waste from municipal clean-up that does not contain food waste,

(d) waste collected by or on behalf of local councils from street sweeping,

(e) grit, sediment, litter and gross pollutants collected in, and removed from, stormwater treatment devices or stormwater management systems, that has been dewatered so that it does not contain free liquids,

(f) grit and screenings from potable water and water reticulation plants that has been dewatered so that it does not contain free liquids,

(g) garden waste,

(h) wood waste,

(i) waste contaminated with lead (including lead paint waste) from residential premises or educational or child care institutions,

(j) containers, having previously contained dangerous goods, from which residues have been removed by washing or vacuuming,

(k) drained oil filters (mechanically crushed), rags and oil absorbent materials that only contain non-volatile petroleum hydrocarbons and do not contain free liquids,

(l) drained motor oil containers that do not contain free liquids,

(m) non-putrescible vegetative waste from agriculture, silviculture or horticulture,

(n) building cavity dust waste removed from residential premises, or educational or child care institutions, being waste that is packaged securely to prevent dust emissions and direct contact,

(o) synthetic fibre waste (from materials such as fibreglass, polyesters and other plastics) being waste that is packaged securely to prevent dust emissions, but excluding asbestos waste,

(p) virgin excavated natural material,

(q) building and demolition waste,

(r) asphalt waste (including asphalt resulting from road construction and waterproofing works),

(s) biosolids categorised as unrestricted use, or as restricted use 1, 2 or 3, in accordance with the criteria set out in the *Biosolids Guidelines*,

(t) cured concrete waste from a batch plant,

(u) fully cured and set thermosetting polymers and fibre reinforcing resins,

(v) fully cured and dried residues of resins, glues, paints, coatings and inks,

(w) anything that is classified as general solid waste (non-putrescible) pursuant to an EPA Gazettal notice,

(x) anything that is classified as general solid waste (non-putrescible) pursuant to the Waste Classification Guidelines,

(y) any mixture of anything referred to in paragraphs (a)–(x).

general solid waste (putrescible) means waste (other than special waste, hazardous waste, restricted solid waste or liquid waste) that includes any of the following:

(a) household waste containing putrescible organics,

(b) waste from litter bins collected by or on behalf of local councils,

(c) manure and nightsoil,

(d) disposable nappies, incontinence pads or sanitary napkins,

(e) food waste,

(f) animal waste,

(g) grit or screenings from sewage treatment systems that have been dewatered so that the grit or screenings do not contain free liquids,

(h) anything that is classified as general solid waste (putrescible) pursuant to an EPA Gazettal notice,

(i) anything that is classified as general solid waste (putrescible) pursuant to the Waste Classification Guidelines,

(j) a mixture of anything referred to in paragraphs (a)–(i).

hazardous waste means waste (other than special waste or liquid waste) that includes any of the following:

(a) anything that is classified as:

(i) a substance of Class 1, 2, 5 or 8 within the meaning of the *Transport of Dangerous Goods Code*, or

(ii) a substance to which Division 4.1, 4.2, 4.3 or 6.1 of the *Transport of Dangerous Goods Code* applies,

(b) containers, having previously contained:

(i) a substance of Class 1, 3, 4, 5 or 8 within the meaning of the *Transport of Dangerous Goods Code*, or

(ii) a substance to which Division 6.1 of the *Transport of Dangerous Goods Code* applies,

from which residues have not been removed by washing or vacuuming,

(c) coal tar or coal tar pitch waste (being the tarry residue from the heating, processing or burning of coal or coke) comprising more than 1% (by weight) of coal tar or coal tar pitch waste,

(d) lead-acid or nickel-cadmium batteries (being waste generated or separately collected by activities carried out for business, commercial or community services purposes),

(e) lead paint waste arising otherwise than from residential premises or educational or child care institutions,

(f) anything that is classified as hazardous waste pursuant to an EPA Gazettal notice,

(g) anything that is classified as hazardous waste pursuant to the Waste Classification Guidelines,

(h) a mixture of anything referred to in paragraphs (a)–(g).

liquid waste means any waste (other than special waste) that includes any of the following:

(a) anything that:

(i) has an angle of repose of less than 5 degrees above horizontal, or

(ii) becomes free-flowing at or below 60°C or when it is transported, or

(iii) is generally not capable of being picked up by a spade or shovel,

(b) anything that is classified as liquid waste pursuant to an EPA Gazettal notice.

restricted solid waste means any waste (other than special waste, hazardous waste or liquid waste) that includes any of the following:

(a) anything that is classified as restricted solid waste pursuant to the Waste Classification Guidelines,

(b) anything that is classified as restricted solid waste pursuant to an EPA Gazettal notice.

special waste means any of the following:

(a) clinical and related waste,

(b) asbestos waste,

(c) waste tyres,

(d) anything that is classified as special waste pursuant to an EPA Gazettal notice.

(2) Despite subclause (1), in this Schedule, any waste that is classified as one of the following classes of waste, in accordance with an immobilised contaminants approval granted under Part 10 of the *Protection of the Environment Operations (Waste) Regulation 2014*, is taken to be waste of that class:

(a) general solid waste (non-putrescible),

(b) general solid waste (putrescible),

(c) hazardous waste,

(d) restricted solid waste,

(e) special waste.

Division 2 Other definitions

50 Other definitions

(1) In this Schedule:

animal waste includes dead animals and animal parts and any mixture of dead animals and animal parts.

asbestos means the fibrous form of those mineral silicates that belong to the serpentine or amphibole groups of rock-forming minerals, including actinolite, amosite (brown asbestos), anthophyllite, chrysotile (white asbestos), crocidolite (blue asbestos) and tremolite.

asbestos waste means any waste that contains asbestos.

Australian Explosives Code means the document entitled *Australian Code for the Transport of Explosives by Road and Rail*, published by the Commonwealth Department of Infrastructure, Transport, Regional Development and Local Government and as in force from time to time.

Appendix J. Groundwater Management Plan

Groundwater Management Plan

Nullamanna Feedlot Expansion

Report Number 23876.83046

Prepared for

Nullamanna Station

1633 Nullamanna Road
Nullamanna NSW 2360
Telephone: 0428 539 163

ABN: 16 786 478 183

Prepared by

PO Box 411
TOOWOOMBA QLD 4350
Telephone: (07) 4638 2228

ABN: 56 135 005 999

Document Status Record

Report Type:	Groundwater Management Plan
Project Title:	Nullamanna Feedlot Expansion
Client:	Nullamanna Station
Project Document Number:	23876.83046
File Name:	23876.83046_160118_Nullamanna Groundwater Management Plan_Rev0

Revision	Date of Issue	Author	Reviewed	Quality Assurance	Approved
0	03/02/2016	Lindi Olivier	Simon Lott	Barb Calderwood	Simon Lott
Signatures					

Notes:

Rev 0: Final Report

Distribution:

Recipient	No. Copies
Client	Nullamanna Station 1
Company	EnviroAg Australia 1

This document provides information to address the intent of Project Number 23876 as agreed to by Nullamanna Station.

Disclaimer: In preparing this document EnviroAg Australia Pty Limited may have relied upon certain information and data generated and provided by the client as set out in the terms of engagement agreed for the purposes of this document. Under the terms of engagement, EnviroAg Australia is not required to verify or test the accuracy and/or completeness of such client information and data. Accordingly, EnviroAg Australia does not and cannot warrant that the client information and data relied upon for the purpose of this report is accurate and complete. EnviroAg Australia therefore does not and cannot accept any responsibility and disclaims any liability for errors, omissions or misstatements contained in this report, which have resulted from EnviroAg Australia placing reasonable reliance on such client information and data.

Copyright: The contents of this document are copyright and subject to the Copyright Act 1968. Extracts or the entire document may not be reproduced by any process without the written permission of the Directors of EnviroAg Australia Pty Limited.

Executive Summary

The Nullamanna area consists of low water yielding basalt, generally characterised by low yielding bores from minor aquifers. The yields from fractured aquifers tend to be highly variable and recharge is typically local (QLD Natural Resources and Mines, 2005). The Aquifer Risk Assessment Report (NSW Department of Land and Water Conservation, 1998) lists Inverell Basalts and miscellaneous fractured rocks of the Barwon Region as low risk aquifers.

Fresh water supplies for the feedlot will be met by the expansion of an existing harvestable rights dam on the property. The expansion will remain within the allowable maximum harvestable right for the property. No commercial extraction of groundwater is proposed.

The feedlot expansion will be constructed with a Controlled Drainage Area (CDA), which will contain and treat wastes and contaminants. This will include appropriately lined feedlot pens, drainage and storage facilities.

Liquid and solid wastes will be composted, and wastewater will be captured in a sedimentation basin to remove solids and the water treated in the holding pond, before re-use on an improved pasture irrigation area. The crop nutrient requirements are expected to exceed the nutrients available in the wastewater. Irrigation management measures, including irrigation applications that do not over wet the soil, will ensure that nutrients such as nitrogen and phosphorus are not leached into the underlying groundwater table

A groundwater monitoring program will be established to ensure the feedlot is not impacting on groundwater. It will involve monitoring groundwater quality and levels at two new piezometers and one existing stock and domestic bore, which are downstream of the feedlot expansion area.

Table of Contents

List of Tables

List of Figures

List of Appendices

1. Background

Nullamanna Station is on the border of the Inverell Basalt and New England Fold Belt Groundwater Management areas (Figure 1). Bore reports for bores in the Nullamanna area show that they are predominantly used for stock and domestic or monitoring. These bore reports also show that below the topsoil is a layer of clay with low permeability (less than 1 x 10^{-9} m/s), beneath which is rock and basalt.

The Nullamanna area consists of low water yielding basalt, generally characterised by low yielding bores from minor aquifers. The area is made up of basalt stratigraphy and bores yield water from fractures in the basalt. Thus, to extract water the bore would need to tap into one of these fractures. The yields from fractured aquifers tend to be highly variable and recharge is typically local (QLD Natural Resources and Mines, 2005). However, the Aquifer Risk Assessment Report (NSW Department of Land and Water Conservation, 1998) lists Inverell Basalts and miscellaneous fractured rocks of the Barwon Region as low risk aquifers.

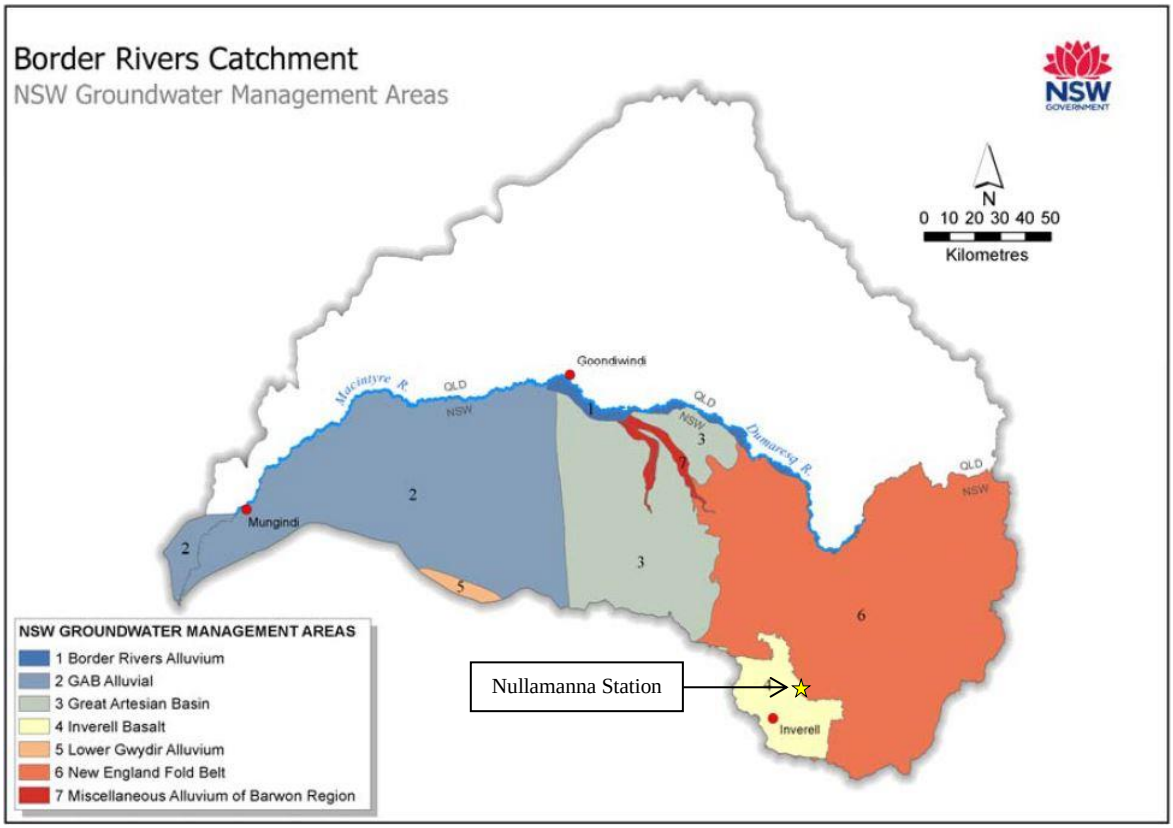


Figure 1 Location of the site in relation to Groundwater Management Areas

2. Purpose

This Groundwater Management Plan (GWMP) has been prepared to minimise the impacts of the Nullamanna Station feedlot on groundwater systems and prevent harm to their ecosystems and those that use the water. This plan aims to:

- Provide a monitoring framework for Nullamanna Station;
- Determine if the expanded feedlot is having an effect on groundwater quality and standing water levels through monitoring and assessment;
- Provide water triggers for an action plan should there be unexpected water level or water quality impacts; and,
- Report progress to local and state government, if required.

2.1 Scope

This document is applicable to the operational phase of Nullamanna Station's feedlot. The scope of this document includes, but is not limited to:

- Potential sources of groundwater contamination on the feedlot site, including the controlled drainage area (CDA) (includes pens, compost manure pad, wastewater drains and ponds) and irrigation area;
- Onsite water monitoring;
- Responsibilities of staff and contractors;
- Incident management and emergency response; and,
- Record keeping.

This management plan must be read in conjunction with the Solid and Liquid Waste Management Plan.

2.2 Regulatory framework

Table 1 below describes that State and Commonwealth legislation that relates to the monitoring of water.

Table 1 State and Commonwealth legislation relevant to waste

Commonwealth legislation
Water Act 2007
Environmental Protection and Biodiversity Conservation Act 1999
New South Wales Legislation
Environmental Planning and assessment Act 1979
Natural Resources Commission Act 2003
State Water Corporation Act 2004
Water Management Act 2000

3. Baseline Groundwater Quality

Water quality data for other bores in the area were not recorded on the bore records. However, water quality analysis of Nullamanna Station's bore has been undertaken in 2006 and 2016, the results of which are shown in Table 2. Laboratory results are available in Appendix A – Groundwater Sampling Results.

The electrical conductivity results show that the water is slightly saline, but still suitable for human and livestock consumption (sea water is approximately 50,000µS/cm).

The bore water has nitrate levels that exceed the 95% species protection values of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ, 2000) freshwater guidelines, but not drinking water guidelines (NHMRC & NRMMC, 2004). These levels appear to have decreased since tested in 2006. Increased levels of nitrogen are not uncommon in the Inverell Basalts, because they have been vegetated with Brigalow, which have naturally high nitrogen levels (i.e. they have been found to be natural background levels) (Silburn et al. 2009).

Table 2 Water quality test results from Nullamanna Station bore

	Unit	Freshwater Guidelines (ANZECC & ARMCANZ 2000)	National Drinking Water Guidelines (NHMRC 2011)	2006	2016
pH	No unit	-	6.5-8.5 (aesthetic)	7.7	7.9
Electrical conductivity	µS/cm	-	-	2473	1800
Nitrate, NO_3 as NO_3	mg/L	0.7	50	12.37	7.7
Nitrite, NO_2 as NO_2	mg/L	-	3	<0.01	<0.05
Ammonia, NH3	mg/L	0.9	0.5 (aesthetic)	-	<0.05
Total Kjeldahl Nitrogen	mg/L	-	-	1.61	0.11
Total Nitrogen (calc)	mg/L	-	-	4.4	1.9
Filterable Reactive Phosphorus	mg/L	-	-	-	0.046
Total Phosphorus (Kjeldahl Digestion)	mg/L	-	-	-	0.09
E. Coli	CFU/100ml	-	<1	<1	-
Sodium	mg/L		180 (aesthetic)	358.73	-
Chloride	mg/L		250 (aesthetic)	310	-

4. Implementation

4.1 Prevention and Control

The following sections briefly describe management measures used to reduce the risk of negative groundwater impacts. These prevention measures are covered by the Liquid and Solid Waste Management Plan.

4.1.1 *Feedlot Wastes*

Pens will be cleaned every 4–6 weeks to reduce manure loads to the drainage systems. This minimises the risk of:

- Overflowing wastewater systems; and
- Runoff in high rainfall.

Drainage systems will be cleaned regularly to ensure that water flows freely to the wastewater system. This minimises the risk of:

- Runoff from inside the CDA leaving the CDA and leaching into groundwater.

Manure will be stockpiled on the compost pad prior to being used on Nullamanna Station's crops. This minimises the risk of:

- Odour and pollution hazards associated with any subsequent handling and use of the manure, as composting of the manure will stabilise a large proportion of the organic matter constituents.

Small contaminated agricultural runoff (CAR) catchment dams will be constructed below the existing silage and western most pens to ensure that runoff from these areas does not enter Frazers Creek and groundwater systems.

4.1.2 *Irrigation Management*

The wastewater in the holding pond will be used on an irrigable area of 6.6 ha of improved pasture. Improper irrigation management may lead to contamination of the local groundwater aquifer by way of nutrient leaching. To minimise the risks of irrigating with wastewater, irrigation rates and frequencies can be closely monitored to account for leaching fractions and nutrient balance by the following means:

- A total application rate of 87.4mm/ha/year is expected to be applied. Leaching of nutrients to groundwater should not occur, provided irrigation frequencies do not over wet the soil profile.
- Soil moisture should be checked prior to application to ensure the soil profile is not over wet;
- Volume of treated wastewater applied to the irrigation block will be recorded;
- Physical and chemical properties of the soils of the irrigation block will be recorded;
- Active plant growth should be maintained;
- Organic matter content should be increased to maximise nutrient holding capacity; and
- Crop should be harvested to increase nutrient removal.

4.1.3 *Freshwater supply and groundwater drawdown*

The Reference Manual for the Establishment and Operation of Beef Cattle Feedlots in Queensland (Skerman 2000) suggests that the total average annual water requirements of a beef cattle feedlot are approximately of 24 ML/1,000 SCU. Therefore, approximately 72 ML/year of water will have to be secured for the feedlot expansion.

The 65ML dam on the site will be expanded to utilise the allowable harvestable right and this water source will be used to supply water to the feedlot. The bore onsite is approved for stock and domestic use only. The property has an area of some 1872.71 ha, which provides a Maximum Harvestable Right (MHR) of 131.08 ML (NSW Office of Water, 2015). This more the adequately delivers an access right and entitlement for

water supply for the feedlot, from the dam. No groundwater will be extracted for the feedlot. Thus, impacts on volume of extraction from the aquifer are therefore not expected to be affected by the feedlot.

4.1.4 *Hazardous Chemicals*

Fuels, lubricants, pesticides, medicines, and other animal treatments are amongst some of the hazardous chemicals likely to be used at the feedlot. The risk to groundwater lies in the misuse and incorrect storage, disposal and spillage of chemicals. To minimise this risk, the following will be enacted:

- Dangerous goods will be stored in designated areas according to their specific storage requirements and, where applicable, consistent with any requirements under the Dangerous Goods Act 1975. Where Australian Standards are available, these will provide the minimum storage conditions applicable. Applicable standards include AS 1940-1993: The storage and handling of flammable and combustible liquids, AS 2507-1984: The storage and handling of pesticides, AS 4452-1997: The storage and handling of toxic substances, and AS/NZS 4861-2000: The storage and handling of Class 9 (miscellaneous) dangerous goods and articles;
- Spill kits will be on hand to reasonably cater for the range of spills possible on the site;
- Employees trained in spill management response and made aware of their legislative and regulatory obligations in terms of their duty of care, both from an environmental and occupational safety perspective;
- A library of material safety data sheets (MSDS) on dangerous goods will be developed and maintained by the site manager onsite;
- All of the veterinary medicines, animal treatments and pesticides will be registered for their respective uses and will be used in strict accordance with label directions or as prescribed by a consulting veterinarian.
- Any application equipment to be cleaned after use in accordance with the product label and or industry guidelines (ensuring soil, groundwater and surface water are not contaminated). Empty chemical, drug, antibiotic, vaccine and disinfectant containers to be disposed of at an appropriately licensed waste management facility. Unused chemicals, spilt product or contaminated materials are to be disposed of in a manner approved by the Environment Protection Authority.

4.2 Environmental Monitoring

Groundwater monitoring will be undertaken at two (2) piezometers, one downstream of the feedlot and the other downhill from the irrigation areas (Appendix B - Groundwater Monitoring Locations). Groundwater monitoring will also continue to be undertaken at the existing stock and domestic bore.

Groundwater will be monitored twice (6 monthly) in the first year. After this, the monitoring frequency will be reviewed, and is likely to continue on an annual and event-only basis.

This monitoring will include the following conditions:

- Standing water levels;
- pH;
- Electrical conductivity;
- Total nitrogen;
- Nitrate;
- Nitrate;
- Ammonia; and
- Total phosphorus.

Samples must reach laboratory for testing within their specified holding time to ensure quality of samples.

4.3 Roles and Responsibilities

The roles and responsibilities pertaining to this plan are highlighted in Table 3.

Table 3 Responsibilities under the GWMP

Position	Responsibilities
Farm Manager	Ensure that this Groundwater management plan is implemented
	Ensure that all personnel are aware of and adhere to the GWMP
	Carry out staff training and induction to make staff aware of their obligations under the GWMP
	Maintain records of groundwater monitoring results for a minimum of five (5) years
	Arrange for samples to be tested with a laboratory
	Take groundwater samples from piezometers and send to laboratory
Farm workers	Adhere to the Solid and Liquid Waste Management Plan
All employees and contractors	Any cracks or leaks in bunding, earthen mounds or dam walls are reported

4.4 Training and induction

All employees and contractors entering the site to undertake work activities will be inducted prior to commencing work. This will ensure that they are aware of their obligations under the GWMP. Re-training will be undertaken if there are any changes to the procedures outlined in this plan, or if there are any non-conformances to procedures noted by management or external authorities. Records of training will be keep onsite for a minimum of five years.

4.5 Reporting

The Farm Manager will document details of all non-conformances, incidents, corrective actions and complaints.

Where an incident causes, or is threatening to or may threaten to cause, environmental nuisance or pollution resulting in material or serious environmental harm, NSW EPA must be informed within 24 hours of first becoming aware of the incident.

4.6 Incidents and Compliance Failures

The manager will deal with any non-compliance, complaints or incident. The manager will ensure that corrective actions are taken within an appropriate time frame to ensure that this management plan is adhered to in future.

4.7 Document Review

This GWMP will be reviewed annually. It will also be reviewed when circumstances change that may affect the content of this plan.

5. References

ANZECC & ARMCANZ (2000). National water quality management strategy. Australian and New Zealand guidelines for fresh and marine water quality. Australian and New Zealand Conservation Council & Agriculture, and Resource Management Council of Australia and New Zealand.

MLA (2012) National Beef Cattle Feedlot Environmental Code of Practice (2nd ed.). Sydney, Australia: MLA

NHMRC & NRMMC (2004). National water quality management strategy. Australian drinking water guidelines. National Health and Medical Research Council & Natural Resource Management Ministerial Council, Australia.

NSW Department of Land and Water Conservation (1998). *Aquifer risk assessment report*. Available from: http://www.water.nsw.gov.au/__data/assets/pdf_file/0006/548070/aquifer_risk_assessment_report.pdf. Accessed 19/01/2016.

NSW Office of Water (2016). Groundwater Data. NSW Department of Primary Industries. Available from: http://allwaterdata.water.nsw.gov.au/water.stm. Accessed 04/01/2016.

QLD Department of Natural Resources and Mines (2005). Regional groundwater systems. Available from: http://www.condaminecatchment.com.au/pdf/Groundwater_Forums/GWF_Free_RegGWSystems.pdf. Accessed 19/01/2016.

Silburn, D. M., Cowie, B. A., & Thornton, C. M. (2009). The Brigalow Catchment Study revisited: effects of land development on deep drainage determined from non-steady chloride profiles. Journal of Hydrology, 373(3), 487-498.

6. Appendices

Appendix A. Groundwater Sampling Results

SGS

CTW.2602214

Certificate of Analysis

This is to certify that the undermentioned sample(s) were analysed and this certificate was issued at SGS Agritech, 214 McDougall St., Toowoomba QLD 4350. Phone: 0011+61+7+46330599. NATA accredited laboratory 2120.

APPLICANT: NULLAMANNA FEEDLOT PTY LTD
NULLAMNNA STATION
INVERELL NSW 2360

SAMPLE NUMBER: 2006007049 **SAMPLE(S) RECEIVED:** 28 April 2006

COMMODITY: Water **CERTIFICATE ISSUED:** 10 May 2006

MARKINGS:

TEST IDENTITY	RESULT	UNITS	METHOD
Total Dissolved Solids	1506.0	mg/L	TDS001
Chloride	358.73	mg/L	ANL001
Nitrate	12.37	mg/L	ANL001
Fluoride	0.34	mg/L	ANL001
Sulphate	33.33	mg/L	ANL001
Nitrite	<0.010	mg/L	ANL001
Phosphate	<0.010	mg/L	ANL001
pH	7.7	pH	WAT001
Electrical Conductivity	2473	µS/cm	WAT003
Total Nitrogen	4.4	mg/L	TOT001
Aluminium	<0.1	mg/L	MIN001
Boron	0.030	mg/L	MIN001
Calcium	87	mg/L	MIN001
Copper	<0.01	mg/L	MIN001
Iron	<0.01	mg/L	MIN001
Potassium	2.7	mg/L	MIN001
Magnesium	180	mg/L	MIN001
Manganese	<0.01	mg/L	MIN001
Molybdenum	<0.05	mg/L	MIN001
Sodium	310	mg/L	MIN001
Phosphorus	<1	mg/L	MIN001
Sulphur	14	mg/L	MIN001
Zinc	0.030	mg/L	MIN001
E coli in Water	<1	CFU/100mL	COL004
Total Kjeldahl Nitrogen	1.61	mg/L	

Note: < is Less Than.

Diana Abbott
Manager
For and on behalf of
SGS Australia Pty Ltd

The results apply only to the sample analysed. The sample on which the test was performed was not collected by or on behalf of SGS Agritech. This certificate is discrete and can only be reproduced in full. The analysis was performed between 28/04/2006 and 10/05/2006

SGS

CTW.2602214

Certificate of Analysis

This is to certify that the undermentioned sample(s) were analysed and this certificate was issued at SGS Agritech, 214 McDougall St., Toowoomba QLD 4350. Phone: 0011+61+7+46330599. NATA accredited laboratory 2120.

APPLICANT: NULLAMANNA FEEDLOT PTY LTD
NULLAMNNA STATION
INVERELL NSW 2360

SAMPLE NUMBER: 2006007049

SAMPLE(S) RECEIVED: 28 April 2006

COMMODITY: Water

CERTIFICATE ISSUED: 04 May 2006

MARKINGS:

TEST IDENTITY	RESULT	UNITS	METHOD
E coli in Water	<1	CFU/100mL	COL004

Note: < is Less Than.
CFU - Colony Forming Units.

Robert Lascelles
Chief Chemist
For and on behalf of
SGS Australia Pty Ltd

The results apply only to the sample analysed. The sample on which the test was performed was not collected by or on behalf of SGS Agritech. This certificate is discrete and can only be reproduced in full. The analysis was performed between 28/04/2006 and 4/05/2006

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS		LABORATORY DETAILS	
Contact	Lindi Oliver	Manager	Andrew Tomlins
Client	ENVIROAG AUSTRALIA PTY LTD	Laboratory	SGS Brisbane Environmental
Address	PO BOX 1775 ARMIDALE NSW 2350	Address	59 Bancroft Road PINKENBA QLD 4008
Telephone	61 2 67729010	Telephone	+61 7 3622 4700
Facsimile	61 2 67715999	Facsimile	+61 7 3622 4799
Email	lindi.oliver@enviroag.net.au	Email	au.environmental.brisbane@sgs.com
Project	**Enviroag - Nullamanna Samples**	SGS Reference	**BE015493 R0**
Order Number	**Enviroag - Nullamanna Samples**	Date Received	04 Jan 2016
Samples	2	Date Reported	07 Jan 2016

COMMENTS

Accredited for compliance with ISO/IEC 17025. NATA accredited laboratory 2562(20707/1706).

SIGNATORIES

Caroline McDermid
Inorganics Supervisor

Parameter	Units	LOR	Sample Number: BE015493.001 Sample Matrix: Water Sample Date: 31 Dec 2015 Sample Name: Bore	Sample Number: BE015493.002 Sample Matrix: Water Sample Date: 31 Dec 2015 Sample Name: Creek
pH in water Method: AN101 Tested: 4/1/2016				
pH**	No unit	-	7.9	7.8
Conductivity and TDS by Calculation - Water Method: AN106 Tested: 4/1/2016				
Conductivity @ 25 C	µS/cm	5	1800	350
Low Level Nitrate Nitrogen and Nitrite Nitrogen (NOx) by FIA Method: AN258 Tested: 5/1/2016				
Nitrate, NO_3 as NO_3	mg/L	0.05	7.7	<0.05
Nitrite, NO_2 as NO_2	mg/L	0.05	<0.05	<0.05
Nitrite Nitrogen, NO_2 as N	mg/L	0.005	<0.005	<0.005
Nitrate Nitrogen, NO_3 as N	mg/L	0.005	1.7	<0.005
Ammonia Nitrogen by Discrete Analyser Method: AN280/WC250.19 Tested: 6/1/2016				
Ammonia Nitrogen, NH_3 as N	mg/L	0.05	<0.05	<0.05
Ammonia, NH3	mg/L	0.05	<0.05	<0.05
TKN Kjeldahl Digestion by Discrete Analyser Method: AN281 Tested: 6/1/2016				
Total Kjeldahl Nitrogen	mg/L	0.05	0.11	0.93
Calculated Nitrogen Forms - TN, organic N, inorganic N Method: AN281/292 Tested: -				
Total Nitrogen (calc)	mg/L	0.05	1.9	0.94
Filterable Reactive Phosphorus (FRP) Method: AN278 Tested: 7/1/2016				
Filterable Reactive Phosphorus	mg/L	0.002	0.046	0.033
Filterable Reactive Phosphorus as PO4	mg/L	0.02	0.14	0.10
Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293 Tested: 6/1/2016				
Total Phosphorus (Kjeldahl Digestion)	mg/L	0.02	0.09	0.11

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage.* Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Ammonia Nitrogen by Discrete Analyser Method: ME-(AU)-[ENV]AN280/WC250.19

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Ammonia Nitrogen, NH_3 as N	LB023234	mg/L	0.05	<0.05	0 - 1%	85%	74%
Ammonia, NH3	LB023234	mg/L	0.05	<0.05			

Conductivity and TDS by Calculation - Water Method: ME-(AU)-[ENV]AN106

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Conductivity @ 25 C	LB023216	µS/cm	5	<5	0%	103%

Filterable Reactive Phosphorus (FRP) Method: ME-(AU)-[ENV]AN278

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Filterable Reactive Phosphorus	LB023272	mg/L	0.002	<0.002	0%	94%	90%
Filterable Reactive Phosphorus as PO4	LB023272	mg/L	0.02	<0.02	5%	94%	NA

Low Level Nitrate Nitrogen and Nitrite Nitrogen (NOx) by FIA Method: ME-(AU)-[ENV]AN258

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Nitrate, NO_3 as NO_3	LB023237	mg/L	0.05	<0.05			
Nitrite, NO_2 as NO_2	LB023237	mg/L	0.05	<0.05			
Nitrite Nitrogen, NO_2 as N	LB023237	mg/L	0.005	<0.005	0%	105%	117%
Nitrate Nitrogen, NO_3 as N	LB023237	mg/L	0.005	<0.005			

pH in water Method: ME-(AU)-[ENV]AN101

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
pH**	LB023216	No unit	-	5.8	0%	101%

TKN Kjeldahl Digestion by Discrete Analyser Method: ME-(AU)-[ENV]AN281

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Kjeldahl Nitrogen	LB023225	mg/L	0.05	<0.05	2 - 3%	99 - 100%	97%

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage.* Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Total Phosphorus by Kjeldahl Digestion DA in Water **Method: ME-(AU)-[ENV]AN279/AN293**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Phosphorus (Kjeldahl Digestion)	LB023225	mg/L	0.02	<0.02	0 - 9%	90 - 104%	111%

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode (glass plus reference electrode) and is calibrated against 3 buffers purchased commercially. For soils, an extract with water is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN106	Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos/cm or µS/cm @ 25°C. For soils, an extract with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Total Dissolved Salts can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. SGS use 0.6. Reference APHA 2510 B.
AN258	Nitrate and Nitrite by FIA: In an acidic medium, nitrate is reduced quantitatively to nitrite by cadmium metal. This nitrite plus any original nitrite is determined as an intense red-pink azo dye at 540 nm following diazotisation with sulphanilamide and subsequent coupling with N-(1-naphthyl) ethylenediamine dihydrochloride. Without the cadmium reduction only the original nitrite is determined. Reference APHA 4500-NO3- F.
AN278	Reactive Phosphorus by DA: Orthophosphate reacts with ammonium molybdate (Mo VI) and potassium antimonyl tartrate (Sb III) in acid medium to form an antimony-phosphomolybdate complex. This complex is subsequently reduced with ascorbic acid to form a blue colour and the absorbance is read at 880 nm. The sensitivity of the automated method is 10-20 times that of the macro method. Reference APHA 4500-P F
AN279/AN293	The sample is digested with Sulphuric acid, K2SO4 and CuSO4. All forms of phosphorus are converted into orthophosphate. The digest is cooled and placed on the discrete analyser for colorimetric analysis.
AN280/WC250.19	A filtered water sample containing ammonia (NH3) or ammonium cations (NH4+) is reacted with alkaline phenol and hypochlorite in a buffered solution to form the blue indophenol colour. The absorbance is measured at 630nm and compared with calibration standards to obtain the concentration of ammonia in the sample.
AN281	An unfiltered water or soil sample is first digested in a block digestor with sulfuric acid, K2SO4 and CuSO4. The ammonia produced following digestion is then measured colourimetrically using the Aquakem 250 Discrete Analyser. A portion of the digested sample is buffered to an alkaline pH, and interfering cations are complexed. The ammonia then reacts with salicylate and hypochlorite to give a blue colour whose absorbance is measured at 660nm and compared with calibration standards. This is proportional to the concentration of Total Kjeldahl Nitrogen in the original sample.
AN281/292	Calculation of total nitrogen and organic nitrogen.

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
		QFL	QC result is below the lower tolerance
**	Indicative data, theoretical holding time exceeded.	-	The sample was not analysed for this analyte
		NVL	Not Validated

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calcuated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

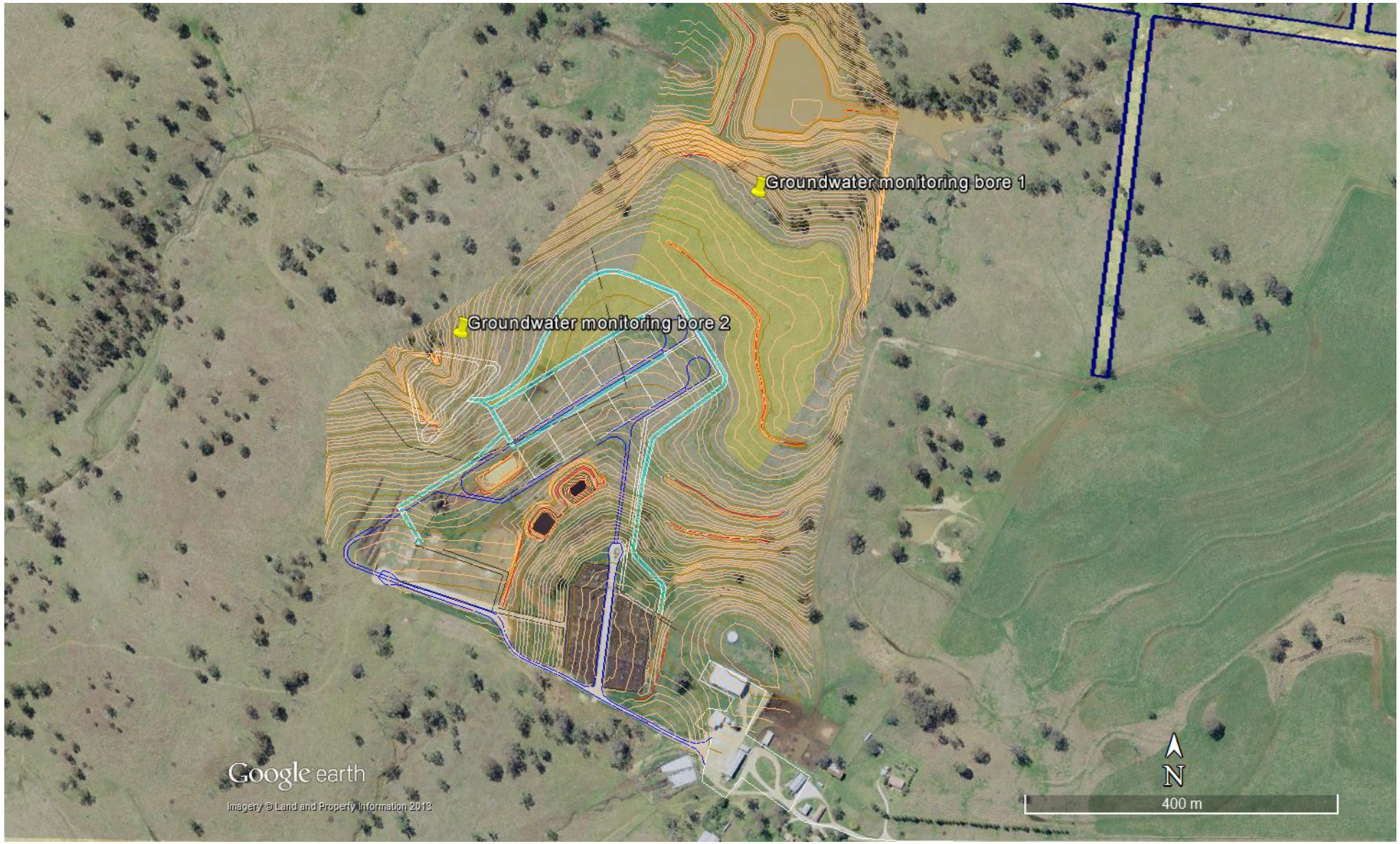
The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

This document is issued, on the Client's behalf, by the Company under its General Conditions of Service available on request and accessible at http://www.sgs.com/en/Terms-and-Conditions/General-Conditions-of-Services-English.aspx. The Client's attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Any other holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents.

This report must not be reproduced, except in full.

Appendix B. Groundwater Monitoring Locations


Groundwater monitoring bore 1
Groundwater monitoring bore 2
Google earth
Imagery © Land and Property Information 2013
N
400 m

Appendix K. Flora and Fauna Assessment

Flora and Fauna Assessment

The Nullamanna Feedlot Expansion does not require approval under the Native Vegetation Act 2003, as it is not proposed to clear any vegetation based on the initial concept plan provided to the client.

The existing facility was established on land previously used for grazing and cultivation. The site for the expansion is cleared, highly disturbed grassland. The standard fauna that generally inhabit areas on or around cropping zones have been observed during initial site visits. No threatened or endangered fauna species have been observed or reported onsite.

A NSW BioNet Atlas search found twelve (12) threatened fauna and one (1) threatened flora species in a 10km radius of the feedlot. None of these were found on Nullamanna Station. All were found to the west of the property.

The EPBC Act Protected Matters Report found seventeen (17) fauna species and fourteen (14) flora species. These species from the BioNet search and the EPBC search are combined in the assessment below.

Species from both desktop searches are listed in the table below, with a description of their habitat and whether they are likely to be affected by the feedlot expansion. Due to the degraded nature of this area, it was found that only two flora species had potential home range in the feedlot area:

- *Dichanthium setosum* – Bluegrass
- *Thesium austral* – Austral toadflax.

A 7 part test has been undertaken for these two species. This concluded that the proposed activity will not have a significant impact on any of these species.

The proposed development will not require referral to the Commonwealth Minister for the Environment for consideration under the EPBC Act.

Table 1 Flora and fauna listed as protected by the NSW and Federal Governments

Scientific Name	Common Name	NSW status[#]	Comm. status	Records	Habitat required*	Suitable habitat present?
			Fauna			
Oedura rhombifer	Zigzag Velvet Gecko	E1,P		1	Mainly found in woodland habitat, although it also has been recorded in rubbish dumps and buildings. It is predominantly arboreal and shelters beneath the peeling bark of standing or fallen trees. Can also be found in ground litter occasionally.	No
Uvidicolus sphyrurus	Border Thick-tailed gecko		V		Mainly found in undisturbed habitat on rocky outcrops and stony hills within eucalypt and cypress pine, woodland/open-forest.	No
Wollumbinia belli	Bell's turtle		V		Lives in small tributaries of major rivers flowing through granitic bedrock. The species prefer narrow river with pools at an average of 3m deep with rock or sandy riverbed bottoms and sporadic weeds.	No
Litoria booroolongensis	Booroolong frog		E		Occurs along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses.	No
Anthochaera phrygia	Regent Honeyeater	E4A,P	CE	1	Inhabits eucalypt open forests and woodlands, including; box-ironbark types, Spotted Gum, Swamp Mahogany and River She-oak. These birds are omnivorous, but mainly feeding on eucalyptus nectar and supplemented with insects, fruit, seeds and sap.	No
Chthonicola sagittata	Speckled Warbler	V,P		1	Typically lives in Eucalyptus open canopy communities with native tussock grass and a sparse shrub layer. They are omnivorous, foraging on the ground for arthropods and seeds.	No
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V,P		7	Lives in open eucalypt woodland with an open grassy understorey. They are insectivores, nest in tree hollows and are sedentary in permanent territories.	No
Daphoenositta chrysoptera	Varied Sittella	V,P		1	Inhabits eucalypt forests and woodlands and are sedentary in nature. They feed on arthropods in crevices in rough bark, dead branches standing dead trees, etc.	No
Ethrotriorchis radiates	Red Goshawk		V		Occurs in tropical and warm-temperate coastal and sub-coastal areas in wooded and forested areas. They are carnivorous, feeding mainly on birds, usually hunting at dawn and dusk.	No
Geophaps scripta scripta	Squatter Pigeon		V		Inhabits Eucalyptus open forests, remnant, regrowth or partly modified vegetation, close to water sources. The species can move into highly modified or degraded habitats foraging on seeds on the ground.	No
Glossopsitta pusilla	Little Lorikeet	V,P		5	Inhabit dry and open eucalypt forest and woodlands. They feed on nectar and pollen of White Box and Yellow Box, melaleucas and mistletoe.	No
Grantiella picta	Painted honeyeater		V		Lives in dry open forests and woodlands. Mainly feeds on mistletoe fruit and can supplement this with invertebrates mainly found in Eucalyptus.	No

Scientific Name	Common Name	NSW status[#]	Comm. status	Records	Habitat required*	Suitable habitat present?
Lathamus discolour	Swift parrot		E		Dry sclerophyll eucalypt forests and woodlands, they mainly forage in Spotted Gum (*Corymbia maculate*), swamp mahogany (*E. robustus*), Red Bloodwood (E. *gummifera)* and forest red gum (*E. tereticornis*). They are omnivorous, mainly feeding on eucalyptus nectar supplemented with insects, seeds and fruit.	No
Lophoictinia isura	Square-tailed Kite	V,P,3		1	Inhabits eucalypt-dominated open forests, woodlands and riparian woodland, in coastal and sub-coastal regions. They feed on small birds and their eggs and are territorial with a home range of roughly 50km^2.	No
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V,P		4	Inhabits dry eucalypt woodland with ironbark, box eucalypts and River Red Gum. They live in groups feeding in the canopy on nectar, insects and seeds.	No
Neophema pulchella	Turquoise Parrot	V,P,3		6	Inhabits rugged country with eucalypts and cypress-pine open forest and woodlands with native grasses and occasionally shrubby understorey. They can also live in open woodland or riparian gum woodland. They require tree stumps and logs for nesting, trees and shrubs for shelter and seeds for food.	No
Poephilia cincta cincta	Black-throated finch		E		Inhabits Eucalypt dominated open woodland and forests with native grasses. Often in proximity to watercourses and water bodies. They feed on seeds of grasses and herbaceous plants and can supplement these with insects.	No
Rostratula australis	Australian Painted Snipe		E		Inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and clay pans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. They are omnivorous, eating vegetation, seeds, insects, worms and molluscs.	No
Maccullochella peelii	Murray cod		V		Utilises a diverse range of habitats from clear rocky streams, to slow-flowing, turbid lowland rivers and billabongs. They are carnivorous and highly territorial.	No
Chalinolobus dwyeri	Large-eared pied bat		V		Inhabits sandstone cliffs and fertile woodland valley habitat within close proximity of each other. It is thought that they hunt for insects at night below the canopy.	No
Dasyurus maculatus maculatus	Spotted tail quoll		E		Can inhabit a wide range of habitats, including: temperate and subtropical rainforests in mountain areas, wet sclerophyll forest lowland forests open and closed eucalypt woodlands inland riparian and River Red Gum (*Eucalyptus camaldulensis*) forests, dry 'rainshadow' woodland, sub-alpine woodlands, coastal heathlands. They are carnivorous and adept climbers, hunting for possums, glider and birds.	No
Nyctophilus corbeni	Corben's Long-eared Bat	V,P	V	1	Mainly inhabits eucalypt woodland, although it has also been recorded from rainforest It is most abundant in vegetation with a distinct canopy and a dense cluttered shrub layer. They are insectivorous and forage around patches of trees.	No

Scientific Name	Common Name	NSW status[#]	Comm. status	Records	Habitat required*	Suitable habitat present?
Petaurus norfolcensis	Squirrel Glider	V,P		2	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest and Blackbutt-Bloodwood forest with heath understorey. They feed on nectar and pollen, supplemented with invertebrates.	No
Petrogale penicillata	Brush-tail rock-wallaby		V		Rocky habitats, including loose boulder piles, rocky outcrops, steep rocky slopes, cliffs, gorges and isolated rock stacks. They feed primarily on grasses, forbs and browse and forage mostly at night.	No
Phascolarctos cinereus	Koala	V,P	V	2	Inhabits eucalyptus woodlands and forests. Feeding only on eucalyptus leaves.	No
Pteropus poliocephalus	Grey-headed flying-fox		*V*		Utilises vegetation communities including rainforests, open forests, closed and open woodlands, Melaleuca swamps and Banksia woodlands. They feed on nectar and pollen from eucalypts, melaleuca and banksia, they supplement this with introduced fruits.	No
					Flora	
Acacia pubifolia	Velvet wattle		V		This species grows on rocky granite hillsides, in sandy, stony or loamy soil in eucalypt-scrub woodland or *Eucalyptus-Callitris* forest.	No
Astrotricha roddii			E		Grows in low dry woodland and shrub lands on granite and acid volcanic outcrops, often in rock crevices. Surrounding woodland is often dominated by *Eucalyptus dealbata* and *E. melanophloia*. The species favours crevices or areas of rock rubble for establishment and is largely absent from nearby areas of level ground.	No
Boronia granitica	Granite boronia		E		Grows on granitic soils or screes amongst rock outcrops, often in rock crevices. It has been found in dry sclerophyll forests, woodlands and heathlands on mostly shallow soils.	No
Callistemon pungens			V		Occurs along rocky watercourses usually with sandy granite (or occasionally basalt) creek beds, and generally among naturalised species.	No
Dichanthium setosum	Bluegrass	V	V		Heavy basaltic black soils and red-brown loams with clay subsoil. Associated species include White Box (*Eucalyptus albens*), Silver-leaved Ironbark (*Eucalyptus melanophloia*), Yellow Box (*Eucalyptus melliodora*), Manna Gum (*Eucalyptus viminalis*), Amulla (*Myoporum debile*), Purple Wire-grass (*Aristida ramosa*), Kangaroo Grass (*Themeda triandra*), Fine-leaved Tussock-grass (*Poa sieberiana*), Red-leg Grass (*Bothriochloa ambigua*), Pitted Blue-grass (*Bothriochloa decipiens*), *Macrozamia stenomera*, Small Woolly Burr-medic (*Medicago minima*), Scaly Buttons (*Leptorhynchos squamatus*), *Lomandra* aff. *longifolia*, Australian Bugle (*Ajuga australis*), Bogan-flea (*Calotis hispidula*) and *Austrodanthonia* spp., *Dichopogon* spp., *Brachyscome* spp., *Vittadinia* spp., *Wahlenbergia* spp. and *Psoralea* spp.	Possible habitat
Eucalyptus caleyi sub sp. Ovendii	Ovendens ironbark		V		Grows on shallow soils in dry, open grassy woodlands. Associated species include Yellow Box (*E. melliodora*), Tumbledown Red Gum (*E. dealbata*), White Box (*E. albens*), Silver-leaved Ironbark (*E. melanophloia*), and Wilga (*Geijera parviflora*).	No

Scientific Name	Common Name	NSW status[#]	Comm. status	Records	Habitat required*	Suitable habitat present?
Eucalyptus mckieana	McKie's stringybark		V		Usually grows in gently undulating to flat areas, on the drier western side of the New England Tablelands and on the upper western slopes at altitudes of approximately 600– 1050 m. It grows on a range of soil types, including deep clay loams on metasediments, but more commonly on sandy loams derived from granites and quartz porphyrites; found on both moderately fertile and siliceous, relatively infertile, granitic soils.	No
Eucalyptus nicholii	Narrow leaved peppermint		V		Occurs in grassy or schlerophyll woodland, in association with other eucalypts that grow in the region, including New England Blackbutt (*E. andrewsii*) and many of the stringybarks, such as Broad-leaved Stringybark (*E. caliginosa*).	No
Eucalyptus rubida subsp. Barbigerorum	Blackbutt candlebark		V		Dry schlerophyll forest or woodland on poor sandy loam on acid granite.	No
Lepidium peregrinum	Wandering pepper-cress		E		This species grows in riparian open forest dominated by *Eucalyptus camaldulensis* and *Casuarina cunninghamiana* with a variably dense shrubby understorey of *Hymenanthera dentata, Bursaria spinosa, Acacia fimbriata, A. floribunda, Callistemon viminalis* and *Leptospermum brachyandrum*. This species was most abundant in the tussock grassland fringe of the riparian open forest.	No
Polygala linariifolia	Native Milkwort	E1,P		1	Sandy soils in dry eucalypt forest and woodland with a sparse understorey. The species has been recorded from the Inverell and Torrington districts growing in dark sandy loam on granite in shrubby forest of *Eucalyptus caleyi, Eucalyptus dealbata* and Callitris, and in yellow podsolic soil on granite in layered open forest.	No
Prasophyllum petilum	Tarengo leek orchid		E		Occurs on relatively fertile soils in grassy woodland or natural grassland. Occurs on flat or gently sloping sites on plains and rolling hills. Soils are usually loams, clay loams or sandy clays.	No
Thesium austral	Austral toadflax	V	V		Semi-parasitic on roots of a range of grass species, notably Kangaroo Grass (*Themeda triandra*). It occurs in subtropical, temperate and subalpine climates over a wide range of altitudes. It occurs on soils derived from sedimentary, igneous and metamorphic geology on a range of soils including black clay loams to yellow podzolics and peaty loams.	Possible habitat
Tylophora linearis			E		Grows in dry scrub and open forest. Recorded from low-altitude sedimentary flats in dry woodlands of *Eucalyptus fibrosa, Eucalyptus sideroxylon, Eucalyptus albens, Callitris endlicheri, Callitris glaucophylla* and *Allocasuarina luehmannii*.	No

* Habitat/Ecological Profile descriptions from the NSW Office of Environment and Heritage (2011) and Australian Government department of the Environment (2016).

NSW Bionet descriptions: S3: Sensitivity Class 3 (Sensitive Species Data Policy), P: Protected (National Parks & Wildlife Act 1974), E: Endangered (Threatened Species Conservation Act 1995), V: Vulnerable (Threatened Species Conservation Act 1995), E4A: Critically Endangered (Threatened Species Conservation Act 1995)

The 7-part test, as required under Section 5A of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act), has been applied to determine whether there is likely to be a significant effect on threatened species (endangered and vulnerable) recorded at, or likely to occur at the site.

Under the terms of the EP&A Act and the TSC Act, the most critical issues for this assessment are (i) the definition of a "local population" and (ii) the definition of a "region". The Acts regard a "local population" as that inhabiting the study area, unless there is contiguous or proximate occupied habitat. Furthermore, consideration of a "population" for the purpose of assessing its conservation status requires it to be a recognisable entity, disjunct or genetically distinct. "Region" means a defined bioregion, in this case the New England Tableland Bioregion.

Threatened fauna species observed at the subject site

Endangered species:

Nil

Vulnerable species:

Nil

Threatened flora with potential habitat occurring on the subject site

Endangered species:

Nil

Vulnerable species:

Dichanthium setosum → Bluegrass

Thesium austral → Austral toadflax

7-Part Test

1. In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

***Dichanthium setosum* → Bluegrass**

Schedule 2 – vulnerable

This species was not observed or recorded onsite but has been recorded on the EPBC Act Protected Matters Report as potentially occurring within 10km of the site.

An erect perennial which grows to a 1m in height, it has mostly hairless leaves about 2-3mm wide. The flowers are densely hairy and clustered together along a stalk in a cylinder shape. It is found on heavy basaltic black soils and red-brown loams with clay subsoil.

The land that the feedlot expansion is proposed to affect, is already very disturbed and planted with improved pasture species. Thus it is considered unlikely that the proposed action will disrupt the lifecycle of this species such that any potentially viable local population would be placed at risk of extinction.

***Thesium austral* → Austral toadflax**

This species was not observed or recorded onsite but has been recorded on the EPBC Act Protected Matters Report as potentially occurring within 10km of the site.

Austral Toadflax is a hairless, yellowish-green perennial herb with slender, wiry stems to 40cm high and tiny, white flowers. It is semi-parasitic on roots of a range of grass species, notably Kangaroo Grass (*Themeda triandra*). It occurs in subtropical, temperate and subalpine climates over a wide range of altitudes. It occurs on soils derived from sedimentary, igneous and metamorphic geology on a range of soils including black clay loams to yellow podzolics and peaty loams.

The land that the feedlot expansion is proposed to affect, is already very disturbed and planted with improved pasture species. Thus it is considered unlikely that the proposed action will disrupt the lifecycle of this species such that any potentially viable local population would be placed at risk of extinction.

2. In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction

Not applicable, as the Director-General of the National Parks and Wildlife Service has not declared any endangered local populations of these species considered.

3. In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) Is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) Is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

No endangered ecological communities were found or mapped on site.

4. In relation to the habitat of a threatened species, population or ecological community:

(i) The extent to which habitat is likely to be removed or modified as a result of the action proposed,

(ii) Whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) The importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality

(i) Tree clearance is not anticipated. However, improved pasture grassland will be cleared to construct the feedlot expansion. Whilst both species are found in grassland, they are sensitive to grazing, disturbance and being replaced by crop species, as is the case of this site. Thus clearance will not remove a significant habitat area.

(ii) Removal of this area is not likely to fragment the habitat, as there is connected habitat surrounding this disturbed area.

(iii) This habitat is unlikely to be important for the long term survival of the listed threatened flora in this locality due to its degraded condition.

5. Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)

Not applicable, as the Director-General of the National Parks and Wildlife Service has not declared any critical habitat for any species relevant to the subject land.

6. Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan

Specific recovery plans are not available for these species. They are covered under the *Saving our Species* program, which aims to maximise the number of threatened species that can be secured in the wild in NSW for 100 years.

Dichanthium setosum is listed as a *Site Managed Species*, which means that under this program it is managed by carrying out targeted conservation projects on specific sites. There are 5 sites listed for this species, which are just outside of Guyra and Armidale. Thus, this management plan will not be affected.

Thesium Austral is listed as a *Keep Watch Species*, which means that it requires no immediate investment because it is either naturally rare, has few known threats, or is more abundant than previously assumed. For this species in particular, the following statement is supplied: *"This species is likely to be secure in NSW for the long term without targeted management, assuming adequate ongoing management of habitat within the public reserve system."* Thus due to the degraded nature of this site, clearance is unlikely to affect this species.

7. Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process

The proposed action constitutes part of four (4) key threatening processes listed under Schedule 3 of the Threatened Species Conservation Act that may impact native fauna at the site:

1. Clearing of native vegetation

There is a high correlation between native vegetation clearance, habitat loss and fragmentation, and biodiversity decline. The impact of clearing on biodiversity is greatest in areas where ecosystems contain a relatively high diversity of habitats and high numbers of endemic species with restricted ranges, especially those that are already considered to be threatened.

Future development of the site will involve removal of groundcover and grassland. The action may increase the impact of land clearance within the region. However, due to the already degraded nature of the site, it is unlikely that the feedlot expansion area supports a large population of these species.

2. Invasion of native plant communities by exotic perennial grasses

Exotic perennial grasses are those that are not native to NSW and have a life-span of more than one growing season. This key threatening process would have already occurred onsite due to the planting of improved pasture species in the proposed area for the feedlot expansion for hay production.

EPBC Act Considerations

An assessment of the impact of the proposed development threatened species, populations and ecological communities, World Heritage values, and migratory species listed under the EPBC Act is presented below.

Impacts on threatened species and ecological communities

Critically endangered and endangered species

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

- Lead to a long-term decrease in the size of a population;
- Reduce the area of occupancy of the species;
- Fragment an existing population into two or more populations;
- Adversely affect habitat critical to the survival of a species;
- Disrupt the breeding cycle of a population;
- Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species´ habitat; or
- Interfere with the recovery of the species.

No critically endangered or endangered species were flagged in this assessment.

Vulnerable species

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

- Lead to a long-term decrease in the size of an important population of a species;
- Reduce the area of occupancy of an important population;
- Fragment an existing important population into two or more populations;
- Adversely affect habitat critical to the survival of a species;
- Disrupt the breeding cycle of an important population;
- Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- Result in invasive species that are harmful a vulnerable species becoming established in the vulnerable species´ habitat; or
- Interferes substantially with the recovery of the species.

An important population is one that is necessary for a species' long-term survival and recovery. This may include populations that are:

- Key source populations either for breeding or dispersal;
- Populations that are necessary for maintaining genetic diversity; and/or
- Populations that are near the limit of the species' range.

No vulnerable species were observed on the subject site. Potential habitat exists for *Dichanthium setosum* and *Thesium austral.*

It is considered unlikely that the proposed action will disrupt the lifecycle of *Dichanthium setosum* and *Thesium austral* such that any potentially viable local populations would be placed at risk of extinction due to the already degraded nature of the site. The potential impacts of the proposed action on this species are not likely to result in any of the points listed above.

Critically endangered and endangered ecological communities

No critically endangered or endangered ecological communities are mapped on the feedlot site.

Impacts on migratory species

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

- Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat of the migratory species;
- Result in invasive species that is harmful to the migratory species becoming established in an area of important habitat of the migratory species; or
- Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of the species.

An area of important habitat is:

- Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species;
- Habitat utilised by a migratory species which is at the limit of the species range; or
- Habitat within an area where the species is declining.

Neither of these species are migratory species.

EPBC Act assessment

The impact of the proposed activity on matters of National Environmental Significance was assessed accordingly:

- The proposed development is located within the Border Rivers Catchment;
- The flora and fauna assessment concluded that the proposed activity will not have a significant impact on any of the newly listed, threatened or migratory species listed under the EPBC Act and recorded within 10 km of the site; and,
- No endangered or critically endangered communities are considered to occur in the area proposed to be developed.

Referral Recommendation

The proposed development does not require referral to the Commonwealth Minister for the Environment for consideration under the EPBC Act.