Development Application 261-8-2002-i MOD 2 – Notice of Section 4.55(1A) – Modification to Rangers Valley Cattle Feedlot

Response to Submissions Report

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[June 2019]

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DOCUMENT INFORMATION RECORD

Project details

Client name:	Rangers Valley Cattle Station Pty Ltd (ABN 17 001 060 402)
Project:	Proposed expansion of Rangers Valley Feedlot
Project No:	A8-114D

Document control

Document title:	Development Application 261-8-2002-i MOD 2 - Notice of Section 4.55(1A) - Modification to Rangers Valley Cattle Feedlot – Response to Submissions Report		
File name:	A8-114D RVCS RTS Report V1R2.docx		
Revision:	V1R2		
Author:	Rod Davis	**Position:**	Director
Signature:	R.J.Davis	**Date:**	20/06/2019
Reviewed by:	Rod Davis	**Position:**	Director
Signature:	R.J.Davis	**Date:**	20/06/2019
Approved by:	Rod Davis	**Position:**	Director
Signature:	R.J.Davis	**Date:**	20/06/2019

Revision history

Version	Issue date	Reason for issue	Author	Reviewed by	Approved by
V1R1	14/06/2019	Draft for client review	Rod Davis	Rod Davis	Rod Davis
V1R2	20/06/2019	Final for DPE	Rod Davis	Rod Davis	Rod Davis

Distribution

Version	Recipient	Lodgement	Copies
V1R1	Rangers Valley Cattle Station Pty Ltd	Electronic	-
V1R2	Department of Planning and Environment	Electronic	-

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Citation

RDC Engineers Pty Ltd, 2019, Development Application 261-8-2002-i MOD 2 - Notice of Section 4.55(1A) - Modification to Rangers Valley Cattle Feedlot, Response to Submissions Report, Rangers Valley Cattle Station Pty Ltd, 1304 Rangers Valley Road, Glen Innes, A8-114D, V1R2 RDC Engineers Pty Ltd, Toowoomba, QLD, 4350.

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Executive summary

Rangers Valley Cattle Station Pty Ltd (Rangers Valley Cattle Station) own and operate an existing beef cattle feedlot, which is located about 28 km north of Glen Innes on the central New England Tablelands, New South Wales.

In 2004, Development Consent (DA-261-8-2002-i) (DIPNR, 2004) was granted to Rangers Valley Cattle Station for the expansion of the Rangers Valley Feedlot from 24,000 head to 50,000 head.

In 2018, Rangers Valley Cattle Station lodged a Development Application (DA-261-8-2002-i MOD 2) with the Department of Planning and Environment (DPE) to modify Development Consent (DA-261-8-2002-i) for the Rangers Valley Feedlot. The Development Application is being assessed as State Significant Development. Development Application (DA-261-8-2002-i MOD 2) is being sought under Section 4.55(1A) of the Environmental Planning and Assessment Act (1974).

The Development Application (DA-261-8-2002-i MOD 2) seeks to modify site layout and staging; incorporate an emergency wet weather manure storage area; amend traffic movement hours; amend effluent and manure utilisation areas; and modify conditions of consent for the Rangers Valley Feedlot.

This document provides the proponent's Response to Submissions (RTS) associated with its Development Application (MOD 2) to modify Development Consent DA-261-8-2002-i, applicable to Rangers Valley Feedlot.

This RTS report has been prepared by RDC Engineers Pty Ltd (RDCE) on behalf of the proponent, Rangers Valley Cattle Station Pty Ltd (Rangers Valley Cattle Station) for submission to DPE as part of the application review process.

Following the referral process of Development Application (DA-261-8-2002-i MOD 2), 6 submissions were received by the DPE from government agencies.

A full set of the submissions received by DPE is available on the DPE Major Projects Website. This RTS report provides detailed responses to the key issues raised in the submissions received. Where a specific issue or concern has been raised in multiple submissions, a single response has been provided with the relevant submissions referenced by their DPE assigned reference number.

The proponent has reviewed the key issues raised in all the state agency submissions received and considered them in the context of the existing environmental assessment, proponent commitments and the existing requirements under the Development Consent (DA-261-8-2002-i) (DIPNR, 2004). This RTS together with the Rangers Valley Feedlot DA modification – Environmental Assessment report (EnviroAg Australia Pty Limited, 2018), demonstrates that the modification to Rangers Valley Feedlot development consent can be developed responsibly with acceptable levels of impact subject to appropriate management of those impacts.

1 Introduction

1.1 Development background

Rangers Valley Cattle Station Pty Ltd (Rangers Valley Cattle Station) own and operate an existing beef cattle feedlot on the property Rangers Valley. Rangers Valley is a pastoral station located on the Severn River about 28 km north of Glen Innes on the central New England Tablelands, New South Wales in the Glen Innes Severn Local Government Area as shown in Figure 1.

Rangers Valley Feedlot commenced operations in 1977 and has been under the ownership of the Marubeni Corporation of Japan since the late 1980's.

In 2004, Development Consent (DA-261-8-2002-i) (DIPNR, 2004) was granted to Rangers Valley Cattle Station Pty Ltd for the staged expansion (6 stages) of the beef cattle feedlot known as Rangers Valley Feedlot from 24,000 head to 50,000 head following the preparation and public notification of an Environmental Impact Statement (EA Systems, 2002). However, due to various economic and market factors, Rangers Valley Cattle Station have only completed stages 1 and 2 of the development which allows a capacity 32,000 head of cattle to be currently accommodated on the site.

Development Consent was subsequently modified under Section 96(1A), on 4 December 2009 (MOD 1) to rectify inconsistencies between the consent and the Environment Protection Licence (EPL no. 3864).

In 2018, Rangers Valley Cattle Station Pty Ltd lodged a Development Application with the Department of Planning and Environment to modify Development Consent (DA-261-8-2002- i MOD 2) under s4.55(1A) for the Rangers Valley Feedlot. Development Application (DA 261-8-2002-i MOD 2) is being assessed as State Significant Development.

Development Application (DA 261-8-2002-i MOD 2) seeks to modify site layout and staging; incorporate an emergency wet weather manure storage area; increase traffic movement hours; alter effluent and manure utilisation areas; and modify conditions of consent for the Rangers Valley Feedlot. Development Application (DA 261-8-2002-i MOD 2) does not seek to change the approved capacity of 50,000 head, nor does it seek to substantially modify the footprint or the general operations as outlined in the original Development Application (EA Systems, 2002).

1.2 Proponent details

The proponent is Rangers Valley Cattle Station Pty Ltd (ABN - 17 001 060 402). In the late 1980's Rangers Valley Cattle Station was purchased by the Marubeni Corporation and transformed into a world-class cattle station and feedlot. The award winning Rangers Valley Feedlot is currently the 4th largest in Australia with a capacity of 32,000 head and is located on Rangers Valley, a land aggregation of 12,000 acres on the Severn River , some 30km north of Glen Innes in NSW.

The proponent and their contact details are provided in Table 1.

Table 1 – Proponent and contact details

Proponent entity:	Rangers Valley Cattle Station Pty Ltd
Physical Address:	1304 Rangers Valley Road, GLEN INNES, NSW 2370
Postal Address:	PO Box 63, GLEN INNES, NSW 2370
Contact Person:	Mr Keith Howe
Position	Managing Director
Phone:	02 6734 4000
Facsimile	02 6734 4985
Email:	rangers@rangersvalley.com.au

1.3 Purpose and scope

This document provides the proponent's Response to Submissions (RTS) that were received by the Department of Planning and Environment (DPE) in respect of the referral of the Development Application 261-8-2002-i MOD 2 - Notice of Section 4.55(1A) - Modification to Rangers Valley Cattle Feedlot, Rangers Valley Road, Rangers Valley.

Where necessary, the responses are supported by reference to existing or revised assessment reports relating to matters raised in the various submissions.

This Report has been prepared by RDC Engineers Pty Ltd (RDCE) on behalf of the proponent, Rangers Valley Cattle Station Pty Ltd (Rangers Valley Cattle Station) for submission to the Secretary, Department of Planning and Environment (DPE) as part of the DPE's review process for Development Application (261-8-2002-i MOD 2).

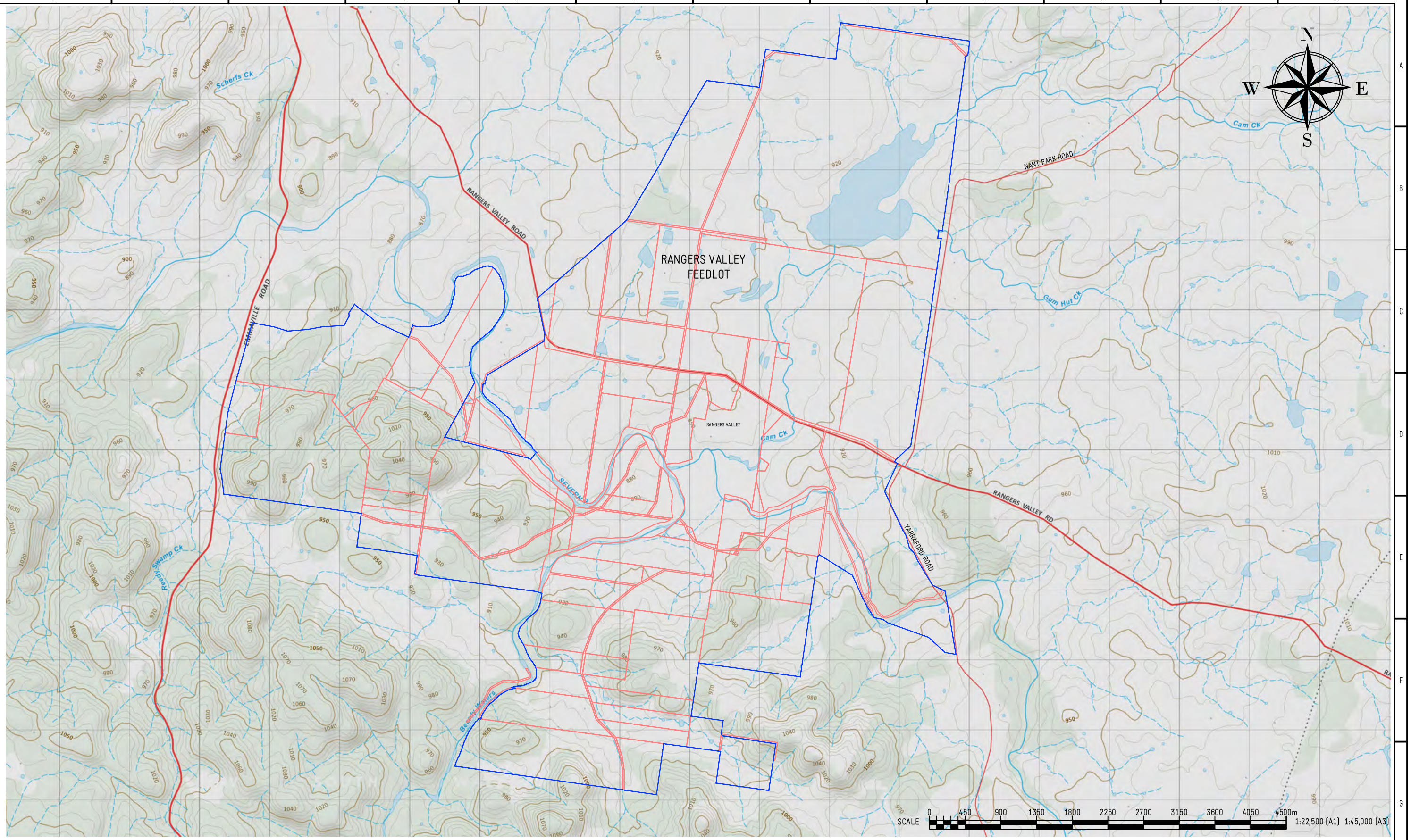
In preparing this RTS, Rangers Valley Cattle Station has aimed to treat each of the submissions objectively and respectfully.

This RTS also aims to address issues raised by the respective submitters and provide factual information associated with the proposed development modification, its potential impacts and the proposed management measures.

DPE will prepare an assessment report that will provide details of its review of the relevant issues for Development Application (261-8-2002-i MOD 2) including recommendations for

the determination of the application and proposals for any variations to the conditions of consent. The DPE assessment report together with the Rangers Valley Feedlot DA modification – Environmental Assessment report (EnviroAg Australia Pty Limited, 2018), submissions received and this RTS will form elements to be considered by the Independent Planning Commission (IPC).

This RTS has been prepared to assist the determining authority to review and consider the context for the respective issues raised in submissions, the relevant matters to be addressed and to reach a view as to the weighting of significance of the respective matters in determining the Development Application (261-8-2002-i MOD 2).



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- LAND PARCEL BOUNDARY

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REV.	DATE	REVISION DESCRIPTION	DRAWN	CHECK	APPROVED	SCALE	1:45,000 (A3)
A	09/06/19	ISSUE TO CLIENT	RJD	RJD	RJD	DRAWN	RJD
B	10/06/19	FINAL FOR SUBMISSION TO DPE	RJD	RJD	RJD	DATE	10/06/2019
						CHECKED	RJD
						DATE	10/06/2019
						APPROVED	RJD
						DATE	10/06/2019

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CLIENT: RANGERS VALLEY CATTLE STATION PTY LTD
PROJECT: RANGERS VALLEY FEEDLOT EXPANSION
TITLE: RESPONSE TO SUBMISSIONS REPORT
RANGERS VALLEY FEEDLOT LOCALITY PLAN

REPORT REFERENCE	SUPPLIED DRAWING NUMBER		DRAWING NUMBER	REV.
FIGURE 1		A3	A8-114-25-01	B

2 Consideration of submissions

The referral of Development Application (261-8-2002-i MOD 2) resulted in DPE receiving six (6) submissions from NSW State agencies.

In accordance with section 4.55(1A) of the Environmental Planning and Assessment Act 1979, this RTS report provides considered responses to the issues raised in submissions received in relation to the Development Application (261-8-2002-i MOD 2).

The submissions received from NSW State agencies are summarised and tabulated in Table 2. Table 2 summarises details include the source of the submission and issues raised in the submission and the section of this RTS report where further details and the proponent's response to the submissions are set out.

Table 2 – Summary of NSW State Agency Submissions

DPE Reference	Agency	Issue raised	Report section
261-8-2002-i MOD 2	NSW Department of Industry - Crown Lands	There will be not be any impact on Crown land provided that the current road closing application made by the proponent is finalised.	section 3.1
261-8-2002-i MOD 2	NSW Department of Industry – Lands and Water	Update surface water and groundwater monitoring program to address the additional effluent irrigation areas	section 3.2
261-8-2002-i MOD 2	NSW Department of Primary Industries – NSW Agriculture	The approval makes reference that the development be conducted within relevant guidelines.	section 3.3
261-8-2002-i MOD 2	NSW Environment Protection Authority	Clarification of proposed effluent irrigation areas, manure application areas and terminal ponds and proposed amendments to development application conditions.	section 3.4
261-8-2002-i MOD 2	NSW Office of Environment and Heritage	Potential impacts on biodiversity from the additional manure application areas and further consultation with the local aboriginal community and an onsite archaeological survey of any areas where ground disturbing works are proposed.	section 3.5
261-8-2002-i MOD 2	NSW Transport, Roads and Maritime Services	The adequacy of the current intersection treatment for the expected traffic volumes / distributions for a typical ten year design horizon and road safety.	section 3.6

3 Response to submissions

Six (6) submissions were received by the DPE from NSW state agencies. The issues raised by the respective agencies are summarised in the following sections.

The state agency submissions have been addressed individually for each submission as they reflect specific issues related to the particular technical expertise of the agency.

3.1 NSW Department of Industry – Crown Lands

NSW Department of Industry – Crown Lands Division does not have any objections to Development Application (261-8-2002-i MOD 2) and recommended one issue be addressed as outlined in Table 3.

The NSW Department of Industry – Crown Lands comments have been reviewed and through consultation with Anthea Slack (NSW Department of Industry – Lands and Water Natural Resource Officer), the status of the current road closing application made by the proponent has been established. A response to matters raised by NSW Department of Industry – Crown Lands is provided in Table 3.

The NSW Department of Industry – Crown Lands submission and details of the proponent consultation with relevant agencies is provided in Annexure A.

Table 3 – NSW Department of Industry – Crown Lands – Submission and response

Issue / Recommendation	Response
There will be not be any impact on Crown land provided that the current road closing application made by the proponent is finalised.	Rangers Valley Cattle Station submitted an application to close several roads within their property in October 2000. This application was assigned road closing number W334340 and filed in AE01H359. These roads were advertised and approved for closure in 2002 but were never gazetted or transferred to Rangers Valley Cattle Station. In 2015 the application was re-investigated and the roads were re-advertised. The roads have since been re-approved for closure and now form part of the road disposal account number 550801 (Crown Lands reference - 17/01454). Rangers Valley Cattle Station have made payment for the relevant roads to be purchased. The Crown Land roads team have sent a transfer form to RVCS which has been executed and the transfer dealing stamped at Revenue NSW. The transfer and other dealings were lodged with Land Registry Services on June 6 2019. Consequently, the disposal account is nearly finalised with the final step being the issue of the certificate of titles for the relevant roads.

3.2 NSW Department of Industry – Lands and Water

The NSW Department of Industry – Lands and Water advised DPE that they have no objections to Development Application (261-8-2002-i MOD 2) and identified two issues for consideration post project determination as summarised in Table 4.

The NSW Department of Industry – Lands and Water detailed submission is provided in Annexure B. A response to matters raised by NSW Department of Industry – Lands and Water is provided in Table 4.

The NSW Department of Industry – Lands and Water comments have been reviewed and issues raised by the NSW Department of Industry – Lands and Water noted.

Table 4 – NSW Department of Industry – Land and Water – Submission and response

Issue / Recommendation	Response
Post approval: The surface water and groundwater monitoring program be updated to address the additional effluent irrigation areas. This should include the collection of baseline data and the development of triggers and contingency protocols.	**Noted:** Prior to application of effluent to the additional effluent irrigation areas the proponent will consult with the NSW Department of Industry – Land and Water and EPA to ensure that the surface water and groundwater monitoring program is updated to adequately reflect the risks these areas pose to groundwater and surface water sources and related users. In the event that the modification is approved, the proponent will submit an application to vary the current EPL to the EPA to reflect the broader project area and approved layout and any other changes required for the modified project.
Ensure the sediment basins and holding ponds meet the requirements of Clause 3 of Schedule 1 of the Water Management (General) Regulation 2018.	**Noted:** The proposed sediment basin and holding ponds meet the requirements of Clause 3 of Schedule 1 of the Water Management (General) Regulation 2018 as their design is consistent with best practice and they are sited within a controlled drainage area to prevent contamination of a water source. Consequently, these dams are excluded development from the Harvestable Rights requirements.

3.3 NSW Department of Primary Industries – NSW Agriculture

NSW Department of Industry – NSW Agriculture does not have any objections to Development Application (261-8-2002-i MOD 2) and have not identified any issues. However, NSW Department of Industry – NSW Agriculture recommend that the development be conducted in accordance with a number of guidelines as outlined in Table 5. A response to matters raised by NSW Agriculture is provided in Table 5.

The NSW Department of Primary Industries – NSW Agriculture submission is provided in Annexure C.

Table 5 – NSW Department of Primary Industries – NSW Agriculture – Submission and response

Issue / Recommendation	Response
DPI recommends that an approval makes reference that the development be conducted within the following guidelines:	
National Guidelines for Beef Cattle Feedlots in Australia SCARM report 47	**Noted**. Since the publication of the National Guidelines for Beef Cattle Feedlots in Australia SCARM report 47 (ARMCANZ, 2004), scientific knowledge, technology and community expectations have changed in relation to the environmental management of feedlots. ARMCANZ (2004) has been extensively revised into new editions with the most recent being the National Guidelines for Beef Cattle Feedlots in Australia – 3rd Edition (MLA, 2012a) and National Beef Cattle Feedlot Environmental Code of Practice – 2nd Edition (MLA, 2012b). Consequently, if any requirement of the ARMCANZ (2004) is relevant it will be applied to the environmental management of the feedlot.
National Guidelines for Beef Cattle Feedlots in Australia 3rd edition.	**Noted**. The broad framework of generally acceptable principles of the relevant guidelines including the companion document National Beef Cattle Feedlot Environmental Code of Practice (MLA, 2012b) will be applied to the establishment and operation of the feedlot.
Model Codes of Practice for the Welfare of Animals: Cattle	**Noted**. The requirements of the relevant code of practice will be applied to the welfare of cattle within the feedlot to which they apply.
Model Code of Practice for the Welfare of Animals: Land Transport of Cattle	**Noted**. The requirements of the relevant code of practice will be applied to the welfare of cattle during transport to which they apply.
Model Code of Practice for the Welfare of Animals: Animals at Saleyards	**Noted**. The requirements of the relevant code of practice will be applied to the welfare of cattle within saleyards to which they apply.
Tips & Tools: Heat load in feedlot cattle MLA October 2006	**Noted**. The requirements of the relevant guidelines will be applied to the management of heat load of cattle within the feedlot.
Beef cattle feedlots: design and construction MLA August 2016	**Noted**. The broad framework of generally acceptable principles of the relevant guidelines will be applied to the design and construction of the feedlot.

3.4 NSW Environment Protection Authority

NSW Environment Protection Authority (EPA) raised a number of matters with Development Application (261-8-2002-i MOD 2) as summarised in Table 6. EPA recommended that these matters be addressed prior to the application being referred to EPA for further review.

The EPA matters have been reviewed and through consultation with EPA's nominated development assessment officer Ms Rebecca Scrivener, the proponent has adequately addressed these concerns by way of detailed response for each matter. A summary response to matters raised by EPA is provided in Table 6. The detailed response to EPA concerns in relation to the application have been provided in the *"Response to EPA request for additional information in relation to Development Application 261-8-2002-i MOD 2 – Notice of Section 4.55(1A) – Modification to Rangers Valley Cattle Feedlot* report provided in Annexure D.

Table 6 – NSW Environment Protection Authority – Submission and response

Issue / Recommendation	Response
Odour	
The EPA has not recommended any general terms of approval for this aspect of the modification and relies on the current Project Approval and EPL conditions as they relate to odour.	**Noted.** Odour mitigation measures adopted include frequency of cleaning pens, stocking rates, the slope of the pen areas to promote rapid drying of pen surfaces and placement of treatment ponds away from drainage areas and nearby neighbours.
Surface Water and Effluent Management in Controlled Drainage Area	
The EPA has not recommended any general terms of approval for this aspect of the modification and relies on the current Project Approval and EPL conditions as they relate to surface water and effluent management in the controlled drainage area.	The proposed changes to sediment basins and holding ponds within the controlled drainage areas have been designed and shall be constructed in accordance with current industry guidelines and performance standards as identified in Table 5. The emergency wet weather manure storage areas will be located within the controlled drainage area and that any liquid generated from the storage areas will be captured within the controlled drainage area holding pond system.
Proposed Effluent Irrigation Areas, Manure Application Areas and Terminal Ponds	
The EPA notes the Hydrological Assessment provided in the appendices states that a tail water drain will be installed to the "south of the flood irrigation area". It is unclear where this flood irrigation area is.	**Noted**: The proponent shall only apply effluent to irrigation areas via spray, pivot or drip irrigation methods. The statement relating to tail water drain and reference to flood irrigation area on page 32 of the report Hydrological Assessment (Appendix D of Environmental Assessment - Rangers Valley Feedlot DA Modification, Report Number 24072.87581, EnviroAg Australia Pty Ltd, (2018)) is an error and should be deleted. There is no surface (flood) irrigation currently undertaken on Rangers Valley Cattle Station and no surface irrigation is proposed to be undertaken as a method of effluent application in the future. All effluent irrigation is and shall be applied by centre pivot or low pressure overhead spray methods.
The EA states that manure will be applied to improved pasture and cropping areas and not to timbered areas. The manure application areas	EnviroAg Australia Pty Ltd, (2018) states that manure will be applied to improved pasture and cropping areas and not to timbered areas. However, the scale at which Figure 7 within EnviroAg Australia Pty Ltd, (2018) was prepared shows a blanket covering over each paddock and the

identified on Figure 7 of the EA main document appears to be all fully timbered and on ridge lines or steeper country.	property level mapping scale is not sufficient to illustrate that the intended manure application area has been selected to avoid areas that are timbered, have unsuitable terrain and/or unsuitable soils. Consequently, a paddock scale plan of each proposed manure application paddock at an appropriate scale has been prepared that shows that the proposed manure application areas was identified based on consideration of native vegetation mapping (plant community types (PCT) and native grasslands), on-ground vegetation coverage, terrain and soil suitability factors (slope, rockiness) and buffers to sensitive receivers. Paddock scale plans of the proposed manure utilisation areas are provided in the detailed response report provided in Annexure D. Manure shall not be applied to fully timbered areas or on ridge lines or steeper country.
Proposed Amendments to Development Application Conditions	
The proponent is seeking to remove reference to collection of sigma theta and air temperature data at 10m which is currently specified in condition 4.2 of project approval 261-8-2002-i. The EPA does not support this proposed amendment as data collected in accordance with condition 4.2 will be used in future odour modelling and assessment, should the proponent proceed to Stage 2 of the development. Collection and use of on-site data in modelling is preferred to synthetic databases as this provides a more realistic and accurate prediction on potential impacts from activities at the site.	The proponent currently collects sigma theta data and air temperature at 10m from a 10m on-site automatic weather station in accordance with condition 4.2 of the current EPL licence. It is understood that these data would be used in any future odour modelling and impact assessment, should the proponent proceed to Stage 2 of the development (50,000 head). Therefore, it is proposed to continue collecting data in accordance with condition 4.2 of the current EPL licence.
If the modification is approved, the proponent will need to submit a licence variation application form to include any new monitoring or discharge points, including any additional soil quality monitoring sites. The EPA may also use the opportunity to update map references in the EPL as appropriate.	**Noted**. In the event that the modification is approved, the proponent will submit an application to vary the current EPL to reflect the broader project area and approved layout and any new monitoring or discharge points, including any additional soil quality monitoring sites and other changes required for the modified project as appropriate.

3.5 NSW Office of Environment and Heritage

NSW Office of Environment and Heritage (OEH) raised a number of matters with Development Application (261-8-2002-i MOD 2) as summarised in Table 7. OEH recommended that these matters be addressed prior to the application being referred to OEH for further review. The detailed OEH submission is provided in Annexure E.

The OEH matters in relation to biodiversity have been reviewed and through consultation with OEH's nominated development assessment officer Mr Krister Waern, the proponent has adequately addressed these concerns by way of detailed response report for biodiversity. A summary response to matters raised by OEH in relation to biodiversity is provided in Table 7 and the detailed response to OEH concerns in relation to biodiversity is contained with the BDAR report prepared by AREA Environmental Consultants & Communication Pty Ltd and is provided in Annexure E.1.

The OEH matters in relation to Aboriginal cultural heritage have been reviewed and through consultation with OEH's Mr Roger Mehr (Archaeologist), the proponent has adequately addressed these concerns by way of detailed response report for Aboriginal cultural heritage. A summary response to matters raised by OEH in relation to Aboriginal cultural heritage is provided in Table 7. A detailed response to OEH concerns in relation to Aboriginal cultural heritage is contained within the Aboriginal Heritage Assessment Review report prepared by Northern Tablelands Local Land Services and is provided in Appendix E.2.

Table 7 – NSW Office of Environment and Heritage – Submission and response

Issue / Recommendation	Response
Biodiversity Matters – These relate to the potential impacts on biodiversity from the additional manure application areas, which appear to be located within vegetated parts of the property, and the possibility of the vegetation to be affected forming part of an Endangered Ecological community, As the proposal is being assessed as State Significant Development, the application must be accompanied by a Biodiversity Development Assessment Report prepared by an accredited assessor.	A Biodiversity Development Assessment Report (BDAR) has been prepared by an accredited assessor and is provided in Annexure E.1. The BDAR has been prepared to meet the requirements of the Biodiversity Assessment Method (OEH 2017) and the *NSW Biodiversity Conservation Act 2017*. This has involved an assessment of the landscape values on the site and surrounding assessment area, the vegetation communities present and their condition relative to benchmark scores, and the known or potential presence of threatened flora or fauna species. The proposal area was selected to avoid impacts to remnant vegetation as much as possible. Despite this, the proposal would result in some loss of remnant vegetation and impacts are described in the BDAR along with measures to further avoid and mitigate potential impacts to biodiversity. The proposal area is generally within grassed, grazed or cropped land with some remnant trees. The native vegetation was mapped as PCT510 in all areas of native vegetation. Manure utilisation areas do not require vegetation removal and the effluent utilisation areas require removal of a 0.59 hectare patch of PCT510 and the removal of five living and five dead remnant paddock trees. Impact to native vegetation communities mapped as PCT510 requires offsetting of one ecosystem credit. Removal of the five living paddock trees requires offsetting with five ecosystem credits. PCT510 is an example of the Endangered Ecological Community -White Box Yellow Box Blakely's Red Gum Woodland. The BAMCC highlighted this community as a potential Serious and Irreversible Impact (SAII). The BDAR asserts given the size and type of impact proposed, it is not an SAII in this case. Nine threatened species were determined to have habitat within the proposal area and have a potential to be present in the proposal area. A species credit requirement has been generated for these species totalling 19 (plus that for one species which is to be confirmed by OEH). Two threatened species were identified by the BAMCC as potential SAII species. These are the Regent Honeyeater and the Eastern Cave Bat. The BDAR asserts given the size and type of impact proposed it is not an SAII for these species.
Aboriginal cultural heritage matters – The report should detail the level of assessment that has been	The level of assessment that has been undertaken to consider any aboriginal cultural heritage values that may be present on site has been provided to OEH in the form of a copy of the original Aboriginal Cultural Heritage Assessment Report (ACHAR) dated 2001 which informed the original approval.

undertaken to consider any aboriginal cultural heritage values that may be present on site and an Aboriginal Cultural Heritage Management Plan should be prepared if required.	OEH has reviewed the ACHAR (Archaeological Surveys & Reports Pty Ltd, 2001) and generally concur with the findings, although OEH noted that since the original assessment in 2001, the visible archaeological signature with the development area may have been altered by taphonomic processes. Consequently, OEH in correspondence dated 23 October 2018 (Appendix E.2) recommended further consultation with the local aboriginal community and an onsite archaeological survey of any areas where ground disturbing works are proposed prior to any final approval given the timespan since the original survey was carried out.
Further consultation with the local Aboriginal community is carried out to ensure that the current community understanding is consistent with that at the time of the ACHAR being prepared.	Further consultation with the local Aboriginal community being the Glen Innes Local Aboriginal Land Council (GILALC) was undertaken. GILALC advised that the area of the proposed ground disturbing works is of no cultural significance to the Aboriginal community of Glen Innes. The level of consultation and correspondence from GILALC is provided in the detailed response report provide in Annexure E.2.
An on-site archaeological survey of the areas where ground disturbing works are proposed is carried out prior to any final approval. This will ensure that any unexpected Aboriginal objects that may be present are treated in a scientifically and culturally appropriate manner.	An on-site archaeological survey of the areas where ground disturbing works are proposed was carried out in November 2018 by Mr Tony Sonter (Archaeologist), Mr Jaydyn Potter (CEO – Glen Innes Local Aboriginal Land Council, Aboriginal Field Officer) and Mr Harry White (Senior Land Services Officer, Aboriginal Communities northern Tablelands Local Land Services). The on-site survey followed a robust procedure and found no evidence of objects of Aboriginal cultural heritage within the areas where ground disturbing works are proposed that would preclude the commencement of work on this project. The areas where ground disturbing works are proposed have in the past experienced ploughing; construction of rural infrastructure such as dams, fences, roads, earthworks; substantial grazing and involved clearing of vegetation. The on-site survey noted that the finding of any Aboriginal cultural heritage items particularly stone artefacts, would be extremely unlikely and if so, would be by chance encounter. Consequently, a Chance Find procedure for items of Aboriginal cultural heritage shall be included in the Construction Environmental Management Plan. Further details on the on-site archaeological survey undertaken is provided in the detailed response report provided in Annexure E.2.

3.6 NSW Roads and Maritime Services

NSW Roads and Maritime Services does not have any objections to Development Application (261-8-2002-i MOD 2). However, RMS raised a number of comments with the application as summarised in Table 8.

The RMS comments have been reviewed and through consultation with RMS nominated development assessment officer Mr Greg Sciffer, the proponent has adequately addressed these concerns by way of detailed response report. A summary response to matters raised by RMS is provided in Table 8. The detailed response to RMS comments in relation to the application have been provided in the *"Response to RMS request for additional information in relation to Development Application 261-8-2002-i MOD 2 – Notice of Section 4.55(1A) – Modification to Rangers Valley Cattle Feedlot* report provided in Annexure F.

Table 8 – NSW Roads and Maritime Services – Submission and response

Issue / Recommendation	Response
The Environmental Assessment (EA) for the modification did not include an updated traffic impact assessment and it is unclear if the current intersection treatment is adequate for the expected traffic volumes / distributions for a typical ten year design horizon.	An updated draft Traffic Impact Assessment (TIA) has been prepared and submitted to RMS for review. The TIA demonstrates that the current intersection treatment is adequate for the expected traffic volumes / distributions for a typical ten year design horizon. All concerns raised by Greg Sciffer in review of the draft TIA have been addressed and a final TIA is provided in Annexure F.
New England Highway / Rangers Valley Road junction is showing signs of pavement failure due to heavy vehicle turning movements. The junction pavement should be reconstructed / upgraded to reduce maintenance requirements and improve road safety.	An updated draft Traffic Impact Assessment (TIA) has been prepared and submitted to RMS for review. The TIA illustrates that the current pavement condition of the New England Highway and Rangers Valley Road Tintersection is showing signs of pavement breakup in the throat of the intersection due to heavy vehicle turning movements. The southern turn radius pavement is in a worse condition than the northern turn radius pavement as the majority of heavy vehicles enter Rangers Valley Road from the south. The exact cause of the failure of the pavement is not known but possible causes are that the pavement is not carrying the load or vehicles are turning too quickly. Consequently, to improve the safety of the intersection, maintenance is required on the throat of the intersection by the relevant authority. All concerns raised by Greg Sciffer in review of the draft TIA have been addressed and a final TIA is provided in Annexure F.
The modification proposes additional turning movements during night time hours. Truck (crossing or entering) signs (W5-22) could be installed on the New England Highway on each approach to the junction in accordance with AS1742.2 Clause 4.11.2.5 to warn motorists and improve road safety.	To further improve road safety at the intersection of Rangers Valley Road and the New England Highway, additional safety measures are proposed due to the number of heavy vehicle turning movements and the additional turning movements proposed during night time hours. It is proposed to install Truck (crossing or entering) signs (W5-22) size B (750 mm x 750 mm) on the New England Highway on each approach to the junction in accordance with AS1742.2 Clause 4.11.2.5 to warn motorists and improve road safety.
It is recommended that developers familiarise themselves with the requirements of the Works Authorisation Deed (WAD) process for any works deemed necessary on the classified (State) road.	**Noted.** Any works on the classified (State) road shall be designed and constructed in accordance with the current Austroads Guidelines, Australian Standards and Roads and Maritime supplements. The proponent will enter into a WAD with RMS for any works deemed necessary on the classified (State) road and be responsible for all costs associated with the works and administration for the WAD.

4 Conclusion

The proponent has reviewed the key issues raised in all the state agency submissions received and considered them in the context of the existing environmental assessment, proponent commitments and the existing requirements under the Development Consent (DA-261-8-2002-i) (DIPNR, 2004).

This RTS report together with the Rangers Valley Feedlot DA modification – Environmental Assessment report (EnviroAg Australia Pty Limited, 2018), demonstrates that the proposed modification to Rangers Valley Feedlot development consent can be developed responsibly with acceptable levels of impact subject to appropriate management of those impacts.

The proponent believes that this RTS report has adequately addressed all of the issues raised in the six (6) submissions received to enable the Department of Planning to complete its assessment and determination of the Proposal.

The proponent's commitments contained within the Environmental Assessment report, together with the commitments contained in the responses in this RTS report will ensure that the proposed changes to the development can be constructed and operated with minimal impact to the existing environment.

5 References

Archaeological Surveys & Reports Pty Ltd, 2001, Archaeological Investigation Report, Rangers Valley Feedlot, Archaeological Surveys & Reports Pty Ltd – September 2001, Armidale.

AREA Environmental Consultants & Communication Pty Ltd, 2019, Biodiversity Development Assessment Report, Rangers Valley Feedlot, Proposed manure and effluent utilisation areas, AREA Environmental Consultants & Communication Pty Ltd, Dubbo, NSW.

ARMCANZ, 2004, National guidelines for beef cattle feedlots in Australia, 2nd Edn, SCARM Report 47, Agricultural and Resource Management Council of Australia and New Zealand, Standing Committee on Agriculture and Resource Management, CSIRO Publishing, Collingwood, VIC.

Department of Infrastructure, Planning and Natural Resources (DIPNR), 2004, Ministerial Consent - Integrated DA No. DA-261-8-2002-i, NSW Government Department of Infrastructure, Planning and Natural Resources.

EA Systems, 2002, Environmental Impact Statement, Feedlot Expansion, Rangers Valley Cattle Station, EA Systems, Armidale, NSW.

EnviroAg Australia Pty Limited, 2018, Environmental Assessment - Rangers Valley Feedlot DA Modification, Rangers Valley Cattle Station, EnviroAg Australia Pty Limited, Armidale, NSW.

Meat and Livestock Australia, 2012a, National Guidelines for Beef Cattle Feedlots in Australia 3rd Edition, Meat & Livestock Australia, North Sydney, NSW.

Meat and Livestock Australia, 2012b, National Beef Cattle Feedlot Environmental Code of Practice 2nd Edition, Meat & Livestock Australia, North Sydney, NSW.

Northern Tablelands Local Land Services, 2018, Aboriginal Heritage Assessment Review Proposed cattle feedlot expansion Rangers Valley Cattle Station Pty Ltd, Inverell, NSW.

RDC Engineers Pty Ltd, 2019, Response to EPA request for additional information in relation to Development Application 261-8-2002-i MOD 2 - Notice of Section 4.55(1A) - Modification to Rangers Valley Cattle Feedlot, Rangers Valley Road, Glen Innes, A8-114C, V1R2 RDC Engineers Pty Ltd, Toowoomba, QLD, 4350.

RDC Engineers Pty Ltd, 2018, Response to RMS request for additional information in relation to Development Application 261-8-2002-i MOD 2 - Notice of Section 4.55(1A) - Modification to Rangers Valley Cattle Feedlot, Rangers Valley Road, Glen Innes, A8-114A, V1R3 RDC Engineers Pty Ltd, Toowoomba, QLD, 4350.

Watts, PJ, Davis, RJ, Keane, OB, Luttrell, MM, Tucker, RW, Stafford, RD and Janke, S, 2016, Beef Cattle Feedlots: Design and Construction Manual, *Meat and Livestock Australia*, Sydney.

Annexure A – NSW Department of Industry – Crown Lands – Submission and consultation

From:	elizabeth.currey@crownland.nsw.gov.au
To:	Shaun Williams
Subject:	Fwd: Notification - Rangers Valley Cattle Feedlot s4.55(1A) Modification - DA 261-8-2002-i MOD 2
Date:	Monday, 27 August 2018 10:02:25 AM
Attachments:	Rangers Valley Modification - Notification Letter - DPI.PDF

Good morning

There will be any impact on Crown land provided that the current road closing application made by the proponent is finalised.

Kind regards, Lizzy
Lands Ministerial Unit
NSW Department of Industry - Crown Lands
Level 4, 437 Hunter Street, NEWCASTLE NSW 2300
E: lands.ministerials@industry.nsw.gov.au W: www.industry.nsw.gov.au

Please contact Elizabeth Currey (M,T,W) on (02) 4920 5067 and contact Kirstyn Goulding (Th,F) on (02) 4920 5058 for any inquiries

---------- Forwarded message ---------
From: **Landuse Enquiries** <landuse.enquiries@dpi.nsw.gov.au>
Date: Tue, Aug 14, 2018 at 2:31 PM
Subject: Fwd: Notification - Rangers Valley Cattle Feedlot s4.55(1A) Modification - DA 261-8-2002-i MOD 2
To: Water Referrals <water.referrals@dpi.nsw.gov.au>, Landuse Ag <landuse.ag@dpi.nsw.gov.au>, Lands Ministerials <lands.ministerials@industry.nsw.gov.au>, AHP Central <ahp.central@dpi.nsw.gov.au>
Cc: Landuse Minerals <landuse.minerals@planning.nsw.gov.au>

For you direct response to DPE.

---------- Forwarded message ---------
From: **Shaun Williams** <Shaun.Williams@planning.nsw.gov.au>
Date: Fri, 10 Aug 2018 15:21
Subject: Notification - Rangers Valley Cattle Feedlot s4.55(1A) Modification - DA 261-8-2002-i MOD 2
To: Adam Oehlman <landuse.enquiries@dpi.nsw.gov.au>

Good afternoon,

The Department has received modification application DA 261-8-2002-i MOD 2, from EnviroAg Australia Pty Ltd on behalf of Rangers Valley Cattle Station. The modification application relates to the Rangers Valley Cattle Feedlot at Glen Innes in the Glen Innes Severn Local Government Area (LGA). The modification application has been made pursuant to section 4.55(1a) of the *Environmental Planning and Assessment Act 1979*.

Please see the attached notification letter of the modification application for more details. I would appreciate it if you could review the documentation and send me your agencies submissions for the assessment by **COB 24 August 2018**.

The proposed modification application and associated documents are available on the Department's website at:

http://www.majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=9521

Please contact me on the details below if you have any enquiries.

Regards,

Shaun Williams

Planning Officer

Industry Assessments

320 Pitt Street | GPO Box 39 | Sydney NSW 2001
T 02 8275 1345 | **E** shaun.williams@planning.nsw.gov.au


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--

Regards

Simon

Simon Francis I Senior Policy Officer - Cabinet and Legislation Services

NSW Department of Industry I Lands & Water I Strategy and Policy

E: landuse.enquiries@dpi.nsw.gov.au

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rod.davis@rdcengineers.com.au

From: Megan McCullough <megan.mccullough@crownland.nsw.gov.au>
Sent: Thursday, 13 June 2019 11:03 AM
To: rod.davis@rdcengineers.com.au
Subject: Rangers Valley Cattle Station - Crown road purchase

Hi Rod

I have checked with our Status Branch and they lodged the transfer and other dealings on 6 June 2019. Land Registry Services indicate that minimum response is 10 working days, however, from experience it may be longer. Once I receive any notice I will let you know.

Megan

Megan McCullough| Business Services Officer - Business Centre, Roads NSW Trade & Investment
144 Fitzroy Street Grafton NSW 2460| PO Box 2215 DANGAR NSW 2309
T: 02 6640 3928 | F: 02 6640 3995 |E: megan.mccullough@crownlands.nsw.gov.au W: www.industry.nsw.gov.au/lands

*** PLEASE NOTE THAT MY E-MAIL ADDRESS HAS CHANGED - PLEASE UPDATE YOUR ADDRESS BOOK TO megan.mccullough@crownland.nsw.gov.au**

rod.davis@rdcengineers.com.au

From: Megan McCullough <megan.mccullough@crownland.nsw.gov.au>
Sent: Friday, 22 March 2019 12:39 PM
To: rod.davis@rdcengineers.com.au; tudora@rangersvalley.com.au
Subject: Re: FW: Rangers Valley Cattle Station Road Purchase - Followup

Hi Rod

Annabelle asked me yo give you an update on Crown road transfer. The transfer dealing has been stamped at Revenue NSW and once I receive it I will lodge the dealing with Land Registry Services. I advise you when the land is registered to Rangers Valley Cattle Station.

Regards

Megan

Megan McCullough| Business Services Officer - Business Centre, Roads NSW Trade & Investment
144 Fitzroy Street Grafton NSW 2460| PO Box 2215 DANGAR NSW 2309
T: 02 6640 3928 | F: 02 6640 3995 |E: megan.mccullough@crownlands.nsw.gov.au W: www.industry.nsw.gov.au/lands

*** PLEASE NOTE THAT MY E-MAIL ADDRESS HAS CHANGED - PLEASE UPDATE YOUR ADDRESS BOOK TO megan.mccullough@crownland.nsw.gov.au**

On Thu, 21 Feb 2019 at 09:27, <rod.davis@rdcengineers.com.au> wrote:

> Good Morning Megan,
>
> I wish to follow up on progress of the closure of roads for Rangers Valley Cattle Station as per email trail below.
>
> Could you please provide an update.
>
> Thanks and regards,
>
> **Rod Davis**
>
> Director
>
> —
>
> 0427629203

rod.davis@rdcengineers.com.au

RDC ENGINEERS | AGRICULTURAL ENVIRONMENTAL PROJECT MANAGEMENT

From: Anthea Slack <anthea.slack@crownland.nsw.gov.au>
Sent: Wednesday, 21 November 2018 1:55 PM
To: rod.davis@rdcengineers.com.au
Subject: Re: Rangers Valley Cattle Station Road Purchase - Followup

Hi Rod,

I just spoke to Megan who is the relevant roads action officer for this road closure. She said they are still having trouble issuing the transfer forms as a result of the new Crown lands legislation. They're working on resolving the issue at the moment and she said that the RVCS application will be one of the first to be processed when they are able to start issuing transfer forms again given the current development application.

Megan can be contacted on (02) 6640 3928 if you require any further information .

Sorry I couldn't be of more help,

Anthea Slack I Natural Resource Officer

NSW Department of Industry - Lands & Water

TAFE Armidale | K Block | Allingham Street | Armidale | NSW 2350
PO Box 2185 | Dangar | NSW 2309

T: (02) 6770 3139 | F: (02) 6770 3199 | E: anthea.slack@crownland.nsw.gov.au

E: armidale.crownlands@crownland.nsw.gov.au

W: www.industry.nsw.gov.au/lands

On Mon, Nov 19, 2018 at 9:05 AM Anthea Slack <anthea.slack@crownland.nsw.gov.au> wrote:

> Hi Rod,
>
> Sorry it's taken so long to get back to you, I was out in the field all of last week so just catching up on emails now. I have sent an email to the relevant officer in the roads team asking for an update so will let you know as soon as I hear back from her.
>
> Kind regards,
>
> **Anthea Slack** I Natural Resource Officer
>
> **NSW Department of Industry - Lands & Water**
>
> TAFE Armidale | K Block | Allingham Street | Armidale | NSW 2350
> PO Box 2185 | Dangar | NSW 2309
>
> T: (02) 6770 3139 | F: (02) 6770 3199 | E: anthea.slack@crownland.nsw.gov.au
>
> E: armidale.crownlands@crownland.nsw.gov.au
>
> W: www.industry.nsw.gov.au/lands

On Thu, Nov 15, 2018 at 2:34 PM <rod.davis@rdcengineers.com.au> wrote:

> Hi Anthea,
>
> I am following up on the transfer form to RVCS for the road closures – Could you please advise if the Crown land roads team has forwarded a transfer form to RVCS ?.
>
> Regards,

Rod Davis

Director

—

0427629203

rod.davis@rdcengineers.com.au

From: Anthea Slack <anthea.slack@crownland.nsw.gov.au>
Sent: Wednesday, 17 October 2018 2:22 PM
To: rod.davis@rdcengineers.com.au
Subject: Fwd: Rangers Valley Cattle Station Road Purchase

Hi Rod,

I've done a bit of digging following our conversation and have provided a very brief overview below of what I understand has happened.

It seems that Rangers Valley Cattle Station (RVCS) submitted an application to close several roads within their property in October 2000. This application was assigned road closing number W334340 and filed in AE01H359 (the reference number that you have). These roads were advertised and approved for closure in 2002 but were never gazetted or transferred to RVCS.

In 2015 the application was re-investigated and the roads were re-advertised. The roads have since been re-approved for closure and now form part of the road disposal account number 550801 (our reference - 17/01454). Those roads to be sold as part of this disposal account are highlighted in the attached map.

As I mentioned on the phone, this disposal account is nearly finalised with the final step being the issue of the certificate of titles for the relevant roads. If all goes to plan, the Crown land roads team will send a transfer form to RVCS in the coming weeks. Once this is signed, the certificate of title for the lots can be issued to RVCS and the process will be finalised.

I hope this helps to clarify everything but please let me know if I can assist further.

Kind regards,

Anthea Slack I Natural Resource Officer

NSW Department of Industry - Lands & Water

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E: armidale.crownlands@crownland.nsw.gov.au

W: www.industry.nsw.gov.au/lands

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rod.davis@rdcengineers.com.au

From: Anthea Slack <anthea.slack@crownland.nsw.gov.au>
Sent: Thursday, 21 February 2019 8:23 AM
To: rod.davis@rdcengineers.com.au
Subject: Re: FW: Rangers Valley Cattle Station Road Purchase - Followup

Hi Rod,

It is megan.mccullough@crownland.nsw.gov.au.

Kind regards,

Anthea Slack I Natural Resource Officer
NSW Department of Industry - Lands & Water
TAFE Armidale | K Block | Allingham Street | Armidale | NSW 2350
PO Box 2185 | Dangar | NSW 2309
T: (02) 6770 3139 | F: (02) 6770 3199 | E: anthea.slack@crownland.nsw.gov.au
E: armidale.crownlands@crownland.nsw.gov.au
W: www.industry.nsw.gov.au/lands

On Thu, Feb 21, 2019 at 9:20 AM <rod.davis@rdcengineers.com.au> wrote:

> Hi Anthea
>
> I am trying to contact Megan as outlined below re Rangers Valley transfer forms – do you have an current email address for Megan?.
>
> Regards,
>
> **Rod Davis**
>
> Director
>
> —
>
> 0427629203
>
> rod.davis@rdcengineers.com.au

RDC ENGINEERS | AGRICULTURAL ENVIRONMENTAL PROJECT MANAGEMENT

From: rod.davis@rdcengineers.com.au <rod.davis@rdcengineers.com.au>
Sent: Wednesday, 21 November 2018 2:11 PM
To: 'Anthea Slack' <anthea.slack@crownland.nsw.gov.au>
Subject: RE: Rangers Valley Cattle Station Road Purchase - Followup

Thanks Anthea

I appreciated the followup.

Regards,

Rod Davis

Director

—

0427629203

rod.davis@rdcengineers.com.au

RDC ENGINEERS | AGRICULTURAL ENVIRONMENTAL PROJECT MANAGEMENT

From: Anthea Slack <anthea.slack@crownland.nsw.gov.au>
Sent: Wednesday, 21 November 2018 1:55 PM
To: rod.davis@rdcengineers.com.au
Subject: Re: Rangers Valley Cattle Station Road Purchase - Followup

Hi Rod,

I just spoke to Megan who is the relevant roads action officer for this road closure. She said they are still having trouble issuing the transfer forms as a result of the new Crown lands legislation. They're working on resolving the issue at the moment and she said that the RVCS application will be one of the first to be processed when they are able to start issuing transfer forms again given the current development application.

Megan can be contacted on (02) 6640 3928 if you require any further information .

Sorry I couldn't be of more help,

Anthea Slack I Natural Resource Officer

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E: armidale.crownlands@crownland.nsw.gov.au

W: www.industry.nsw.gov.au/lands

On Mon, Nov 19, 2018 at 9:05 AM Anthea Slack <anthea.slack@crownland.nsw.gov.au> wrote:

> Hi Rod,
>
> Sorry it's taken so long to get back to you, I was out in the field all of last week so just catching up on emails now. I have sent an email to the relevant officer in the roads team asking for an update so will let you know as soon as I hear back from her.
>
> Kind regards,
>
> **Anthea Slack** I Natural Resource Officer

NSW Department of Industry - Lands & Water

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E: armidale.crownlands@crownland.nsw.gov.au

W: www.industry.nsw.gov.au/lands

On Thu, Nov 15, 2018 at 2:34 PM <rod.davis@rdcengineers.com.au> wrote:

> Hi Anthea,
>
> I am following up on the transfer form to RVCS for the road closures – Could you please advise if the Crown land roads team has forwarded a transfer form to RVCS ?.
>
> Regards,
>
> **Rod Davis**
>
> Director
>
> —
>
> 0427629203
>
> rod.davis@rdcengineers.com.au
>
> **From:** Anthea Slack <anthea.slack@crownland.nsw.gov.au>
> **Sent:** Wednesday, 17 October 2018 2:22 PM
> **To:** rod.davis@rdcengineers.com.au
> **Subject:** Fwd: Rangers Valley Cattle Station Road Purchase

Hi Rod,

I've done a bit of digging following our conversation and have provided a very brief overview below of what I understand has happened.

It seems that Rangers Valley Cattle Station (RVCS) submitted an application to close several roads within their property in October 2000. This application was assigned road closing number W334340 and filed in AE01H359 (the reference number that you have). These roads were advertised and approved for closure in 2002 but were never gazetted or transferred to RVCS.

In 2015 the application was re-investigated and the roads were re-advertised. The roads have since been re-approved for closure and now form part of the road disposal account number 550801 (our reference - 17/01454). Those roads to be sold as part of this disposal account are highlighted in the attached map.

As I mentioned on the phone, this disposal account is nearly finalised with the final step being the issue of the certificate of titles for the relevant roads. If all goes to plan, the Crown land roads team will send a transfer form to RVCS in the coming weeks. Once this is signed, the certificate of title for the lots can be issued to RVCS and the process will be finalised.

I hope this helps to clarify everything but please let me know if I can assist further.

Kind regards,

Anthea Slack I Natural Resource Officer

NSW Department of Industry - Lands & Water

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E: armidale.crownlands@crownland.nsw.gov.au

W: www.industry.nsw.gov.au/lands

rod.davis@rdcengineers.com.au

From: Anthea Slack <anthea.slack@crownland.nsw.gov.au>
Sent: Wednesday, 17 October 2018 2:47 PM
To: rod.davis@rdcengineers.com.au
Subject: Re: Rangers Valley Cattle Station Road Purchase
Attachments: image001.png

Hi Rod,

Payment has been received for the roads.

Thanks,

Anthea Slack I Natural Resource Officer

NSW Department of Industry - Lands & Water
TAFE Armidale | K Block | Allingham Street | Armidale | NSW 2350
PO Box 2185 | Dangar | NSW 2309
T: (02) 6770 3139 | F: (02) 6770 3199 | E: anthea.slack@crownland.nsw.gov.au
E: armidale.crownlands@crownland.nsw.gov.au
W: www.industry.nsw.gov.au/lands

On Wed, Oct 17, 2018 at 3:30 PM <rod.davis@rdcengineers.com.au> wrote:

> Thankyou Anthea,
>
> That is great news.
>
> Has RVCS purchased the land or is this still to undertaken?
>
> Regards,
>
> **Rod Davis**
>
> Director
>
> —
>
> 0427629203

rod.davis@rdcengineers.com.au

From: Anthea Slack <anthea.slack@crownland.nsw.gov.au>
Sent: Wednesday, 17 October 2018 2:22 PM
To: rod.davis@rdcengineers.com.au
Subject: Fwd: Rangers Valley Cattle Station Road Purchase

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I hope this helps to clarify everything but please let me know if I can assist further.

Kind regards,

Anthea Slack I Natural Resource Officer

NSW Department of Industry - Lands & Water

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rod.davis@rdcengineers.com.au

From: Anthea Slack <anthea.slack@crownland.nsw.gov.au>
Sent: Wednesday, 17 October 2018 2:22 PM
To: rod.davis@rdcengineers.com.au
Subject: Fwd: Rangers Valley Cattle Station Road Purchase
Attachments: Diagram C2 - Rangers ValleyRoad Purchace Plan.jpg

Hi Rod,

I've done a bit of digging following our conversation and have provided a very brief overview below of what I understand has happened.

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Kind regards,

Anthea Slack I Natural Resource Officer

NSW Department of Industry - Lands & Water
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PO Box 2185 | Dangar | NSW 2309
T: (02) 6770 3139 | F: (02) 6770 3199 | E: anthea.slack@crownland.nsw.gov.au
E: armidale.crownlands@crownland.nsw.gov.au
W: www.industry.nsw.gov.au/lands

Annexure B – NSW Department of Industry – Lands and Water Division – Submission

Department of Industry

OUT18/15559

Shaun Williams
Planning Officer
Industry Assessments
NSW Department of Planning and Environment

shaun.williams@planning.nsw.gov.au

Dear Mr Williams

Rangers Valley Cattle Feedlot Project (DA 261-8-2002-I MOD 2) - Modification 2
EIS Exhibition

I refer to your email of 10 August 2018 to the Department of Industry (DoI) in respect to the above matter. Comment has been already forwarded to you separately from several branches of Lands & Water and Department of Primary Industries. This response includes the outstanding DoI - Water comments.

Any further referrals to Department of Industry can be sent by email to landuse.enquiries@dpi.nsw.gov.au.

The department provides the following recommendations for consideration in assessment of the proposal. Comments to support these recommendations are provided in **Attachment A.**

Recommendations post project determination

Should the project be approved, the Department recommends the following be provided:

- The surface water and groundwater monitoring program be updated to address the additional effluent irrigation areas. This should include the collection of baseline data and the development of triggers and contingency protocols.
- Ensure the sediment basins and holding ponds meet the requirements of Clause 3 of Schedule 1 of the Water Management (General) Regulation 2018.

Yours sincerely

Alison Collaros
A/Manager, Assessment Advice
Lands and Water - Strategy and Policy
9 October 2018

ATTACHMENT A

Rangers Valley Cattle Feedlot Project (DA 261-8-2002-I MOD 2) - Modification 2
EIS Exhibition

Water Resources

- The new effluent irrigation areas pose the highest risk to groundwater and surface water sources and related users. The existing groundwater and surface water monitoring program should be reviewed and expanded to address these additional areas.
- Based on the Department's database it is noted the existing groundwater monitoring network consists of shallow bores, generally around 6m in depth which have not encountered groundwater. Ensuring there are adequate bores to enable sampling of the groundwater is recommended.
- It is noted the proposal has included a redesign of the sediment basins and holding ponds. The Department advises that for these dams to be excluded from the Harvestable Rights requirements they need to be designed to address the requirements of Clause 3 of Schedule 1 of the Water Management (General) Regulation 2018. This includes the need to be consistent with best practice and being for the sole purpose of preventing contamination of a water source.

END ATTACHMENT A

Annexure C – NSW Department of Primary Industries – NSW Agriculture - Submission

From: Andrew Scott
To: Landuse Ag; Shaun Williams
Subject: Re: Notification - Rangers Valley Cattle Feedlot s4.55(1A) Modification - DA 261-8-2002-i MOD 2
Date: Friday, 24 August 2018 5:00:06 PM

Hi Shaun,
Thank you for forwarding the Rangers Valley Feedlot Mod 2 for review and advice.
There have not been any issues identified.
DPI recommends that an approval makes reference that the development be conducted within the following guidelines:

National Guidelines for Beef Cattle Feedlots in Australia SCARM report 47
National Guidelines for Beef Cattle Feedlots in Australia 3rd edition.
Model Codes of Practice for the Welfare of Animals: Cattle
Model Code of Practice for the Welfare of Animals: Land Transport of Cattle
Model Code of Practice for the Welfare of Animals: Animals at Saleyards
Tips & Tools: Heat load in feedlot cattle MLA October 2006
Beef cattle feedlots: design and construction MLA August 2016

If you have any questions don't hesitate to make contact
Regards,
Andrew

Andrew Scott | Resource Management Northwest (Barwon) Region
| NSW Department of Primary Industries | NSW Agriculture
Tamworth Agricultural Institute |
4 Marsden Park Road | Calala | NSW 2340
T: 02 6763 1142 | M: 0427 245 313 |
E: andrew.scott@industry.nsw.gov.au
W: www.industry.nsw.gov.au | www.dpi.nsw.gov.au

"Plan- Resource -Grow"

Building thriving,sustainable Agriculture for tomorrow's communities

Primary Industries land use planning information and guidelines are available at:
http://www.dpi.nsw.gov.au/agriculture/resources/lup

On 15 August 2018 at 10:52, Landuse Ag <landuse.ag@dpi.nsw.gov.au> wrote:

> Hi Andy
>
> Sending through for your response if required.
>
> I have entered this onto the correspondence register but haven't saved into CM9.
>
> Thanks,
> Carolyn
>
> Agriculture Landuse Planning | Education and Regional Services
> DPI Agriculture | Department of Primary Industries
> C/- 161 Kite Street | Locked Bag 21 | Orange NSW 2800

T: 02 6391 3391 | F: 02 6391 3543 | E: landuse.ag@dpi.nsw.gov.au
www.trade.nsw.gov.au | www.dpi.nsw.gov.au

Primary Contact: Lilian Parker
E mail: lilian.parker@dpi.nsw.gov.au

---------- Forwarded message ----------
From: **Landuse Enquiries** <landuse.enquiries@dpi.nsw.gov.au>
Date: Tue, Aug 14, 2018 at 2:30 PM
Subject: Fwd: Notification - Rangers Valley Cattle Feedlot s4.55(1A) Modification - DA 261-8-2002-i MOD 2
To: Water Referrals <water.referrals@dpi.nsw.gov.au>, Landuse Ag <landuse.ag@dpi.nsw.gov.au>, Lands Ministerials <lands.ministerials@industry.nsw.gov.au>, AHP Central <ahp.central@dpi.nsw.gov.au>
Cc: Landuse Minerals <landuse.minerals@planning.nsw.gov.au>

For you direct response to DPE.

---------- Forwarded message ---------
From: **Shaun Williams** <Shaun.Williams@planning.nsw.gov.au>
Date: Fri, 10 Aug 2018 at 15:21
Subject: Notification - Rangers Valley Cattle Feedlot s4.55(1A) Modification - DA 261-8-2002-i MOD 2
To: Adam Oehlman <landuse.enquiries@dpi.nsw.gov.au>

Good afternoon,

The Department has received modification application DA 261-8-2002-i MOD 2, from EnviroAg Australia Pty Ltd on behalf of Rangers Valley Cattle Station. The modification application relates to the Rangers Valley Cattle Feedlot at Glen Innes in the Glen Innes Severn Local Government Area (LGA). The modification application has been made pursuant to section 4.55(1a) of the *Environmental Planning and Assessment Act 1979*.

Please see the attached notification letter of the modification application for more details. I would appreciate it if you could review the documentation and send me your agencies submissions for the assessment by **COB 24 August 2018**.

The proposed modification application and associated documents are available on the Department's website at:

http://www.majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=9521

Please contact me on the details below if you have any enquiries.

Regards,

Shaun Williams

Planning Officer

Industry Assessments

320 Pitt Street | GPO Box 39 | Sydney NSW 2001
T 02 8275 1345 | **E** shaun.williams@planning.nsw.gov.au

 Subscribe to our newsletter

--

Regards

Simon

Simon Francis I Senior Policy Officer - Cabinet and Legislation Services

NSW Department of Industry I Lands & Water I Strategy and Policy

E: landuse.enquiries@dpi.nsw.gov.au

This message is intended for the addressee named and may contain confidential information. If you are not the intended recipient, please delete it and notify the sender. Views expressed in this message are those of the individual sender, and are not

Annexure D – NSW Environment Protection Authority – Submission and response

Our reference: : SF15/32773; DOC18/636092
Contact: : Rebecca Scrivener – 02 6773 7000 – armidale@epa.nsw.gov.au
Date : 03 September 2018

Mr Shaun Williams
Industry Assessments
GPO Box 39
SYDNEY NSW 2001

Email: shaun.williams@planning.nsw.gov.au **BY EMAIL**

Dear Mr Williams,

RE: RANGERS VALLEY CATTLE FEEDLOT s4.55(1A) MODIFICATION - DA 261-8-2002-i MOD 2

I refer to your email of 10 August 2018 seeking our review and comments on the proposed modification to Rangers Valley Cattle Feedlot located in Glen Innes Severn Shire Council area. The Environment Protection Authority (EPA) appreciates the extension to complete our review.

The EPA notes the proposed modification seeks the following:

1. Allow for configuration changes to the layout and staging of pens proposed for the remaining forward stages of the feedlot
2. Incorporate an emergency wet weather manure storage area, within the existing footprint of the feedlot
3. Increase the traffic movement hours
4. Alter both the effluent and manure utilisation areas
5. Modify some consent conditions to align with Environment Protection Licence #3864, feedlot and farm operations

The EPA has reviewed the supporting documentation titled, '*Environmental Assessment - Rangers Valley Feedlot DA Modification, Report Number 24072.87581',* dated 23 July 2018 and prepared by EnviroAg Australia (the EA). The EPA also reviewed previous assessment reports prepared by the Department of Planning and Environment dated November 2003 and December 2009 for previous modifications to Project Approval 261-8-2002-i.

I note the current operating capacity of the feedlot is 30,000 head and has approval hold up to a maximum of 40,000 head as per Stage 1 of Project Approval 261-8-2002-i. The proponent does not intend to progress with Stage 2 of the development, being to increase capacity to 50,000 head, at this point in time.

Odour

Odour was one of the key issues considered in determining the expansion of the Rangers Valley Feedlot as a two-staged project in 2003/04.

In reviewing the current modification, the EPA defers to the odour impact assessment carried out for the 2003/04 determination as there was no revised odour assessment provided with the current modification.

Email: armidale@epa.nsw.gov.au
PO Box 494 Armidale NSW 2350
85 Faulkner Street, Armidale NSW 2350
Tel: (02) 6773 7000 Fax: (02) 6772 2336
ABN 30 841 387 271
www.epa.nsw.gov.au

Several odour mitigation measures were identified including frequency of cleaning pens, stocking rates, the slope of the pen areas to promote rapid drying of pen surfaces and placement of treatment ponds away from drainage areas and nearby neighbours.

The EPA notes improved sloping and drainage of pens form the basis of the proposed changes to pen configuration and also notes stocking density will be maintained at 16.5m^2. The proposed change to drainage of the north-western catchment, to report to a larger sediment dam and holding pond in the south-western catchment also moves these potential odour sources away from neighbours to the north-west of the site.

The EPA is satisfied that the proposed modification will not increase the number of odour sources or increase the potential odour generation from the feedlot operation. The EPA expects the performance of the feedlot to, at a minimum, meet relevant odour criteria and continue implementation of mitigation measures committed to in the assessment process for the original determination.

Recommended Conditions: The EPA has not recommended any general terms of approval for this aspect of the modification and relies on the current Project Approval and EPL conditions as they relate to odour.

Surface Water and Effluent Management in Controlled Drainage Area

The proposed changes to sediment basins and holding ponds within the controlled drainage areas appears to be consistent with industry design and performance standards. Holding ponds will be designed to capture the 90%-ile wet year and drains will be designed to carry a peak flow rate equivalent to that from a design storm event of 1 in 20-year ARI. Sedimentation basins will be designed so that holding time allows for settling of a minimum of 50% solids entrained from the controlled drainage area following a design storm event of 1 in 20-year ARI.

I also note that the emergency wet weather manure storage areas will be located within the controlled drainage area and that any liquid generated from the storage areas will be captured within the controlled drainage area holding pond system.

Recommended Conditions: The EPA has not recommended any general terms of approval for this aspect of the modification and relies on the current Project Approval and EPL conditions as they relate to surface water and effluent management in the controlled drainage area.

Proposed Effluent Irrigation Areas, Manure Application Areas and Terminal Ponds

The EA identifies new areas for effluent irrigation and manure application.

Effluent irrigation methods will be via large lateral move and centre pivot irrigators and areas of drip irrigation. The EPA supports this method of irrigation and expects these parcels of land to be incorporated into the existing soil monitoring program at the premises. The EPA also expects that effluent application will be carried out at a rate that does not exceed the capacity of the area to effectively utilise the effluent.

Terminal ponds will be designed to store runoff equivalent to a minimum of 12mm over the entire effluent irrigation area, expected to be generated following storm events. These ponds will also have a pond spillway designed to accommodate runoff from a 1 in 20-year design storm event. The EPA supports the design criteria of the proposed terminal ponds and notes this is consistent with current industry practice.

The EPA notes the Hydrological Assessment provided in the appendices states that a tail water drain will be installed to the “south of the flood irrigation area”. It is unclear where this flood irrigation area is.

The EPA does not support flood irrigation as a method of effluent application in this instance due to the varying quality of soil and soil properties across the site. The EPA is concerned flood irrigation may create ‘hot spots’ of nutrients and/or sodicity across the soil profile.

The EA states that manure will be applied to improved pasture and cropping areas and not to timbered areas. The manure application areas identified on Figure 7 of the EA main document appears to be all fully timbered and on ridge lines or steeper country.

The EPA does not support the application of manure to timbered land or to the new, purple shaded areas identified in Figure 7 of the EA. The EPA defers to existing conditions 3.31 to 3.34 inclusive, of the current consent and recommends these conditions remain as drafted in Project Approval 261-8-2002-i.

Recommended Condition: The EPA recommends the following condition be included into the consent, should the modification be approved.

1. The proponent must only apply effluent to irrigation areas via spray, pivot or drip irrigation methods.

Proposed Amendments to Development Application Conditions

The proponent is seeking to remove reference to collection of sigma theta and air temperature data at 10m which is currently specified in condition 4.2 of project approval 261-8-2002-i.

The EPA does not support this proposed amendment as data collected in accordance with condition 4.2 will be used in future odour modelling and assessment, should the proponent proceed to Stage 2 of the development. Collection and use of on-site data in modelling is preferred to synthetic databases as this provides a more realistic and accurate prediction on potential impacts from activities at the site.

The EPA does not have any comment on the remaining conditions referred to in the EA. The proposed amendments to these conditions do not affect the current EPL conditions.

Changes to the Environment Protection Licence

If the modification is approved, the proponent will need to submit a licence variation application form to include any new monitoring or discharge points, including any additional soil quality monitoring sites. The EPA may also use the opportunity to update map references in the EPL as appropriate.

Please contact Rebecca Scrivener on (02) 6773 7000 or by email to armidale@epa.nsw.gov.au to discuss this matter further.

Yours sincerely,

ROBERT O'HERN
Head Regional Operations Unit
Environment Protection Authority

rod.davis@rdcengineers.com.au

From: Rebecca Scrivener <Rebecca.Scrivener@epa.nsw.gov.au> on behalf of EPA RSD Armidale Mailbox <Armidale@epa.nsw.gov.au>
Sent: Friday, 21 December 2018 9:19 AM
To: rod.davis@rdcengineers.com.au
Cc: Sean McGee; Keith Howe; Mark Whyte; Duncan McGregor
Subject: RE: Rangers Valley Feedlot (DA 261-8-2002-i MOD 2) development application - Response to EPA submission - Manure application areas

Hi Rod,

The EPA has carried out a very coarse and brief review of the draft document titled "*Response to EPA request for additional information in relation to Development Application 261-8-2002-i MOD 2 – Notice of Section 4.55(1A) – Modification to Rangers Valley Cattle Feedlot - Rangers Valley Cattle Station Pty Ltd -1304 Rangers Valley Road Glen Innes NSW 2370*".

The additional information regarding the manure application areas clarifies how these areas will be managed to address EPA concerns regarding potential pollute waters issues and land pollution (ie maintaining soil health). I note that manure is proposed to be applied to land that is already under cultivation for improved pasture and it is not proposed to apply manure to steep ridgelines or timbered land. I also note buffer zones have been identified around major and minor drainage lines to minimise the risk of pollution of waters. The manure application areas will also be incorporated in the broader soil monitoring program for the premises and soil testing will occur prior to manure application.

Further justification for the proposed buffer distances to water resources should be included in the final report. I note you have referenced DEC 2004, Effluent Guidelines, Use of Effluent by Irrigation, Department of Environment and Conservation (NSW), Sydney, NSW. Table 4.9 of these guidelines recommends buffer distances and delineates between 'low strength' and 'medium to high strength' effluent. The EPA recommends some explanation be provided regarding the strength of the effluent/manure in this context, particularly for internal natural drainage lines where the draft report states a 25m buffer will be applied, while the guidelines refer to "site specific".

Please note that a more detailed review will be carried out on receipt of the final report. A more detailed review may identify further information that has not been identified above.

Please call me if you wish to discuss anything above, further.

Regards,

Rebecca Scrivener
A/Manager Regional Operations – Armidale
North Branch, NSW Environment Protection Authority
+61 2 6773 7000
armidale@epa.nsw.gov.au www.epa.nsw.gov.au @EPA_NSW
Report pollution and environmental incidents 131 555 (NSW only) or +61 2 9995 5555

I acknowledge the Aboriginal nations of the New England, North West Region as the traditional custodians of the lands upon which I live and work, and I pay my respects to their elders, past, present and future.

From: rod.davis@rdcengineers.com.au <rod.davis@rdcengineers.com.au>
Sent: Wednesday, 12 December 2018 11:11 AM
To: EPA RSD Armidale Mailbox <Armidale@epa.nsw.gov.au>
Cc: Sean McGee <mcgees@rangersvalley.com.au>; Keith Howe <howek@rangersvalley.com.au>; Mark Whyte <whytem@rangersvalley.com.au>
Subject: Rangers Valley Feedlot (DA 261-8-2002-i MOD 2) development application - Response to EPA submission - Manure application areas

Good Morning Rebecca,

I have prepared a draft response for manure application areas to the EPA request for additional information for Rangers Valley Feedlot (DA 261-8-2002-i MOD 2) development application based on our discussions a few weeks ago.

The report is only a draft as the section on the catchment areas is not complete as there is work being completed by EnviroAg that will be included when it is finalised. The controlled drainage areas remain the same but the staging plan is being revised.

Would you please be able to review the attached document in particular the section on the proposed additional manure application areas and provide comments on EPA's position on the suitability of these areas for inclusion based on the additional information provided. We are seeking advice from EPA prior to undertaking a biodiversity assessment on these areas to address the concerns raised by OEH on these areas in mid-January.

Any questions please call.

Regards,

Rod Davis
Director
—
0427629203
rod.davis@rdcengineers.com.au

RDC ENGINEERS | AGRICULTURAL ENVIRONMENTAL PROJECT MANAGEMENT

Response to EPA request for additional information in relation to Development Application 261-8-2002-i MOD 2 – Notice of Section 4.55(1A) – Modification to Rangers Valley Cattle Feedlot

Rangers Valley Cattle Station Pty Ltd
1304 Rangers Valley Road
Glen Innes NSW 2370

Rangers Valley Cattle Station Pty Ltd
PO Box 63
GLEN INNES NSW 2370

[June 2019]

RDC ENGINEERS
AGRICULTURAL
ENVIRONMENTAL
PROJECT MANAGEMENT

PO Box 1223
TOOWOOMBA QLD 4350

rdcengineers.com.au

DOCUMENT INFORMATION RECORD

Project details

Client name:	Rangers Valley Cattle Station Pty Ltd (ABN 17 001 060 402)
Project:	Proposed expansion of Rangers Valley Feedlot
Project No:	A8-114C

Document control

Document title:	Response to EPA request for additional information in relation to Development Application 261-8-2002-i MOD 2 - Notice of Section 4.55(1A) - Modification to Rangers Valley Cattle Feedlot		
File name:	A8-114C RVCS DA EPA Resp V1R3.docx		
Revision:	V1R3		
Author:	Rod Davis	**Position:**	Director
Signature:	R.J.Davis	**Date:**	14/06/2019
Reviewed by:	Rod Davis	**Position:**	Director
Signature:	R.J.Davis	**Date:**	14/06/2019
Approved by:	Rod Davis	**Position:**	Director
Signature:	R.J.Davis	**Date:**	14/06/2019

Revision history

Version	Issue date	Reason for issue	Author	Reviewed by	Approved by
V1R1	11/12/2018	Draft for client review	Rod Davis	R.J.Davis	Rod Davis
V1R2	12/12/2018	Draft for EPA review	Rod Davis	R.J.Davis	Rod Davis
V1R3	14/06/2019	Final for EPA	Rod Davis	R.J.Davis	Rod Davis

Distribution

Version	Recipient	Lodgement	Copies
V1R1	Rangers Valley Cattle Station Pty Ltd	Electronic	-
V1R2	Environment Protection Authority	Electronic	-
V1R3	Department of Planning and Environment	Electronic	-

Disclaimer

Citation

RDC Engineers Pty Ltd, 2019, Response to EPA request for additional information in relation to Development Application 261-8-2002-i MOD 2 - Notice of Section 4.55(1A) - Modification to Rangers Valley Cattle Feedlot, 1034 Rangers Valley Road, Glen Innes, A8-114C, V1R3 RDC Engineers Pty Ltd, Toowoomba, QLD, 4350.

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Executive Summary

Rangers Valley Cattle Station Pty Ltd (Rangers Valley Cattle Station) own and operate an existing beef cattle feedlot, which is located about 28 km north of Glen Innes on the New England Tablelands, New South Wales.

In 2004, Development Consent (DA-261-8-2002-i) (DIPNR, 2004) was granted to Rangers Valley Cattle Station Pty Ltd for the expansion of the beef cattle feedlot from 24,000 head to 50,000 head.

In 2018, Rangers Valley Cattle Station lodged a Development Application (DA-261-8-2002-i MOD 2) with the Department of Planning and Environment (DPE) to modify Development Consent (DA-261-8-2002-i) for the Rangers Valley Feedlot. The Development Application is being assessed as State Significant Development. Development Application (DA-261-8-2002- i MOD 2) is being sought under Section 4.55(1A) of the Environmental Planning and Assessment Act (1974).

The Development Application (DA-261-8-2002-i MOD 2) seeks to modify site layout and staging; incorporate an emergency wet weather manure storage area; amend traffic movement hours; amend effluent and manure utilisation areas; and modify conditions of consent for the Rangers Valley Feedlot.

The Environment and Protection Authority (EPA) has reviewed the supporting documentation titled, '*Environmental Assessment - Rangers Valley Feedlot DA Modification, Report Number 24072.87581',* dated 23 July 2018 and prepared by EnviroAg Australia Pty Ltd and previous assessment reports prepared by the Department of Planning and Environment dated November 2003 and December 2009 for previous modifications to Development Consent (261-8-2002-i). The EPA provided comments and recommendations to assist the consent authority in making a determination for Development Application (261-8-2002-i MOD 2) for Rangers Valley Feedlot.

This response report has been prepared by RDC Engineers Pty Ltd on behalf of the Proponent, Rangers Valley Cattle Station Pty Ltd for submission to the Secretary, Department of Planning and Environment (DPE) as part of the DPE's review process for the subject development application (261-8-2002-i MOD 2).

This response report provides additional information for consideration by EPA based on the comments and recommendations of the EPA review of Environmental Assessment - Rangers Valley Feedlot DA Modification, Report Number 24072.87581', dated 23 July 2018 and prepared by EnviroAg Australia Pty Ltd.

1 Introduction

1.1 Development background

Rangers Valley Cattle Station Pty Ltd own and operate an existing beef cattle feedlot, which is located on Rangers Valley, a land aggregation of about 12,000 acres on the Severn River about 28 km north of Glen Innes on the central New England Tablelands, New South Wales. The location of Rangers Valley Feedlot is shown in Figure 1.

In 2004, Development Consent (DA-261-8-2002-i) (DIPNR, 2004) was granted to Rangers Valley Cattle Station Pty Ltd for the expansion of the beef cattle feedlot from 24,000 head to 50,000 head. Since that time there have been various minor variations approved to the Development Consent.

In 2018, Rangers Valley Cattle Station Pty Ltd lodged a Development Application (DA-261-8-2002-i MOD 2) with the Department of Planning and Environment to modify Development Consent (DA-261-8-2002-i) for the Rangers Valley Feedlot. The Development Application is being assessed as State Significant Development.

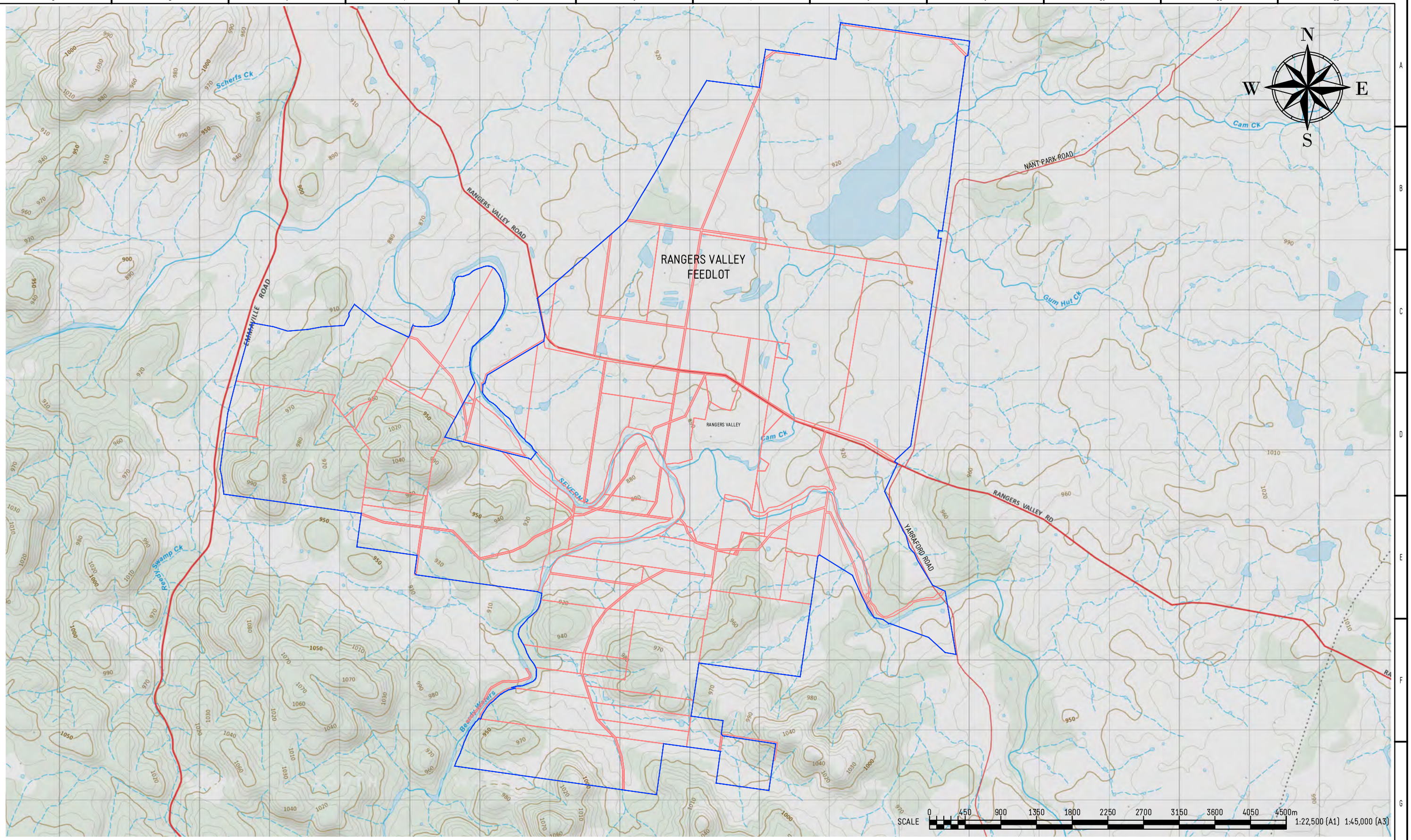
The Development Application seeks to allow for configuration changes to the layout and staging of pens proposed for the remaining future stages; incorporate an emergency wet weather manure storage area; increase traffic movement hours; alter effluent and manure utilisation areas; and modify some conditions of consent to align with Environment Protection Licence #3864, feedlot and farm operations for the Rangers Valley Feedlot.

In accordance with section 4.40 of the Environmental Planning and Assessment Act (1979), the Environment Protection Authority (EPA) is given the opportunity to review and provide comment on the subject development application.

The EPA have reviewed the subject development application and have provided comments and recommendations to assist the assessment by the Department of Planning and Environment (DPE).

This response report has been prepared by RDC Engineers Pty Ltd on behalf of the Proponent, Rangers Valley Cattle Station Pty Ltd for submission to the Secretary, Department of Planning and Environment (DPE) as part of the DPE's review process for the Development Application (261-8-2002-i MOD 2).

This response report provides additional information for consideration by EPA based on the comments and recommendations of the EPA review of Environmental Assessment - Rangers Valley Feedlot DA Modification, Report Number 24072.87581', dated 23 July 2018 and prepared by EnviroAg Australia Pty Ltd.



LEGEND

- RANGERS VALLEY CATTLE STATION BOUNDARY
- LAND PARCEL BOUNDARY

NOTES:
1. CADASTRAL INFORMATION BASED ON THE NSW GOVERNMENT SPATIAL SERVICES DIGITAL CADASTRAL DATABASE (DCDB) 2018, PROVIDED BY THE NSW DEPARTMENT OF FINANCE, SERVICES AND INNOVATION (DFSI) SPATIAL INFORMATION eXCHANGE AND ACCURACY IS LIMITED.
2. TOPOGRAPHIC INFORMATION BASED ON THE QLD GOVERNMENT QTOPO METADATA OCTOBER 2018, PROVIDED BY THE STATE OF QUEENSLAND AND ACCURACY IS LIMITED.
3. INFORMATION MAY HAVE BEEN CAPTURED AT DIFFERENT ACCURACIES AND SCALES.
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RDC ENGINEERS
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E: info@rdcengineers.com.au

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHECK	APPROVED
A	11/12/18	ISSUE TO CLIENT	RJD	RJD	RJD
B	10/06/19	FINAL FOR SUBMISSION TO EPA	RJD	RJD	RJD

SCALE	1:45,000 (A3)
DRAWN	RJD
DATE	10/06/2019
CHECKED	RJD
DATE	10/06/2019
APPROVED	RJD
DATE	10/06/2019

CLIENT: RANGERS VALLEY CATTLE STATION PTY LTD
PROJECT: RANGERS VALLEY FEEDLOT EXPANSION
TITLE: RESPONSE TO EPA SUBMISSION
RANGERS VALLEY FEEDLOT LOCALITY PLAN

REPORT REFERENCE	SUPPLIED DRAWING NUMBER		DRAWING NUMBER	REV.
FIGURE 1		A3	A8-114-20-01	B

2 Response to the EPA comments and recommendations

The key interests for the Environment and Protection Authority (EPA) are environmental issues in relation to air, water and noise pollution, waste and resource recovery, contaminated land, chemicals and hazardous materials, pesticides, protection of human health and degradation of the environment.

The EPA reviewed the supporting documentation titled, '*Environmental Assessment - Rangers Valley Feedlot DA Modification, Report Number 24072.87581',* dated 23 July 2018 prepared by EnviroAg Australia Pty Ltd. The EPA also reviewed previous assessment reports prepared by the Department of Planning and Environment dated November 2003 and December 2009 for previous modifications to Development Approval (261-8-2002-i).

EPA requested additional information to assist the consent authority in making a determination for Development Application 261-8-2002-i MOD 2 - Notice of Section 4.55(1A) - Modification to Rangers Valley Cattle Feedlot, Rangers Valley Road, Rangers Valley in a letter dated 3 September 2018. A copy of the EPA request is provided in Annexure A.

The following sections provide responses to the information requested by EPA in relation to the subject development application.

2.1 Odour

Currently, the development has a capacity of 30,000 head and has approval to hold up to a maximum of 40,000 head as per Stage 1 of Development Consent (DA-261-8-2002-i). The Proponent does not intend to progress with Stage 2 of the development, being to increase capacity to 50,000 head, at this point in time.

Consequently, the EPA defers to the odour impact assessment carried out for the 2003/04 determination as there was no revised odour assessment provided with Development Application (261-8-2002-i MOD 2). Development Consent (DA-261-8-2002-i) requires an odour impact assessment to be undertaken prior to proceeding from Stage 1 to Stage 2.

Several odour mitigation measures are to be implemented such as increased frequency of cleaning pens, reduced stocking density of 16.5 m^2, the slope of the pen areas to promote rapid drying of pen surfaces and placement of treatment ponds away from drainage areas and nearby neighbours with the proposed expansion to 40,000 head.

The proposed change to drainage of the north-western catchment to flow to a larger sediment dam and holding pond in the south-western catchment also moves these potential odour sources away from neighbours to the north-west of the site.

The proponent has revised the staging of the construction of the development to 40,000 head fully utilise existing infrastructure as shown in Figure 2.

With the proposed modifications to layout, design, operating conditions and staging the number of odour sources shall not increase the potential odour generation from the feedlot operation when at a capacity of 40,000 head.

The proponent shall continue implementation of mitigation measures committed to in the assessment process for Development Consent (DA-261-8-2002-i).

2.2 Surface water and effluent management in controlled drainage area

Any changes to sediment basins and holding ponds within controlled drainage areas shall be in accordance with any relevant conditions in Development Consent (DA-261-8-2002-i) and the following industry design and performance standards.

- The NSW Feedlot Manual, The Inter-Departmental Committee on Intensive Animal Industries (Feedlot Section), NSW Agriculture, Orange, NSW (NSW Agriculture, 1997);
- National Guidelines for Beef Cattle Feedlots in Australia 3rd Edition, Meat & Livestock Australia, North Sydney, NSW (Meat and Livestock Australia, 2012a);
- National Beef Cattle Feedlot Environmental Code of Practice 2nd Edition, Meat & Livestock Australia, North Sydney, NSW (Meat and Livestock Australia, 2012b);
- Effluent Guidelines, Use of Effluent by Irrigation (Department of Environment and Conservation (NSW), 2004);
- Beef Cattle Feedlots: Design and Construction, Meat and Livestock Australia, North Sydney, NSW (Meat and Livestock Australia, 2016a); and
- Beef cattle feedlots: waste management and utilisation, Meat and Livestock Australia, North Sydney (NSW Meat and Livestock Australia, 2015b).

The proponent has revised the staging of the construction of the development to 40,000 head to fully utilise existing infrastructure. The proposed staging is provided in Figure 2.

Construction shall commence with Stage 3A (Zone 7) with new pens, drains and roads constructed in the Northeast catchment and these shall drain to the existing sedimentation basin and holding pond servicing that controlled drainage area. The Zone 7 construction plan is shown in Figure 3.

Stage 3B shall be constructed after completion of Stage 3A. Stage 3B shall include the re-development of the existing old section of pens in the Southwest catchment (Zone 2) and new pens, drains and roads constructed in the Northwest catchment (Zone 6) that will drain to a sedimentation basin and holding pond system in the Southwest catchment.

Emergency wet weather manure storage area(s) shall be located within the Southwest and Northwest catchment controlled drainage area and that any liquid generated from the storage area(s) will be captured within the controlled drainage area holding pond system as shown on Figure 5 of the '*Environmental Assessment - Rangers Valley Feedlot DA Modification, Report Number 24072.87581',* dated 23 July 2018 prepared by EnviroAg Australia Pty Ltd.

The land use areas for the revised Stage 3B are provided in Table 1. The proposed land use areas for the Northeast and Southeast catchments remain unchanged and are provided in Table 5 of the Hydrological Assessment report contained within the report *Environmental Assessment - Rangers Valley Feedlot DA Modification, Report Number 24072.87581* (EnviroAg Australia Pty Ltd, 2018)

The hydrological modelling for the revised Southwest and Northwest catchments has been revised by EnviroAg Australia Pty Ltd using FSIM. The revised catchment areas used in the FSIM model are based on the land use areas outlined in Table 1. The input variables other than the land use area used in the FSIM model remain unchanged and are outlined in Table 7 of the Hydrological Assessment report (*Appendix D of Environmental Assessment - Rangers Valley Feedlot DA Modification, Report Number 24072.87581*, EnviroAg Australia Pty Ltd, (2018a)).

The minimum capacity of the holding ponds was determined using an iterative approach in the FSIM mode such that overtopping occurs at a frequency no greater than once in 10 years. Drains have been designed to carry a peak flow rate equivalent to that from a design storm event of 1 in 20-year ARI. The revised hydrological modelling report for the revised Southwest and Northwest catchments is provided in Annexure B.

Sedimentation basins have been designed so that holding time allows for settling of a minimum of 50% solids entrained from the controlled drainage area following a design storm event of 1 in 20-year ARI.

Table 1 – Land use areas (Stage 3B) (EnviroAg Australia Pty Ltd, 2018b)

Land use	Northwest / Southwest catchment m^2
Pens	161,699.99
Roads	16,409.16
Roof (offices, sheds, feedmill)	18,501.01
Hard stan/storage areas	39,539.79
Drains	22,477.17
Sedimentation basin	14,118.30
Holding ponds	61,770.94
Manure storage (including wet weather) and processing area	42,619.22
Hay Storage	25,283.07
Soft catchment (Extraneous)	430,735.06
Total	833,153.72

Table 2 – Holding pond capacity (Stage 3B) (EnviroAg Australia Pty Ltd, 2018b)

Holding pond	Existing ML	Proposed ML
Southwest catchment	105.25	117.23

In summary, all areas from which stormwater runoff has a high organic matter and therefore a high pollution potential are contained within a controlled drainage area. The capacity of the holding ponds has been revised for Stage 3B construction using daily time-step water balance modelling to ensure that overtopping occurs at a frequency no greater than once in 10 years.

Figure 2 shows the proposed staging plan to develop Rangers Valley Feedlot to 40,000 head. The staging provided in the *Environmental Assessment - Rangers Valley Feedlot DA Modification, Report Number 24072.87581* (EnviroAg Australia Pty Ltd, 2018) has been revised to ensure that existing infrastructure such as sedimentation basins and holding ponds can be fully utilised where possible.

Holding Pond 2 and Holding Pond 3 will both be enlarged to obtain a total proposed holding pond capacity of 117.23ML. The proposed design of Holding Pond 2 and Holding Pond 3 are shown in Figure 6 and Figure 7 respectively.

A1

EROSION AND SEDIMENT CONTROL NOTES

1. Avoid stripping & excavation of all areas until neccessary.
2. Minimize stripping & excavation where possible to leave the least amount of exposed/disturbed soil at any one time.
3. Protect all stormwater dams from sediment by erecting sediment barriers or hay bales as required.
4. The contractor shall monitor the installed erosion & sediment control system during construction & repair/modify it as required to maintain it in good working order during all stages of construction until the site has been stabilised/revegetated.
5. Stockpiled materials shall be kept within the stockpile area above the straw bales/silt fence.
6. All hard waste stored on site shall be confined within a 3-sided silt fence barrier constructed to prevent material from being removed from site by wind or flowing water.
7. Revegetate disturbed areas as soon as possible after excavation.
8. All erosion & Sediment control measures to be installed and maintained in accordance with the owners requirements.
9. A vehicle wash-down pad shall be provided at the site exit if instructed.
10. All vehicles must be cleaned down before leaving the site (as instructed).
11. During construction, all material tracked onto the road surface by vehicles leaving the site, shall be broomed up and removed, or relocated on to the site.
12. The contractor shall be responsible for the installation and maintenance of silt management facilities from the time of commencment of construction until the works have been completed.

NOTE
ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES MAY BE REQUIRED DURING THE COURSE OF CONSTRUCTION. THE CONTRACTOR SHALL IDENTIFY POTENTIAL PROBLEM AREAS AND TREAT THEM IN ACCORDANCE WITH THE OWNERS REQUIREMENTS.

ALL DISTURBED AREAS OF SITE INCLUDING ALLOTMENT FILL AREAS TO BE TOPSOILED AND GRASS SEEDED

SETOUT NOTE

THE EARTHWORKS CONTRACTOR IS EXPECTED TO USE MACHINE CONTROL FOR ALL WORKS. A FULL 12D STRING MODEL WILL BE PROVIDED PRIOR TO CONSTRUCTION. FULL SETOUT AND LEVEL INFORMATION IS AVAILABLE THROUGH THIS MODEL.

THE CONTRACTOR IS TO NOTIFY THE SUPERVISING ENGINEER OF ANY DISCREPENCIES BETWEEN THE DESIGN PLANS AND THE CONDITIONS ON SITE PRIOR TO COMMENCEMENT OF ANY WORK.

WARNING
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0 15 30 45 60 75 (A1) 1:1500 150 Metres
(A3) 1:3000

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ORIGINAL ISSUE	9/4/2019	A	GC
AMENDED BASIN NAMING	26/4/2019	B	GC

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RANGERS VALLEY FEEDLOT EXPANSION

1304 RANGERS VALLEY RD,
RANGERS VALLEY
RANGERS VALLEY STATION

GENERAL ARRANGEMENT

checked: AF	date: APRIL 2019	
approved: ---	RPEQ: ---	rev:B
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A1

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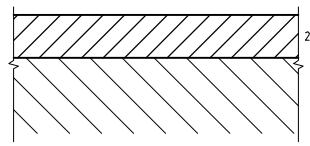

STD PEN & ROAD PAVEMENT DETAIL
NTS

LEGEND:
- EXISTING 0.5m CONTOURS — 32.0
- PROPOSED 0.25m CONTOURS — 32.1
- SPOT LEVELS — 901.2
- FEEDBUNK
- PEN DRAIN (MINOR)
- PEN ROAD

CONSTRUCT DIVERSION CHANNEL TO DIRECT CLEAN WATER FROM UPHILL CATCHMENT AROUND PEN AREA

EXISTING CENTER PIVOT IRRIGATOR

PEN ROW - E

PEN ROW - D

PEN ROW - C

PEN ROW - B

PEN ROW - A

SURVEY IN THIS AREA WAS NOT AVAILABLE AT THE TIME OF DRAFTING

REFER TO DETAILS ON PLAN WK19-0023/C3

EXISTING "FILL PAD" OUTLINE

EXISTING SEDIMENT BASIN (FULL SEDIMENT LEVEL RL902.4)

55.000 (TYP)

60.000 (TYP)

REFER TO DETAILS ON PLAN WK19-0023/C3

2.5%

NO TOPSOIL STRIP TO THE EXISTING "FILL PAD"

CONNECT NEW PEN ROADS TO THE EXISTING ROAD NETWORK

GRADE INTERSECTION TO SUIT TRUCK TURNPATHS AND TO BE FREE DRAINING

EXISTING GRAVEL ROAD

MAINTAIN EARTH MOUND BETWEEN NEW ROAD BATTER AND EXISTING DRAIN. (REFER TO SECTIONS)

900x600 RCBC CROSSING 12m LONG USIL - to suit existing GRADE = 2% WITH PRECAST HEADWALLS

ROCK PROTECTION AT HEADWALL AS PER NOTE ON PLAN C3

EXISTING OPEN DRAIN TO REMAIN

EXISTING OPEN DRAIN TO REMAIN

SHAPE ROAD TO ENSURE DISCHARGE OF WATER IS DISPURSED

PEN DRAIN TO DISCHARGE ACROSS ROAD INTO EXISTING OPEN DRAIN

RE-ALIGN INVERT OF EXISTING DRAIN AS REQUIRED

EXISTING PENS

SETOUT NOTE

THE EARTHWORKS CONTRACTOR IS EXPECTED TO USE MACHINE CONTROL FOR ALL WORKS. A FULL 12D STRING MODEL WILL BE PROVIDED PRIOR TO CONSTRUCTION. FULL SETOUT AND LEVEL INFORMATION IS AVAILABLE THROUGH THIS MODEL.

THE CONTRACTOR IS TO NOTIFY THE SUPERVISING ENGINEER OF ANY DISCREPENCIES BETWEEN THE DESIGN PLANS AND THE CONDITIONS ON SITE PRIOR TO COMMENCEMENT OF ANY WORK.

QUANTITIES - ZONE 7

EARTHWORKS VOLUMES
CUT = 139,790m3
FILL = 146,140m3
BALANCE = 6,350m3 (import FILL)

INDICATIVE AREAS
AREA OF GRAVEL (pens) = 161,700m2
AREA OF GRAVEL (roads & pen drains) = 48,630m2
AREA OF TOPSOIL STRIP = 143,720m2
AREA TO BE RE-TOPSOILED = 14,270m2
(200mm strip of topsoil assumed)

0 10 20 30 40 50 (A1) 1:1000 100 Metres
(A3) 1:2000

North (this sheet): N

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ORIGINAL ISSUE	9/4/2019	A	GC
ADDED EXTRA CULVERT CROSSING	26/4/19	B	GC

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RANGERS VALLEY FEEDLOT EXPANSION
1304 RANGERS VALLEY RD,
RANGERS VALLEY
RANGERS VALLEY STATION

EARTHWORKS LAYOUT - ZONE 7

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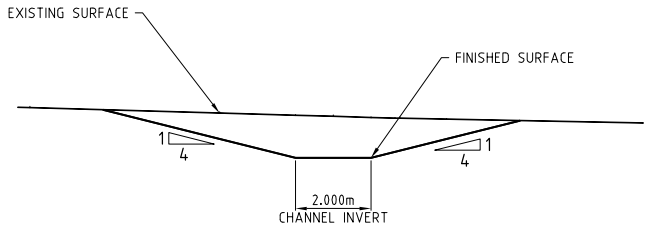

TYPICAL DIVERSION CHANNEL DETAIL
SCALE 1:100

THE CONTRACTOR IS TO NOTIFY THE SUPERVISING ENGINEER OF ANY DISCREPENCIES BETWEEN THE DESIGN PLANS AND THE CONDITIONS ON SITE PRIOR TO COMMENCEMENT OF ANY WORK.

TO BE REMOVED FROM SITE (UNLESS NOTED TO BE RETAINED):
1. BARBED WIRE & BUILDING MATERIAL
2. DANGEROUS TREES & DEAD LIMBS
3. RUBBISH, DEBRIS AND OBSTACLES
4. NOXIOUS WEEDS/PLANTS
5. EXISTING DRIVEWAYS, STRUCTURES & SERVICES THAT ARE NO LONGER REQUIRED.

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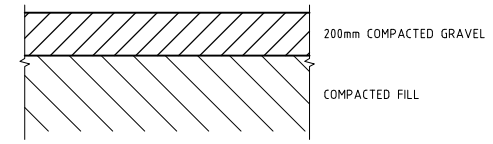
LEGEND:
- EXISTING 0.50m CONTOURS — 32.0
- PROPOSED 0.25m CONTOURS — 32.0
- SPOT LEVELS — 901.2
- FEEDBUNK
- PEN DRAIN (MINOR)
- PEN ROAD

QUANTITIES - ZONE 6

EARTHWORKS VOLUMES
CUT = 19,351 m3
FILL = 25,598 m3
BALANCE = 6,247 m3 (import FILL)

INDICATIVE AREAS
AREA OF GRAVEL (pens) = 49,500 m2
AREA OF GRAVEL (roads & pen drains) = 12,561 m2
AREA OF TOPSOIL STRIP = 70,962 m2
AREA TO BE RE-TOPSOILED = 8,805 m2
(200mm strip of topsoil assumed)



PEN & ROAD PAVEMENT DETAIL
NTS

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(A3) 1:2000

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RANGERS VALLEY FEEDLOT EXPANSION
1304 RANGERS VALLEY RD,
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EARTHWORKS LAYOUT - ZONE 6

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Sheet 1 OF 1			

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A1

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LEGEND:

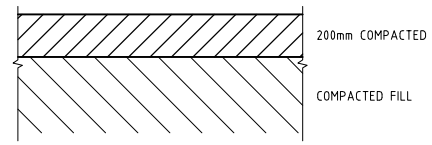
- EXISTING 0.5m CONTOURS — 32.0
- PROPOSED 0.25m CONTOURS — 32.0
- SPOT LEVELS — 901.2
- FEEDBUNK
- PEN DRAIN (MINOR)
- PEN ROAD

THE CONTRACTOR IS TO NOTIFY THE SUPERVISING ENGINEER OF ANY DISCREPENCIES BETWEEN THE DESIGN PLANS AND THE CONDITIONS ON SITE PRIOR TO COMMENCEMENT OF ANY WORK.

QUANTITIES - ZONE 2

EARTHWORKS VOLUMES
CUT = 60,414 m3
FILL = 62,671 m3
BALANCE = 2,257 m3

INDICATIVE AREAS
AREA OF GRAVEL (pens) = 112,080 m2
AREA OF GRAVEL (roads & pen drains) = 31,459 m2
AREA OF TOPSOIL STRIP = 153,221 m2
AREA TO BE RE-TOPSOILED = 10,813 m2
(200mm strip of topsoil assumed)



PEN & ROAD PAVEMENT DETAIL
NTS

ROCK PROTECTION (HEADWALLS)
ROCK PROTECTION TO BE INSTALLED AT BOTH UPSTREAM AND DOWNSTREAM HEADWALLS, FOR FULL WIDTH OF HEADWALL.
UPSTREAM - 1m LONG
DOWNSTREAM - 3m LONG
D_{50} = 150mm
250mm THICK ON A30 GEOFABRIC (OR EQUIV)

0 10 20 30 40 50 (A1) 1:1000 100 Metres
(A3) 1:2000

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ORIGINAL ISSUE	10/05/19	A	NB

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RANGERS VALLEY FEEDLOT EXPANSION
1304 RANGERS VALLEY RD,
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EARTHWORKS LAYOUT - ZONE 2

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Sheet 1 OF 1			

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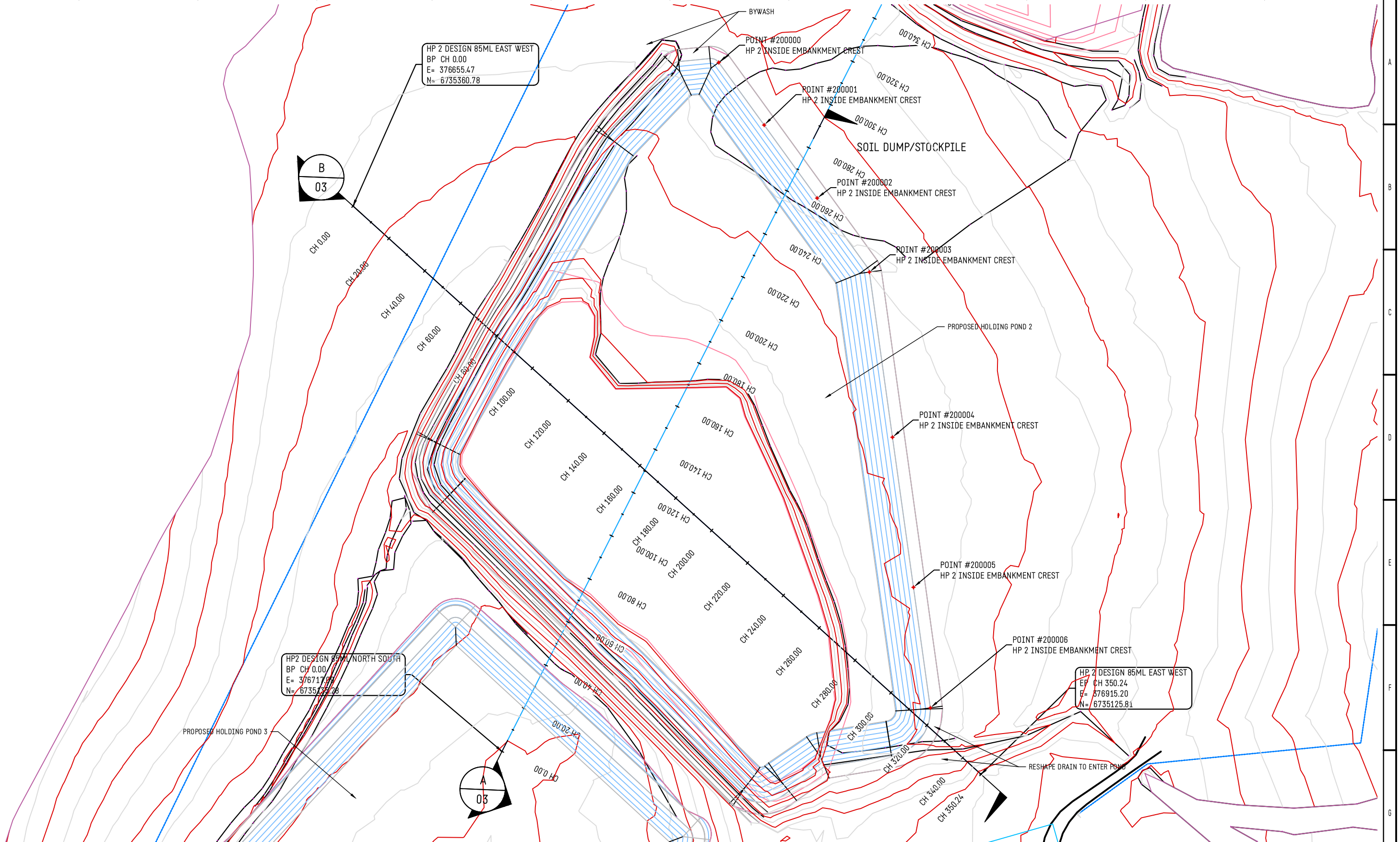

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STATUS	RPEQ
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AGRICULTURAL ENVIRONMENTAL PROJECT MANAGEMENT
ABN 37 627 163 071
PO BOX 1223
TOOWOOMBA QLD 4350
M: 0427 629 203
E: info@rdcengineers.com.au

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHECK	APPROVED
A	22/01/19	ISSUE TO CLIENT	RJD	RJD	RJD
B	04/03/19	ISSUED FOR CONSTRUCTION	RJD	RJD	RJD

SCALE	1:1,500 (A3)
DRAWN	RJD
DATE	04/03/2019
CHECKED	RJD
DATE	04/03/2019
APPROVED	RJD
DATE	04/03/2019

CLIENT RANGERS VALLEY CATTLE STATION PTY LTD

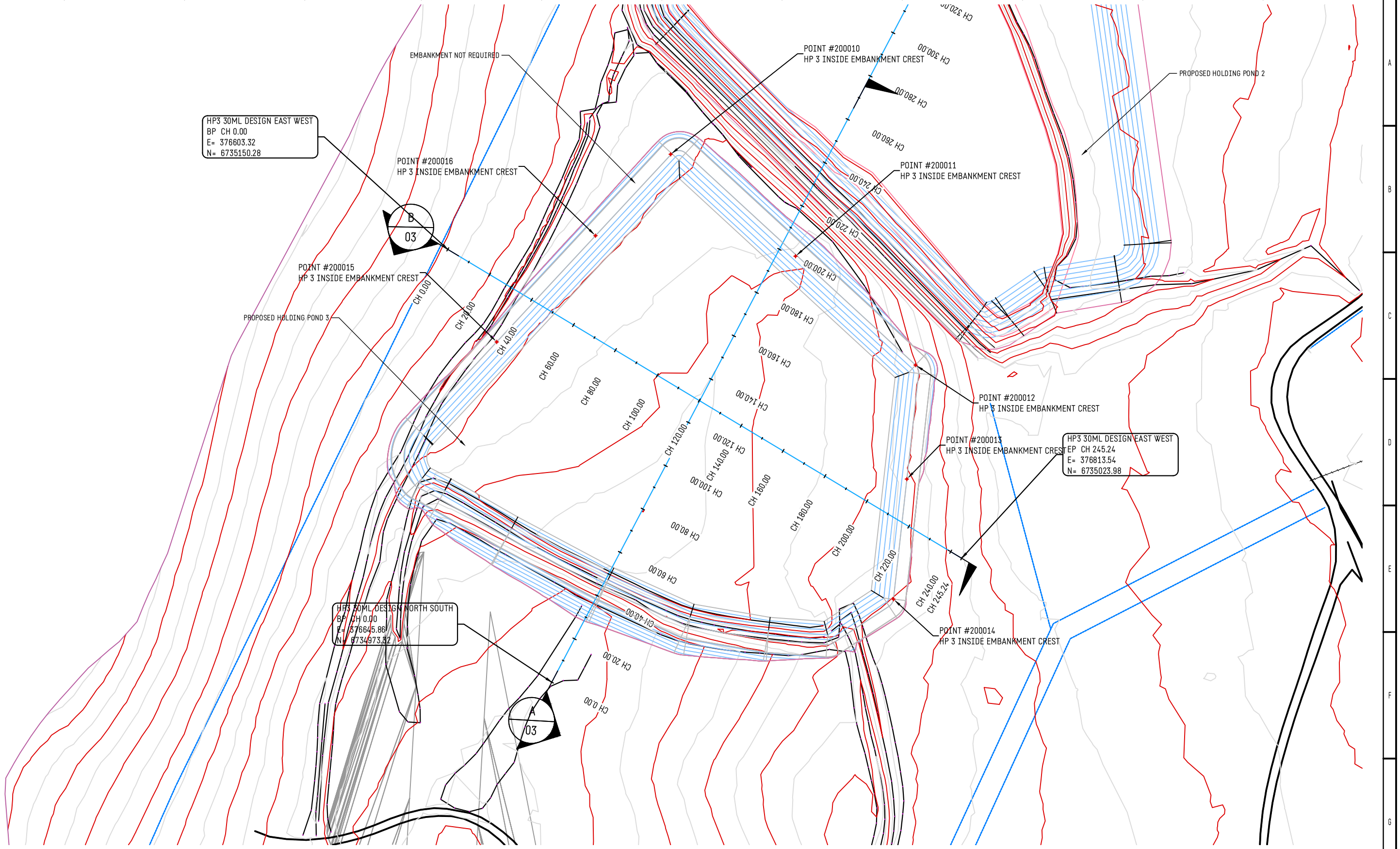
PROJECT RANGERS VALLEY FEEDLOT EXPANSION

TITLE RECONFIGURATION OF SOUTHWEST CATCHMENT HOLDING PONDS HOLDING POND 2 - LAYOUT PLAN

CLIENT REFERENCE	SUPPLIED DRAWING NUMBER	A3	DRAWING NUMBER	REV.
			A8-114-200-02	B

DATE PLOTTED: 4 March 2019 BY : RDC Engineers PTY LTD

FILE PATH: C:\RDC Engineers\RDCE - Projects\A8-114 Rangers Valley FL Exposion\05 - ACAD MasterPlan\05.1 Drawings - CURRENT FILE NAME: A1069 RANGERS VALLEY UPDATED FEEDLOT SURVEY - 180615 RJD 190305.dwg



SCALE 0 15 30 45 60 75 90 105 120 135 150m

1:750 (A1) 1:1,500 (A3)

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E: info@rdcengineers.com.au

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A	22/01/19	ISSUE TO CLIENT	RJD	RJD	RJD
B	04/03/19	ISSUED FOR CONSTRUCTION	RJD	RJD	RJD

SCALE	1:1,500 (A3)
DRAWN	RJD
DATE	04/03/2019
CHECKED	RJD
DATE	04/03/2019
APPROVED	RJD
DATE	04/03/2019

CLIENT RANGERS VALLEY CATTLE STATION PTY LTD

PROJECT RANGERS VALLEY FEEDLOT EXPANSION

TITLE RECONFIGURATION OF SOUTHWEST CATCHMENT HOLDING PONDS
HOLDING POND 3 - LAYOUT PLAN

CLIENT REFERENCE	SUPPLIED DRAWING NUMBER	A3	DRAWING NUMBER	REV.
			A8-114-300-02	B

2.3 Proposed effluent irrigation areas, manure application areas and terminal ponds

Development Application (261-8-2002-i MOD 2) identifies new areas for effluent irrigation and manure application. The following sections outlines responses to EPA comments and recommendations.

2.3.1 Proposed effluent irrigation areas and terminal ponds

Currently, effluent generated by Rangers Valley Feedlot is applied to approved irrigation areas by either centre pivot or low pressure overhead spray irrigation in accordance with Development Consent (261-8-2002-i) and EPL licence conditions.

Effluent application is carried out at a rate that does not exceed the capacity of the area to effectively utilise the effluent.

Additional areas have been identified for effluent application on Rangers Valley and these are shown as purple shading on Figure 8 contained within the Environmental Assessment - Rangers Valley Feedlot DA Modification, Report Number 24072.87581, EnviroAg Australia Pty Ltd, (2018a). No effluent shall be applied to timbered areas or sensitive environments. An amended property scale plan of the effluent irrigation areas is provided in Figure 8.

Prior to application of effluent in these areas, baseline soil monitoring data shall be collected and the areas incorporated in the existing soil monitoring program.

Terminal pond(s) will be designed to store runoff equivalent to a minimum of 12 mm generated following storm events over the proposed effluent irrigation area in those areas not currently serviced by a terminal pond. The terminal pond(s) will have a pond spillway designed to accommodate runoff from a 1 in 20-year design storm event.

The EPA supports the design criteria of the proposed terminal ponds and notes this is consistent with current industry practice.

The EPA noted on page 32 of the Hydrological Assessment (Appendix D of Environmental Assessment - Rangers Valley Feedlot DA Modification, Report Number 24072.87581, EnviroAg Australia Pty Ltd, (2018a)) that a tail water drain will be installed to the "south of the flood irrigation area" and it is unclear where this flood irrigation area is.

The statement relating to tail water drain and reference to flood irrigation area is an error and should be deleted. There is no surface (flood) irrigation currently undertaken on Rangers Valley and no surface irrigation is proposed to be undertaken as a method of effluent application in the future. All effluent irrigation is and shall be applied by centre pivot or low pressure overhead spray methods.

2.3.1.1 Buffer distances

DEC (2004) provides a classification of effluent as low, medium or high strength according to its concentration of nitrogen, phosphorus, BOD_5, TDS and other potential contaminants as outlined in Table 3.1 of DEC (2004) and reproduced in Table 3.

Table 3 – Classification of effluent for environmental management (DEC, 2004)

Constituent	Strength (average concentration mg/L)[1]		
	Low	Medium	High
Total Nitrogen	<50	50-100	>100
Total phosphorus	<10	10-20	>20
BOD	<40	40-1,500	>1,500
TDS	<600	600-1,000	>1,000-2,500
Other pollutants (e.g. metals, pesticides)	Effluent with more than five times the ANZECC and ARMCANZ (2000) long-term water quality trigger values for irrigation waters must be considered high strength for the purpose of establishing a strength class for runoff and discharge controls and will require close examination to ensure soil is not contaminated.		
Grease and Oil	Effluent with more than 1,500 mg/L of grease and oil must be considered high strength and irrigation rates and practices must be managed to ensure soil and vegetation is not damaged.		

[1] Average concentrations established from a minimum of 12 representative samples, collected at regular intervals over a year.

Table 4 shows the typical composition of effluent from Rangers Valley Feedlot based on data from Rangers Valley Annual Monitoring 2017-2018 (Integrity Ag & Environment, 2018). These data were collected from EPA Point 11 during the 2017-2018 monitoring period.

Based on Table 3 and Table 4, effluent from Rangers Valley Feedlot is classified as high strength as defined by DEC (2004). Consequently, a buffer distance shall be applied where the application of effluent takes place within close proximity to roads, or other areas likely to be used by the public at that time or adjacent to sensitive environments in accordance with Table 4.9 of the *Effluent Guidelines, Use of Effluent by Irrigation* (DEC, 2004).

The adopted buffer distances between effluent application areas and water resources and public areas are provided in Table 5. These buffer distances are based on site-specific assessment and risk mitigation measures as outlined in the Rangers Valley Pollution Incident Response Management Plan (PIRMP) and are consistent with the conditions of Development Consent (DA-261-8-2002-i) (DIPNR, 2004).

Prior to application of effluent in the proposed effluent application areas, baseline soil monitoring data shall be collected and the areas incorporated in the existing soil monitoring program.

Table 4 – Typical effluent characteristics EPA Point 11 (Integrity Ag & Environment, 2018)

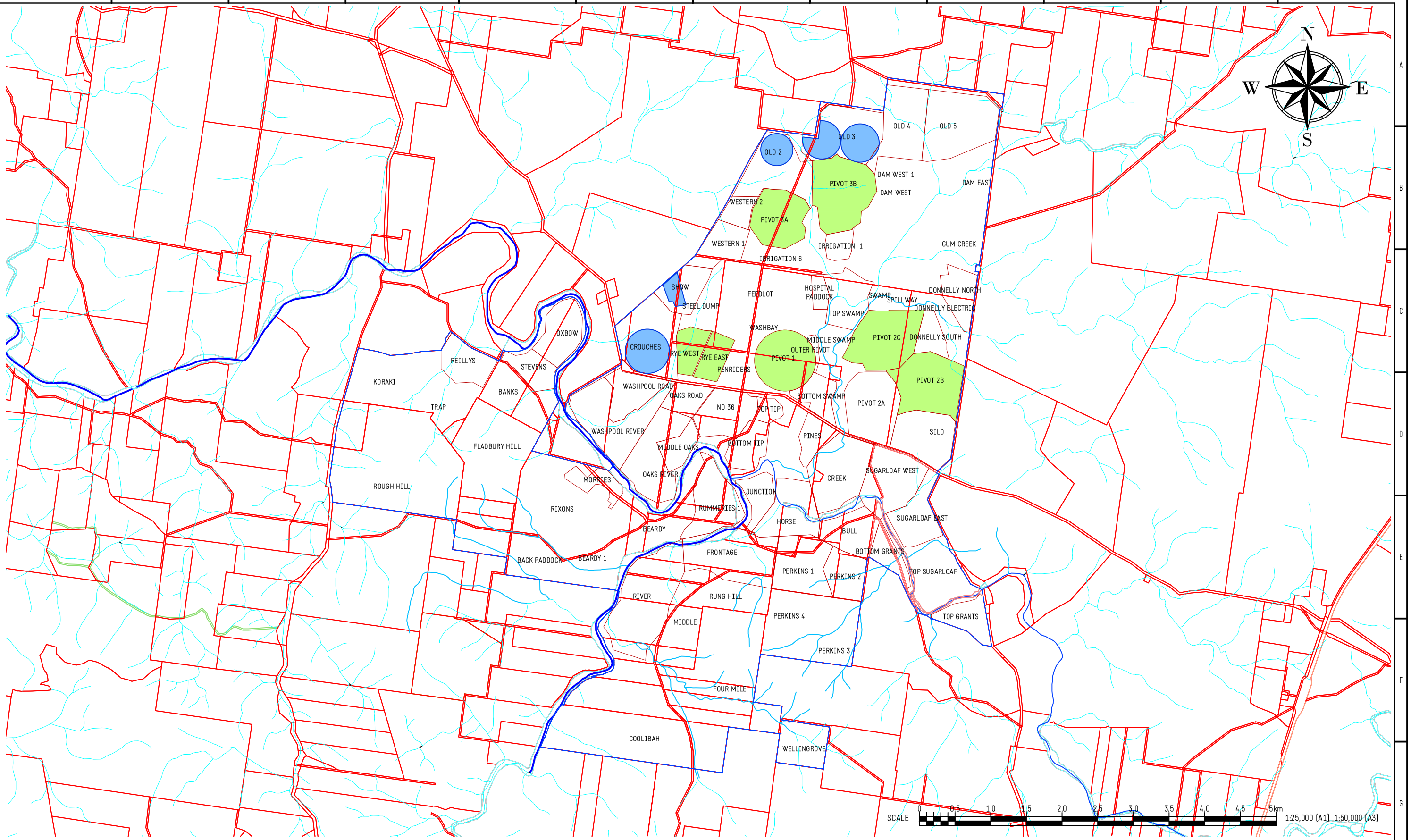
Parameter	Units	13/09/17	18/12/17	19/03/18	19/06/18
Nitrogen (Ammonia)	mg/L	57	25	11	11
Chloride	mg/L	510	490	430	520
Nitrate	mg/L	<0.05	<0.05	<0.025	<0.05
Phosphorus (Reactive)	mg/L	28	26	22	13
pH	-	8.3	8.1	8.0	8.2
Conductivity	µS/m	3,900	3,700	2,800	3,400
SAR	-	3.2	4.0	3.1	3.5
Phosphorus (Total)	mg/L	62	63	31	48
Nitrogen (Total)	mg/L	190	100	39	74
TKN	mg/L	190	100	39	74
Suspended Solids	mg/L	520	1,900	100	480
Calcium	mg/L	20	65	47	54
Potassium	mg/L	8.8	730	540	590
Magnesium	mg/L	13	79	61	61
Sodium	mg/L	45	200	140	160

Table 5 – Proposed effluent buffer distances to water resources and public areas

Sensitive area	Minimum separation distance Effluent m	Impact of concern/comments
Natural waterbody – Severn River	50	Protection of water quality and aquatic ecosystems.
Internal natural drainage lines	25**	Protection of water quality for most sensitive water uses of the potentially affected waterbody.
Roads	25*	Avoidance of spray drift of liquid waste containing pathogens offsite.
Public spaces	50*	Avoidance of spray drift of liquid waste containing pathogens offsite.

*Where irrigation gives rise to aerosols.
** Areas serviced by terminal pond system

Table 4.9 of the DEC (2004) effluent guidelines recommend site-specific buffer distances for high strength effluent. As the proposed additional effluent utilisation areas are serviced by existing terminal points known as EPA Point 26 (Crouches/Show) and EPA Point 10 (Old 2 and Old 3); the irrigation method is proposed to be low pressure overhead spray irrigation; the proposed effluent utilisation areas are well upstream of the natural waterbody being the Severn River; and the buffer area shall be well grassed, a buffer of 25m has been selected as an appropriate buffer distance to internal natural drainage lines.



LEGEND

- RANGERS VALLEY CATTLE STATION BOUNDARY
- LAND PARCEL BOUNDARY
- HYDROLINE
- EFFLUENT APPLICATION AREA - APPROVED
- EFFLUENT APPLICATION AREA - PROPOSED

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APPROVED	RJD
DATE	10/06/2019

CLIENT: RANGERS VALLEY CATTLE STATION PTY LTD
PROJECT: RANGERS VALLEY FEEDLOT EXPANSION
TITLE: RESPONSE TO EPA SUBMISSION
PROPOSED ADDITIONAL EFFLUENT IRRIGATION AREAS

REPORT REFERENCE	SUPPLIED DRAWING NUMBER		DRAWING NUMBER	REV.
FIGURE 8		A3	A8-114-20-08	B

2.3.2 Manure application areas

Currently, solid waste (manure and composted carcasses) generated by Rangers Valley Feedlot is applied to approved manure application areas by a tractor drawn manure spreader prior to sowing of crops or onto pasture.

Additional areas have been identified for manure application on Rangers Valley and these are shown as purple shading on Figure 7 contained within the *Environmental Assessment - Rangers Valley Feedlot DA Modification, Report Number 24072.87581*, EnviroAg Australia Pty Ltd, (2018).

EnviroAg Australia Pty Ltd (2018a) states that manure will be applied to improved pasture and cropping areas and not to timbered areas. However, the scale at which Figure 7 was prepared shows a blanket covering over each paddock and the property level mapping scale is not sufficient to illustrate that the intended manure application area has been selected to avoid areas that are timbered, have unsuitable terrain and/or unsuitable soils.

The OEH also identified issues with the proposed manure application areas in relation to biodiversity with the shading of timbered areas which mostly are plant community types (PCTs). Consequently, a number of paddocks have been identified as unsuitable from a biodiversity perspective and these have been removed from the Development Application.

The proposed manure application areas at a property scale are shown on Figure 9. The proponent has undertaken a biodiversity assessment on the areas shown in Figure 9.

The EPA does not support the application of manure to timbered land or to the new, purple shaded areas identified in Figure 7 of EnviroAg Australia Pty Ltd (2018a) based on the information provided in that report. Rebecca Scrivener (EPA) advised that this conclusion was reached based on the available information and mapping which was provided at a property scale.

Consequently, for consideration by EPA, additional information for each paddock at an appropriate scale that shows the proposed manure application areas within each paddock and any environmental constraints and buffers to sensitive environments is provided.

The manure application area within each proposed manure application paddock was identified based on consideration of native vegetation mapping (plant community types (PCT) and native grasslands), onground vegetation coverage, terrain and soil suitability factors (slope, rockiness). Paddock scale maps of each proposed manure application area were prepared and are provided in Figure 10 to Figure 15 for each proposed manure utilisation paddock.

Each plan of the manure application area within each paddock (Figure 10 to Figure 15) has an overlay of hydro lines from the *Water Management (General) Regulation 2018* and contour data respectively. The hydro lines are a dataset of mapped watercourses and waterbodies in NSW.

Figure 10 to Figure 15 show that ridge lines, steep and timbered country within these paddocks are not currently cultivated and it is not proposed to apply manure to these areas. The plans contained with the Biodiversity Assessment Report (BDAR) (AREA Environmental Consultants & Communication Pty Ltd, 2019) demonstrate that the proposed manure utilisation areas avoid and do not impact on areas of native vegetation.

The proposed manure application paddocks, estimated area within each paddock that is currently cultivated and current land use is provided in Table 6.

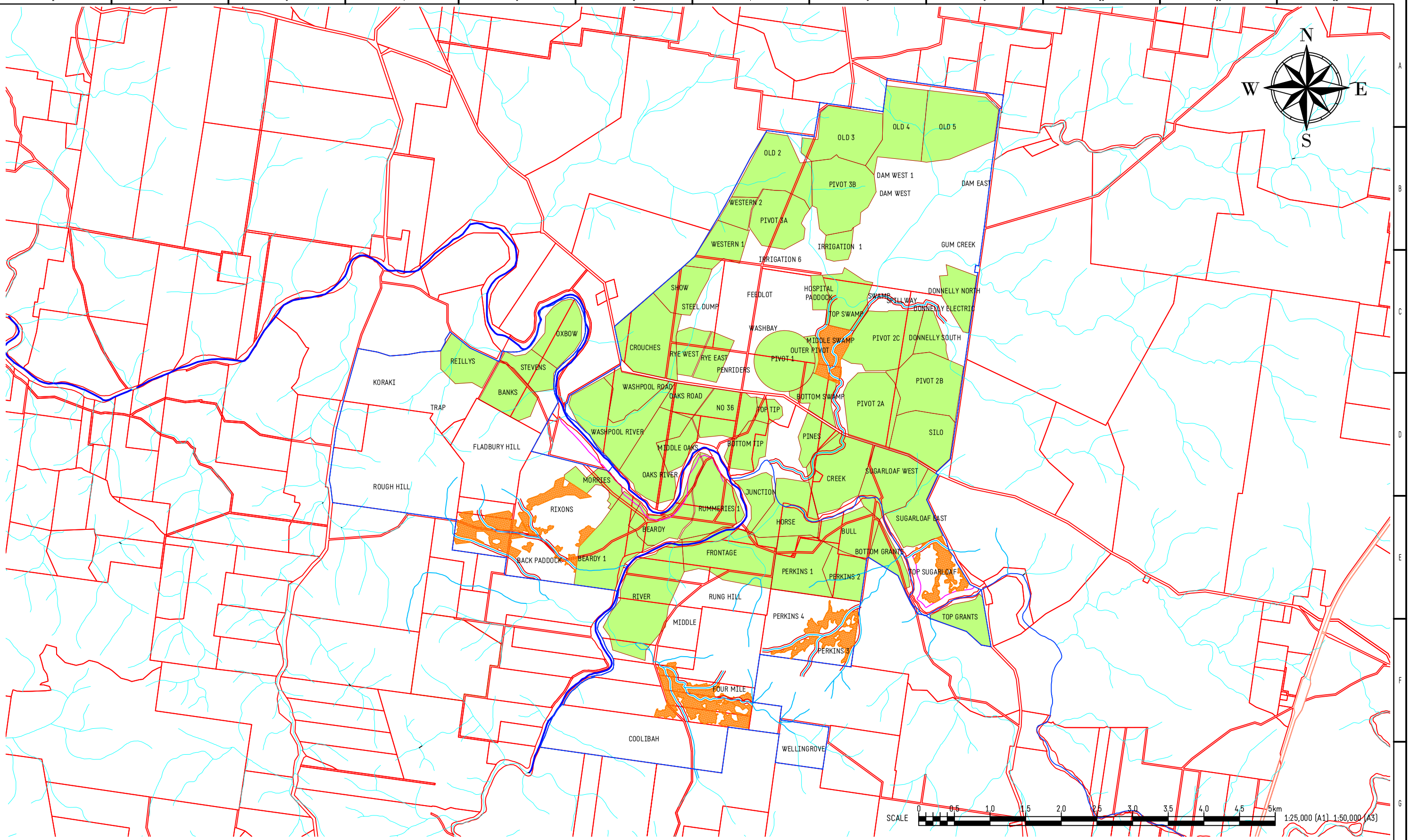
Table 6 – Proposed manure utilisation paddocks

Paddock ID	Area ha	Designation	Current land use
Middle Swamp	20	Manure	Cultivated; improved pasture (cocksfoot)
Top Sugarloaf	17	Manure	Cultivated; improved pasture (perennial ryegrass)
Perkins 3	17.5	Manure	Cultivated; improved pasture (perennial ryegrass)
Perkins 4	8.5	Manure	Cultivated areas; improved pasture (perennial ryegrass)
Rixons	20	Manure	Cultivated; improved pasture (clover; fescue)
Back Paddock	34	Manure	Cultivated areas; improved pasture (phalaris; clover);
Four Mile	42	Manure	Cultivated; improved pasture (clover; fescue)

Photograph 1 and Photograph 2 illustrate the current land use of the proposed Top Sugarloaf and Back Paddock manure application areas.

Photograph 1 – Top Sugarloaf manure application area – Current land use

Photograph 2 – Back Paddock manure application area – Current land use



LEGEND

- RANGERS VALLEY CATTLE STATION BOUNDARY
- LAND PARCEL BOUNDARY
- HYDROLINE
- MANURE APPLICATION AREA - APPROVED
- MANURE APPLICATION AREA - PROPOSED

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TITLE: RESPONSE TO EPA SUBMISSION
PROPOSED ADDITIONAL MANURE APPLICATION AREA

REPORT REFERENCE	SUPPLIED DRAWING NUMBER		DRAWING NUMBER	REV.
FIGURE 9		A3	A8-114-20-09	B

2.3.2.1 Buffer distances

When planning the proposed manure application areas, consideration of the separation of these areas from sensitive environments was considered. The rationale for separating these land uses from sensitive environments is to protect the locality's ground and surface waters and air quality.

Consequently, a buffer distance shall be applied where the application of manure takes place within close proximity to roads, or other areas likely to be used by the public at that time or adjacent to sensitive environments.

The appropriateness of the applied buffer distance has been determined having consideration for the qualities of the materials being applied, weather conditions and other environmental factors; as well as the anticipated level of public usage or exposure at those times.

The adopted buffer distances between manure application areas and water resources and public areas are provided in Table 7. These buffer distances are based on recommended buffer distances in the NSW Feedlot Guidelines (NSW Agriculture, 1997) and site-specific assessment and risk mitigation measures as outlined below.

Within each proposed manure application area, a number of natural drainage lines drain to gully dams that are currently used to store water for livestock supply. The majority of these drainage lines are ephemeral and only flow after heavy rainfall, consequently the dams capture runoff water from the upstream catchment area. Whilst, the risk of stormwater runoff containing contaminants from manure is low due to the manure being incorporated into the soil, these dams also act as terminal ponds in which any potential contaminated runoff from the manure application utilisation area is captured prior to evaporating or consumed by livestock.

Manure shall not be applied to riparian areas along watercourses.

It is proposed to spread manure and work it in to various degrees within each application area. Manure will be also be applied to application areas when the land and its cover minimises potential for any runoff where practical. The application rate will be determined based on the capacity of the area to effectively utilise the nutrients in the manure and vary depending on soil type and crops grown. Consequently, manure may not be applied to each paddock each year.

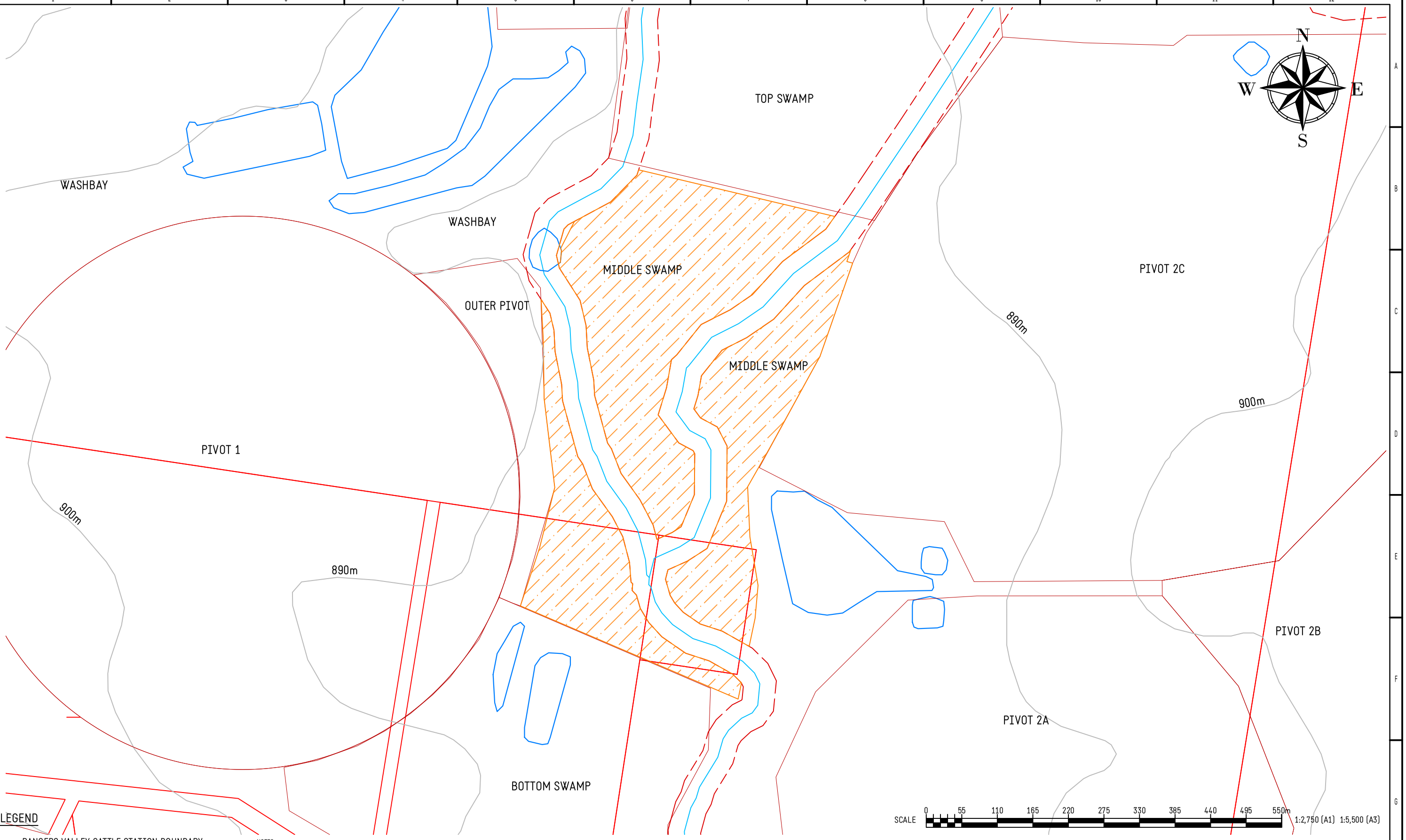
Prior to application of manure in the proposed manure application areas, baseline soil monitoring data shall be collected and the areas incorporated in the existing soil monitoring program.

As part of Rangers Valley Cattle Station obligations under the Protection of the Environment Operations Act 1997, Rangers Valley Cattle Station has in place a Pollution Incident Response Management Plan (PIRMP). The PIRMP covers all operations associated with the Rangers Valley feedlot including the production pens, sedimentation basins, effluent holding ponds, effluent irrigation and manure spreading.

Consequently, buffer distances of 100m, 25m and 50m have been selected to watercourses, internal drainage lines and roads respectively based on the previously mentioned mitigation measures. These buffer distances are shown on Figure 10 to Figure 15 respectively for each proposed manure application paddock. There are no domestic bores or public areas within or adjacent to, the proposed manure application areas.

Table 7 – Proposed manure buffer distances to water resources and public areas

Sensitive area	Minimum separation distance Manure m	Impact of concern/comments
Natural waterbody – Severn River / Beardy Waters	100	Protection of water quality and aquatic ecosystems.
Internal natural drainage lines	25	Protection of water quality for most sensitive water uses of the potentially affected waterbody.
Public roads	50	Protection of public amenity.



LEGEND

- RANGERS VALLEY CATTLE STATION BOUNDARY
- LAND PARCEL BOUNDARY
- WATERCOURSE
- INTERNAL DRAINAGE LINE
- 10m CONTOUR
- MANURE APPLICATION AREA - MIDDLE SWAMP (~20Ha)
- INTERNAL DRAINAGE LINE BUFFER - 25m
- WATERCOURSE BUFFER - 100m

NOTES:
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PROJECT: RANGERS VALLEY FEEDLOT EXPANSION
TITLE: RESPONSE TO EPA SUBMISSION
PROPOSED ADDITIONAL MANURE APPLICATION AREA - MIDDLE SWAMP

REPORT REFERENCE	SUPPLIED DRAWING NUMBER		DRAWING NUMBER	REV.
FIGURE 10		A3	A8-114-20-10	B

SUGARLOAF

SEVERN RIVER

BOTTOM GRANTS

TOP SUGARLOAF

920m

890m

910m

900m

890m

SEVERN RIVER

SEVERN RIVER

TOP GRANTS

N

W E

S

SCALE 0 55 110 165 220 275 330 385 440 495 550m 1:2,750 (A1) 1:5,500 (A3)

LEGEND

- RANGERS VALLEY CATTLE STATION BOUNDARY
- LAND PARCEL BOUNDARY
- WATERCOURSE
- INTERNAL DRAINAGE LINE
- CONTOUR 10m
- MANURE APPLICATION AREA - TOP SUGARLOAF (~17 Ha)
- INTERNAL DRAINAGE LINE BUFFER - 25m
- WATERCOURSE BUFFER - 100m

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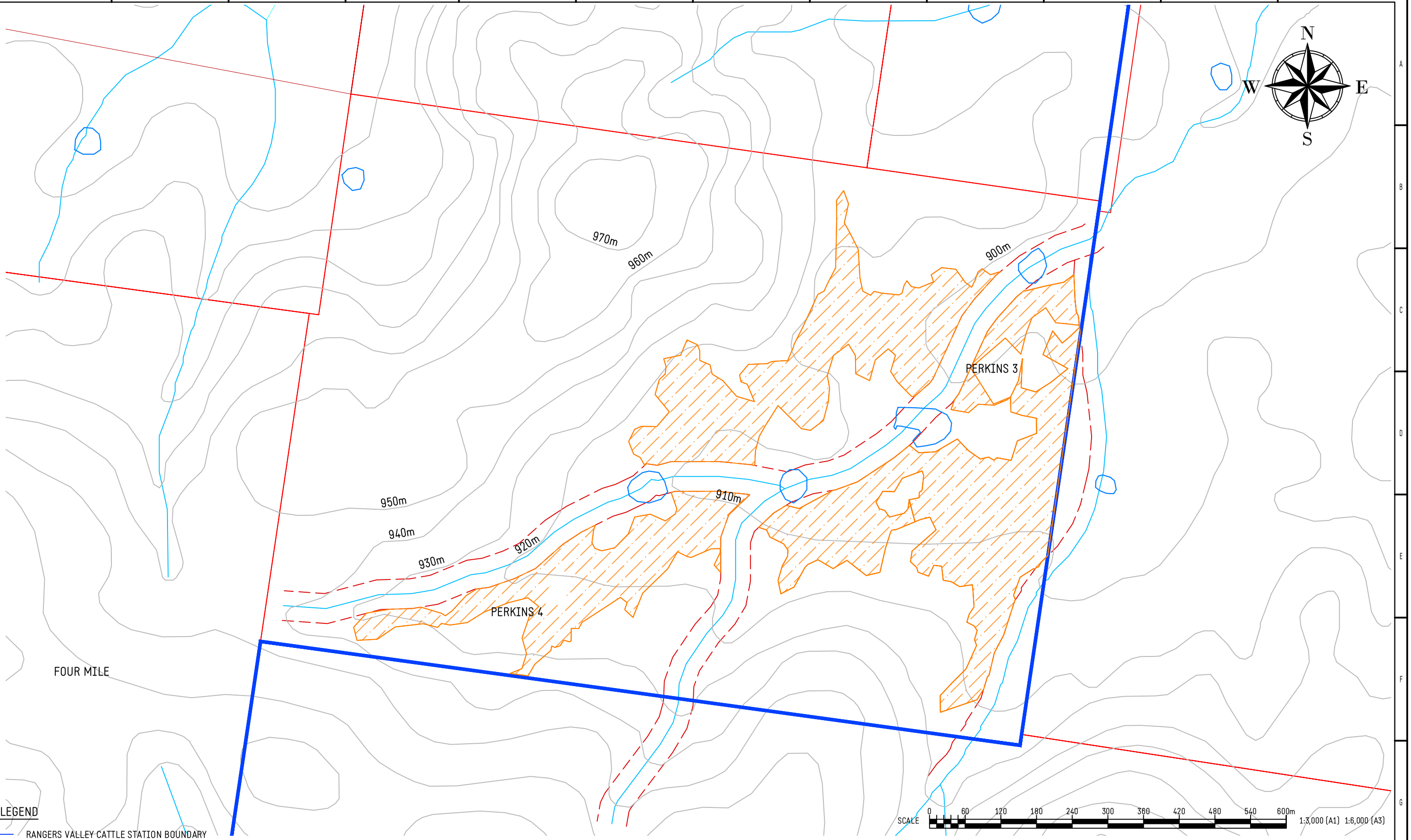
CLIENT RANGERS VALLEY CATTLE STATION PTY LTD

PROJECT RANGERS VALLEY FEEDLOT EXPANSION

TITLE RESPONSE TO EPA SUBMISSION
PROPOSED ADDITIONAL MANURE APPLICATION AREA - TOP SUGARLOAF

REPORT REFERENCE	SUPPLIED DRAWING NUMBER		DRAWING NUMBER	REV.
FIGURE 11		A3	A8-114-20-11	B



LEGEND

- RANGERS VALLEY CATTLE STATION BOUNDARY
- LAND PARCEL BOUNDARY
- WATERCOURSE
- INTERNAL DRAINAGE LINE
- 10m CONTOUR
- MANURE APPLICATION AREA - PERKINS 3 (~17.5 Ha)
- MANURE APPLICATION AREA - PERKINS 4 (~8.5 Ha)
- INTERNAL DRAINAGE LINE BUFFER - 25m
- WATERCOURSE BUFFER - 100m

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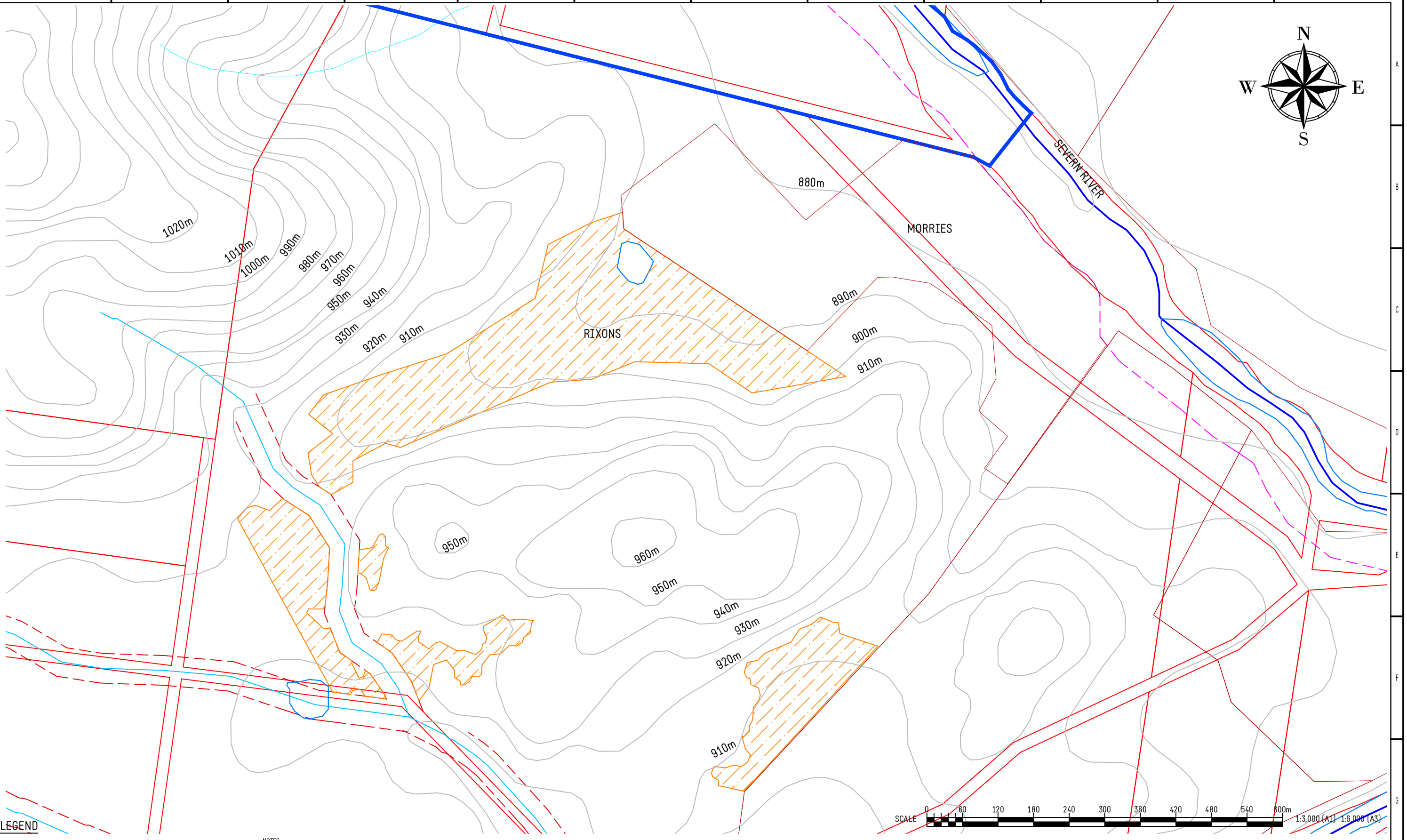
CLIENT: RANGERS VALLEY CATTLE STATION PTY LTD
PROJECT: RANGERS VALLEY FEEDLOT EXPANSION
TITLE: RESPONSE TO EPA SUBMISSION
PROPOSED ADDITIONAL MANURE APPLICATION AREA - PERKINS 3 & 4

REPORT REFERENCE: FIGURE 12
SUPPLIED DRAWING NUMBER:
A3
DRAWING NUMBER: A8-114-20-12
REV.: B

DATE PLOTTED: 14 June 2019 BY: - RDC Engineers PTY LTD
XREF's: Glen Innes Severn Topo Contour Z56
FILE NAME: A8-114 Rangers Valley Master Plan RDCE.dwg
FILE PATH: C:\RDC Engineers\RDCE - Projects\A8-114 Rangers Valley FL Expansion\05 - ACAD MasterPlan\05.1 Drawings - CURRENT



LEGEND

- RANGERS VALLEY CATTLE STATION BOUNDARY
- LAND PARCEL BOUNDARY
- WATERCOURSE
- INTERNAL DRAINAGE LINE
- 10m CONTOUR
- MANURE APPLICATION AREA - RIXONS (~20 Ha)
- INTERNAL DRAINAGE LINE BUFFER - 25m
- WATERCOURSE BUFFER - 100m

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REV.	DATE	REVISION DESCRIPTION	DRAWN	CHECK	APPROVED
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B	10/06/19	FINAL FOR SUBMISSION TO EPA	RJD	RJD	RJD

SCALE	1:6,000 (A3)
DRAWN	RJD
DATE	10/06/2019
CHECKED	RJD
DATE	10/06/2019
APPROVED	RJD
DATE	10/06/2019

CLIENT: RANGERS VALLEY CATTLE STATION PTY LTD
PROJECT: RANGERS VALLEY FEEDLOT EXPANSION
TITLE: RESPONSE TO EPA SUBMISSION
PROPOSED ADDITIONAL MANURE APPLICATION AREA - RIXONS

REPORT REFERENCE	SUPPLIED DRAWING NUMBER		DRAWING NUMBER	REV.
FIGURE 13		A3	A8-114-20-13	B

RIXONS

BACK PADDOCK

BEARDY 1

990m
980m
970m
960m
950m
940m
930m
920m
910m

N
W
E
S

SCALE 0 60 120 180 240 300 360 420 480 540 600m
1:3,000 (A1) 1:6,000 (A3)

LEGEND

- RANGERS VALLEY CATTLE STATION BOUNDARY
- LAND PARCEL BOUNDARY
- WATERCOURSE
- INTERNAL DRAINAGE LINE
- 10m CONTOUR
- MANURE APPLICATION AREA - BACK PADDOCK (~34 Ha)
- INTERNAL DRAINAGE LINE BUFFER - 25m
- WATERCOURSE BUFFER - 100m

NOTES:
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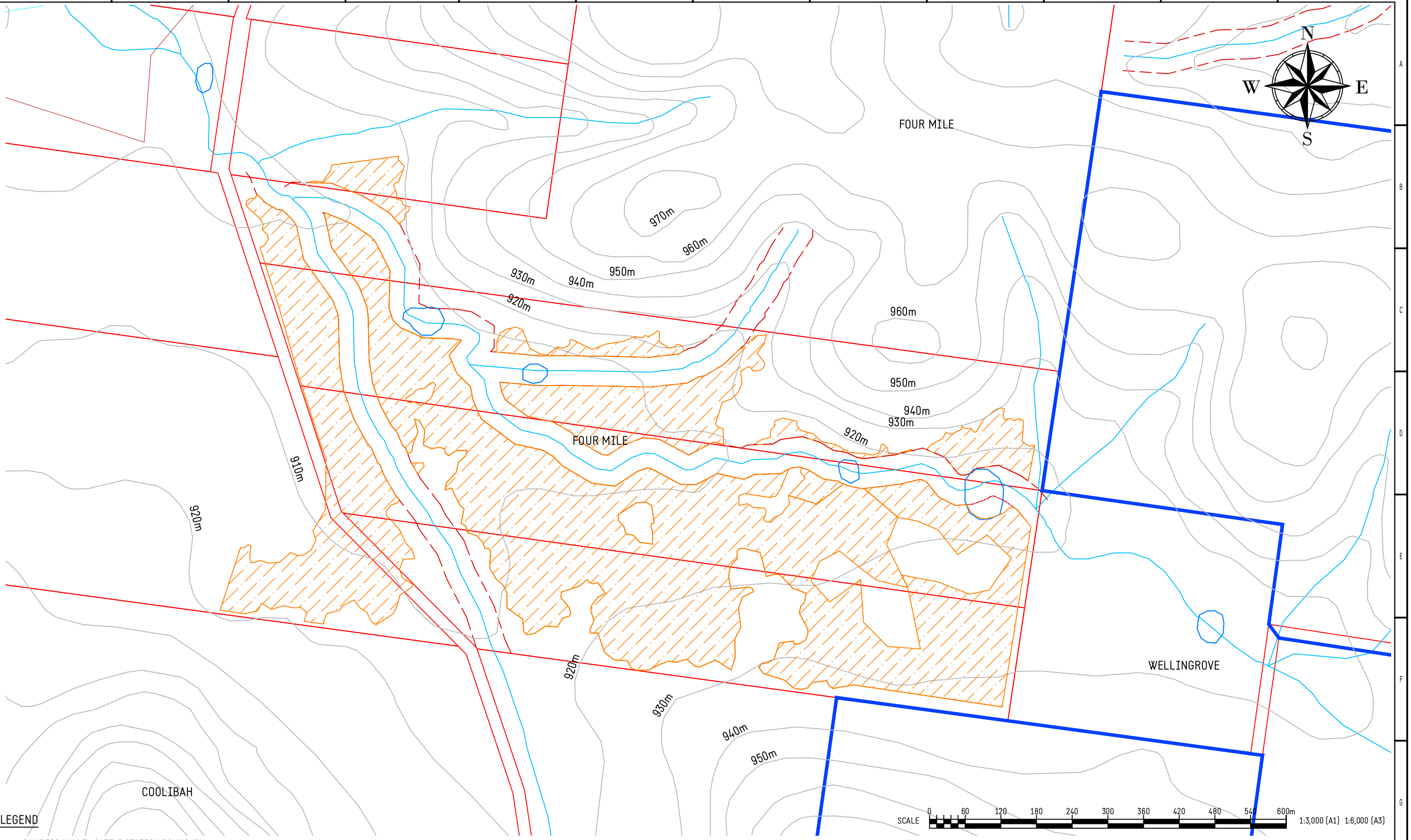
DATE	10/06/2019
APPROVED	RJD
DATE	10/06/2019

CLIENT RANGERS VALLEY CATTLE STATION PTY LTD
PROJECT RANGERS VALLEY FEEDLOT EXPANSION
TITLE RESPONSE TO EPA SUBMISSION
PROPOSED ADDITIONAL MANURE APPLICATION AREA - BACK PADDOCK

REPORT REFERENCE	SUPPLIED DRAWING NUMBER		DRAWING NUMBER	REV.
FIGURE 14		A3	A8-114-20-14	B



LEGEND

- RANGERS VALLEY CATTLE STATION BOUNDARY
- LAND PARCEL BOUNDARY
- WATERCOURSE
- INTERNAL DRAINAGE LINE
- 10m CONTOUR
- MANURE APPLICATION AREA - FOUR MILE (~42 Ha)
- INTERNAL DRAINAGE LINE BUFFER - 25m
- WATERCOURSE BUFFER - 100m

NOTES:

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DRAWN	RJD	
DATE	10/06/2019	
CHECKED	RJD	
DATE	10/06/2019	
APPROVED	RJD	
DATE	10/06/2019	

CLIENT: RANGERS VALLEY CATTLE STATION PTY LTD
PROJECT: RANGERS VALLEY FEEDLOT EXPANSION
TITLE: RESPONSE TO EPA SUBMISSION
PROPOSED ADDITIONAL MANURE APPLICATION AREA - FOUR MILE

REPORT REFERENCE	SUPPLIED DRAWING NUMBER		DRAWING NUMBER	REV.
FIGURE 15		A3	A8-114-00-15	B

FILE PATH: C:\RDC Engineers\RDCE - Projects\A8-114 Rangers Valley FL Expansion\05 - ACAD MasterPlan\05.1 Drawings - CURRENT FILE NAME: A8-114 Rangers Valley Master Plan RDCE.dwg
XREF's: Glen Innes Severn Topo Contour 256
DATE PLOTTED: 14 June 2019 BY : RDC Engineers PTY LTD

2.4 Proposed amendments to development application conditions

As outlined in the '*Environmental Assessment - Rangers Valley Feedlot DA Modification, Report Number 24072.87581',* dated 23 July 2018 prepared by EnviroAg Australia Pty Ltd. the proponent was seeking to remove reference to collection of sigma theta and air temperature data at 10m which is currently specified in condition 4.2 of Development Consent (261-8-2002-i).

However, the Proponent understands that these data would be used in any future odour modelling and impact assessment, should the Proponent proceed to Stage 2 of the development (50,000 head). Consequently, it is proposed to continue collecting sigma theta and air temperature data at 10m in accordance with condition 4.2 of Development Consent (261-8-2002-i).

3 References

AREA Environmental Consultants & Communication Pty Ltd, 2019, Biodiversity Development Assessment Report, Rangers Valley Feedlot, Proposed manure and effluent utilisation areas, AREA Environmental Consultants & Communication Pty Ltd, Dubbo, NSW.

Department of Infrastructure, Planning and Natural Resources (DIPNR), 2004, Ministerial Consent - Integrated DA No. DA-261-8-2002-i, NSW Government Department of Infrastructure, Planning and Natural Resources.

Department of Environment and Conservation (NSW), 2004, Effluent Guidelines, Use of Effluent by Irrigation, Department of Environment and Conservation (NSW), Sydney, NSW.

EA Systems, 2002, Environmental Impact Statement, Feedlot Expansion, Rangers Valley Cattle Station, Armidale, NSW.

EnviroAg Australia Pty Ltd, 2018a, Environmental Assessment - Rangers Valley Feedlot DA Modification, Report Number 24072.87581, Armidale, NSW.

EnviroAg Australia Pty Ltd, 2018b, Rangers Valley Feedlot Expansion Revised NW/SW Catchment Design and Modelling, Report Number 24072.98866, Armidale, NSW.

Integrity Ag & Environment, 2018, Annual Environmental Management Report: Rangers Valley Feedlot, Monitoring Period 1 September 2017 to 31 August 2018. Integrity Ag & Environment, Highfields, QLD 4352.

NSW Agriculture, 1997, The NSW Feedlot Manual, The Inter-Departmental Committee on Intensive Animal Industries (Feedlot Section), NSW Agriculture, Orange, NSW.

Meat and Livestock Australia, 2012a, National Guidelines for Beef Cattle Feedlots in Australia 3rd Edition, Meat & Livestock Australia, North Sydney, NSW.

Meat and Livestock Australia, 2012b, National Beef Cattle Feedlot Environmental Code of Practice 2nd Edition, Meat & Livestock Australia, North Sydney, NSW.

Meat and Livestock Australia, 2016a, Beef Cattle Feedlots: Design and Construction, Meat and Livestock Australia, North Sydney, NSW

Meat and Livestock Australia, 2016b, Beef cattle feedlots: waste management and utilisation, Meat and Livestock Australia, North Sydney, NSW

Annexure A – EPA Request for Information

Our reference: : SF15/32773; DOC18/636092
Contact: : Rebecca Scrivener – 02 6773 7000 – armidale@epa.nsw.gov.au
Date : 03 September 2018

Mr Shaun Williams
Industry Assessments
GPO Box 39
SYDNEY NSW 2001

Email: shaun.williams@planning.nsw.gov.au **BY EMAIL**

Dear Mr Williams,

RE: RANGERS VALLEY CATTLE FEEDLOT s4.55(1A) MODIFICATION - DA 261-8-2002-i MOD 2

I refer to your email of 10 August 2018 seeking our review and comments on the proposed modification to Rangers Valley Cattle Feedlot located in Glen Innes Severn Shire Council area. The Environment Protection Authority (EPA) appreciates the extension to complete our review.

The EPA notes the proposed modification seeks the following:

1. Allow for configuration changes to the layout and staging of pens proposed for the remaining forward stages of the feedlot
2. Incorporate an emergency wet weather manure storage area, within the existing footprint of the feedlot
3. Increase the traffic movement hours
4. Alter both the effluent and manure utilisation areas
5. Modify some consent conditions to align with Environment Protection Licence #3864, feedlot and farm operations

The EPA has reviewed the supporting documentation titled, '*Environmental Assessment - Rangers Valley Feedlot DA Modification, Report Number 24072.87581',* dated 23 July 2018 and prepared by EnviroAg Australia (the EA). The EPA also reviewed previous assessment reports prepared by the Department of Planning and Environment dated November 2003 and December 2009 for previous modifications to Project Approval 261-8-2002-i.

I note the current operating capacity of the feedlot is 30,000 head and has approval hold up to a maximum of 40,000 head as per Stage 1 of Project Approval 261-8-2002-i. The proponent does not intend to progress with Stage 2 of the development, being to increase capacity to 50,000 head, at this point in time.

Odour

Odour was one of the key issues considered in determining the expansion of the Rangers Valley Feedlot as a two-staged project in 2003/04.

In reviewing the current modification, the EPA defers to the odour impact assessment carried out for the 2003/04 determination as there was no revised odour assessment provided with the current modification.

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Several odour mitigation measures were identified including frequency of cleaning pens, stocking rates, the slope of the pen areas to promote rapid drying of pen surfaces and placement of treatment ponds away from drainage areas and nearby neighbours.

The EPA notes improved sloping and drainage of pens form the basis of the proposed changes to pen configuration and also notes stocking density will be maintained at 16.5m^2. The proposed change to drainage of the north-western catchment, to report to a larger sediment dam and holding pond in the south-western catchment also moves these potential odour sources away from neighbours to the north-west of the site.

The EPA is satisfied that the proposed modification will not increase the number of odour sources or increase the potential odour generation from the feedlot operation. The EPA expects the performance of the feedlot to, at a minimum, meet relevant odour criteria and continue implementation of mitigation measures committed to in the assessment process for the original determination.

Recommended Conditions: The EPA has not recommended any general terms of approval for this aspect of the modification and relies on the current Project Approval and EPL conditions as they relate to odour.

Surface Water and Effluent Management in Controlled Drainage Area

The proposed changes to sediment basins and holding ponds within the controlled drainage areas appears to be consistent with industry design and performance standards. Holding ponds will be designed to capture the 90%-ile wet year and drains will be designed to carry a peak flow rate equivalent to that from a design storm event of 1 in 20-year ARI. Sedimentation basins will be designed so that holding time allows for settling of a minimum of 50% solids entrained from the controlled drainage area following a design storm event of 1 in 20-year ARI.

I also note that the emergency wet weather manure storage areas will be located within the controlled drainage area and that any liquid generated from the storage areas will be captured within the controlled drainage area holding pond system.

Recommended Conditions: The EPA has not recommended any general terms of approval for this aspect of the modification and relies on the current Project Approval and EPL conditions as they relate to surface water and effluent management in the controlled drainage area.

Proposed Effluent Irrigation Areas, Manure Application Areas and Terminal Ponds

The EA identifies new areas for effluent irrigation and manure application.

Effluent irrigation methods will be via large lateral move and centre pivot irrigators and areas of drip irrigation. The EPA supports this method of irrigation and expects these parcels of land to be incorporated into the existing soil monitoring program at the premises. The EPA also expects that effluent application will be carried out at a rate that does not exceed the capacity of the area to effectively utilise the effluent.

Terminal ponds will be designed to store runoff equivalent to a minimum of 12mm over the entire effluent irrigation area, expected to be generated following storm events. These ponds will also have a pond spillway designed to accommodate runoff from a 1 in 20-year design storm event. The EPA supports the design criteria of the proposed terminal ponds and notes this is consistent with current industry practice.

The EPA notes the Hydrological Assessment provided in the appendices states that a tail water drain will be installed to the “south of the flood irrigation area”. It is unclear where this flood irrigation area is.

The EPA does not support flood irrigation as a method of effluent application in this instance due to the varying quality of soil and soil properties across the site. The EPA is concerned flood irrigation may create ‘hot spots’ of nutrients and/or sodicity across the soil profile.

The EA states that manure will be applied to improved pasture and cropping areas and not to timbered areas. The manure application areas identified on Figure 7 of the EA main document appears to be all fully timbered and on ridge lines or steeper country.

The EPA does not support the application of manure to timbered land or to the new, purple shaded areas identified in Figure 7 of the EA. The EPA defers to existing conditions 3.31 to 3.34 inclusive, of the current consent and recommends these conditions remain as drafted in Project Approval 261-8-2002-i.

Recommended Condition: The EPA recommends the following condition be included into the consent, should the modification be approved.

1. The proponent must only apply effluent to irrigation areas via spray, pivot or drip irrigation methods.

Proposed Amendments to Development Application Conditions

The proponent is seeking to remove reference to collection of sigma theta and air temperature data at 10m which is currently specified in condition 4.2 of project approval 261-8-2002-i.

The EPA does not support this proposed amendment as data collected in accordance with condition 4.2 will be used in future odour modelling and assessment, should the proponent proceed to Stage 2 of the development. Collection and use of on-site data in modelling is preferred to synthetic databases as this provides a more realistic and accurate prediction on potential impacts from activities at the site.

The EPA does not have any comment on the remaining conditions referred to in the EA. The proposed amendments to these conditions do not affect the current EPL conditions.

Changes to the Environment Protection Licence

If the modification is approved, the proponent will need to submit a licence variation application form to include any new monitoring or discharge points, including any additional soil quality monitoring sites. The EPA may also use the opportunity to update map references in the EPL as appropriate.

Please contact Rebecca Scrivener on (02) 6773 7000 or by email to armidale@epa.nsw.gov.au to discuss this matter further.

Yours sincerely,

ROBERT O'HERN
Head Regional Operations Unit
Environment Protection Authority

rod.davis@rdcengineers.com.au

From: Rebecca Scrivener <Rebecca.Scrivener@epa.nsw.gov.au> on behalf of EPA RSD Armidale Mailbox <Armidale@epa.nsw.gov.au>
Sent: Friday, 21 December 2018 9:19 AM
To: rod.davis@rdcengineers.com.au
Cc: Sean McGee; Keith Howe; Mark Whyte; Duncan McGregor
Subject: RE: Rangers Valley Feedlot (DA 261-8-2002-i MOD 2) development application - Response to EPA submission - Manure application areas

Hi Rod,

The EPA has carried out a very coarse and brief review of the draft document titled "*Response to EPA request for additional information in relation to Development Application 261-8-2002-i MOD 2 – Notice of Section 4.55(1A) – Modification to Rangers Valley Cattle Feedlot - Rangers Valley Cattle Station Pty Ltd -1304 Rangers Valley Road Glen Innes NSW 2370*".

The additional information regarding the manure application areas clarifies how these areas will be managed to address EPA concerns regarding potential pollute waters issues and land pollution (ie maintaining soil health). I note that manure is proposed to be applied to land that is already under cultivation for improved pasture and it is not proposed to apply manure to steep ridgelines or timbered land. I also note buffer zones have been identified around major and minor drainage lines to minimise the risk of pollution of waters. The manure application areas will also be incorporated in the broader soil monitoring program for the premises and soil testing will occur prior to manure application.

Further justification for the proposed buffer distances to water resources should be included in the final report. I note you have referenced DEC 2004, Effluent Guidelines, Use of Effluent by Irrigation, Department of Environment and Conservation (NSW), Sydney, NSW. Table 4.9 of these guidelines recommends buffer distances and delineates between 'low strength' and 'medium to high strength' effluent. The EPA recommends some explanation be provided regarding the strength of the effluent/manure in this context, particularly for internal natural drainage lines where the draft report states a 25m buffer will be applied, while the guidelines refer to "site specific".

Please note that a more detailed review will be carried out on receipt of the final report. A more detailed review may identify further information that has not been identified above.

Please call me if you wish to discuss anything above, further.

Regards,

Rebecca Scrivener
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I acknowledge the Aboriginal nations of the New England, North West Region as the traditional custodians of the lands upon which I live and work, and I pay my respects to their elders, past, present and future.

From: rod.davis@rdcengineers.com.au <rod.davis@rdcengineers.com.au>
Sent: Wednesday, 12 December 2018 11:11 AM
To: EPA RSD Armidale Mailbox <Armidale@epa.nsw.gov.au>
Cc: Sean McGee <mcgees@rangersvalley.com.au>; Keith Howe <howek@rangersvalley.com.au>; Mark Whyte <whytem@rangersvalley.com.au>
Subject: Rangers Valley Feedlot (DA 261-8-2002-i MOD 2) development application - Response to EPA submission - Manure application areas

Good Morning Rebecca,

I have prepared a draft response for manure application areas to the EPA request for additional information for Rangers Valley Feedlot (DA 261-8-2002-i MOD 2) development application based on our discussions a few weeks ago.

The report is only a draft as the section on the catchment areas is not complete as there is work being completed by EnviroAg that will be included when it is finalised. The controlled drainage areas remain the same but the staging plan is being revised.

Would you please be able to review the attached document in particular the section on the proposed additional manure application areas and provide comments on EPA's position on the suitability of these areas for inclusion based on the additional information provided. We are seeking advice from EPA prior to undertaking a biodiversity assessment on these areas to address the concerns raised by OEH on these areas in mid-January.

Any questions please call.

Regards,

Rod Davis
Director
—
0427629203
rod.davis@rdcengineers.com.au

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Annexure B – Enviro Ag Australia Pty Ltd Hydrologic modelling

Briefing Note

Our Reference: 24072.98866
Revision #: Rev0
Date: 14th December 2018

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Rangers Valley Feedlot Expansion

Revised NW/SW Catchment Design and Modelling

1. Introduction/Background

Rangers Valley Cattle Station Pty Ltd (Rangers Valley) engaged EnviroAg Australia Pty Ltd (EnviroAg) to undertake additional hydrological modelling on the combined NW/SW Catchment for the proposed feedlot expansion.

Further changes to the staging of the development and a desire to minimize costs for works on Stage 3 and segregation of catchments are the causal for the added modelling.

As part of the modelling added checks of the physical and hydraulic grades of the main east-west drain, sediment basin and holding ponds were made. It was re-confirmed that existing sediment basins and holding pond structures and their storage capacities and top water levels restrict the development footprint and drainage characteristics of the feedlot.

2. Design Updates

The following drawings have been amended or created to complete this revision of the NW/SW Catchment;

- Rangers Valley Site Plan – NW/SW Catchment (See Appendix A)
- Concept Design – Stage Identification (See Appendix B)
- Concept Design – Land Use Areas (See Appendix C)
- Holding Pond Plan and Section (See Appendix D)

3. Land Use Areas – revised Stage Catchments

Due to the changes made in the number and layout of pens, drains, roads, etc, it was necessary to revise and re calculate the land use areas for the NW/SW Catchment. These revised values are presented in Table 1, and some of these values were then used in the FSIM modelling application.

Hydraulic grades were re checked. It was confirmed that existing sediment and holding ponds could be used "as is". Based on discussions with Mr Sean McGee of Rangers Valley various options for repositioning of storages were explored.

Table 1 Land Use Areas

		NWSW		*NE*	*SE*	TOTAL
Land Use	**ID**	**Individual Areas (m2)**	**Sub-Total (m2)**	**Area (m2)**	**Area (m2)**	**Area (m2)**	**Area (m2)**
Roads (all)				16,409.16	14,730.20	59,767.57	**90,906.93**
Roof (offices, sheds, feedmill)				18,501.01		936.72	**19,437.73**
Pens				161,699.99	115,500.00	244,260.00	**521,459.99**
Drains (pens)				17,113.80	11,550.00	11,992.20	**40,656.00**
Drains (other)				5,363.37	4,867.19		**10,230.57**
Manure storage / composting areas	Current		24,603.60	42,619.22	43,529.92		**86,149.14**
	SB1	5,235.21	18,015.62				
	SB2	12,780.41					
Silage pits				25,283.07			**25,283.07**
Hard stand / storage areas				39,539.79			**39,539.79**
Extraneous areas				430,735.06	19,795.52	200,910.06	**651,440.64**
SB	HP1	12,382.28		14,118.30	21,204.11	85,179.19	**120,501.60**
	HP2	46,498.27					
Holding Ponds	HP3	15,051.59	65,382.17	61,770.94	54,743.06	30,604.26	**147,118.26**
	HP4	3,832.31					
Sub Total (less extraneous areas)				402,418.66	266,124.48	432,739.94	**1,101,283.08**
Total				**833,153.72**	**285,920.00**	**633,650.00**	**1,752,723.72**

4. Updated Capacities

Table 2 presents a detailed comparison of the existing and proposed sediment pond and holding pond areas and capacities. Included are the advised values from Rangers Valley, the values from the original design and modelling, and the new calculated values based on the revised design and modelling.

Total surface areas and volumes for sediment ponds and holding ponds were calculated based on the changes in preparation for use in the FSIM modelling application. These values are presented in Table 3.

Table 2 Surface Area and Capacity Check and Calculations

RV Advised		EnviroAg Design Check / Calculations											
		New Design (Stage 3a)							Revised (Stage 3a)				
Ref	**ML**	**New Ref**	**Surface (m^2)**	**Depth Av (Estimate) (m)**	**Approx Vol (ML)**	**Top of Embankment**	**Less 1m = Freeboard Top of water line (TWL)**	**TWL**	**Bottom of Drain**	**Surface (m2)**	**TWL**	**Bottom of Drain**	**Approx Vol (ML)**
									906.826			906.826	
W1 (Sed)	**8**	**HP1/ New Sed**	14,118.30	1.00	14.12	910.02	909.02	906		12,382.28	**906**		**14.6**
W2	**62**	**HP2**	43,480.01	2.00	86.96	907.52	906.52	905.5		46,498.27	**905.5**		**98.11**
W3	**5**	**HP3**	14,458.62	1.00	14.46	904.55	903.55			15,051.59	**904**		**15.29**
W4	**5**	**HP4**	3,832.31	1.00	3.83	901.88	900.88			3832.31			3.83

Table 3 Revised Surface Areas and Capacity Totals

	Surface (m^2)	Approx Vol (ML)
Sediment Pont	12,382.28	14.6
Holding Ponds	65,382.17	117.23

5. FSIM Modelling

Land use areas from Table 1 were used in the modelling.

The irrigable area required for the development was apportioned to the SW catchment area (100-150ha of irrigable area rotated across summer and winter crop types).

Using the various parameters (surface areas, volumes, etc) that have been calculated using the revised design for HP1 (Sediment Basin), HP2 and HP2, FSIM modelling was run using 126 years of rainfall data at Rangers Valley. This resulted in a total of 5 spills during the 126 year period. This satisfactorily exceeds the required spill rate of 1 in 10 years or less.

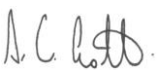
6. Conclusion/Recommendation

Rangers Valley Cattle Station Pty Ltd (Rangers Valley) engaged EnviroAg Australia Pty Ltd (EnviroAg) to undertake additional hydrological modelling on the combined NW/SW Catchment for the proposed feedlot expansion. Changes to the staging of the development and a desire to minimize costs for works on Stage 3 and segregation of catchments are the causal for the added modelling.

Added checks of the physical and hydraulic grades of the main east-west drain, sediment basin and holding ponds were made. It was re-confirmed that existing sediment basins and holding pond structures and their storage capacities and top water levels restrict the development footprint and drainage characteristics of the feedlot.

Removal of existing sediment basin embankments is required. A new sediment pond is to be placed in the current Holding Pond 1. Holding ponds 2 and 3 can be reconfigured with lowered embankments, top water levels, and increases in capacities through excavation.

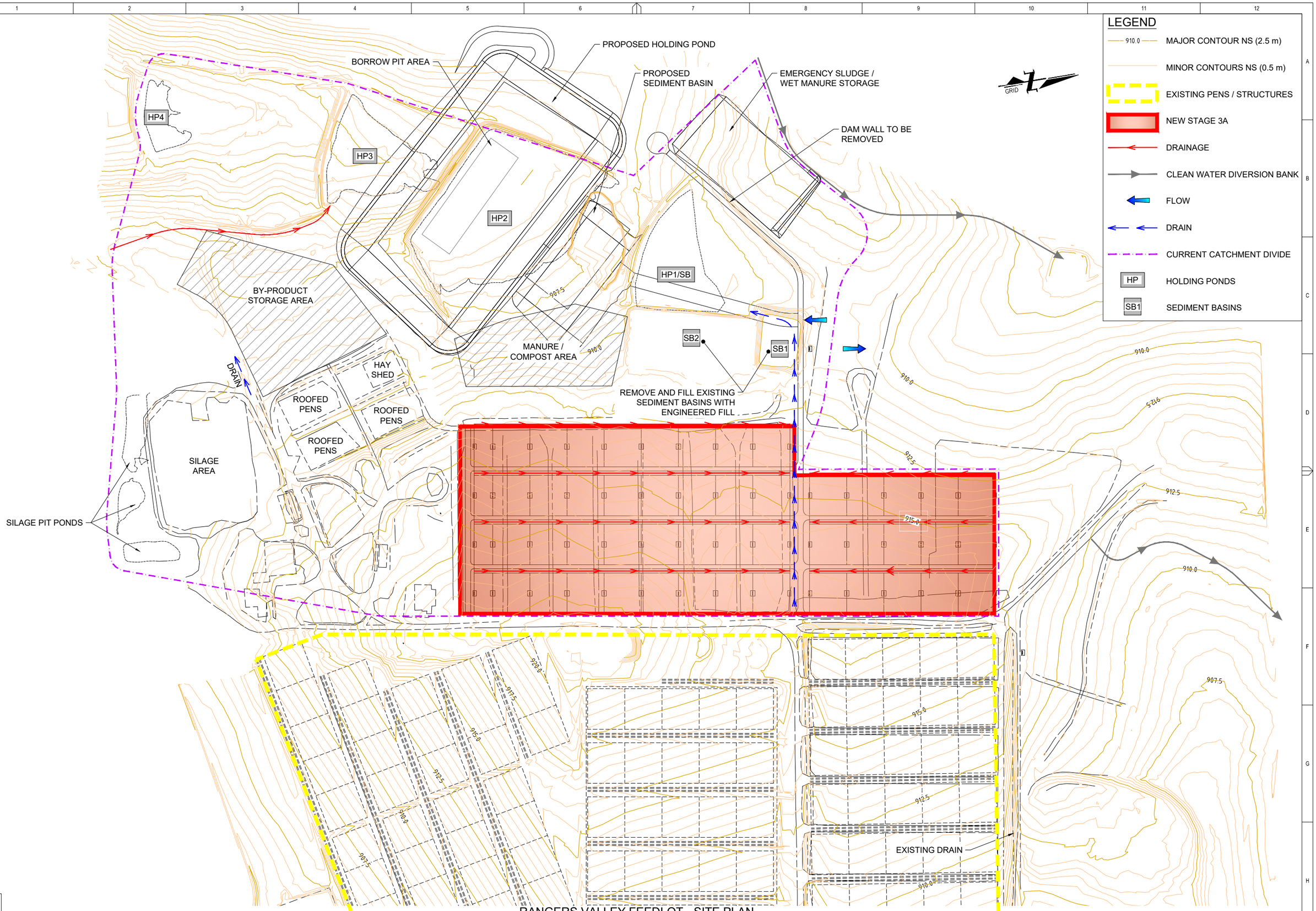
A combined holding pond capacity of 117ML can be achieved in the redeveloped HP2 and HP3. The probable excavation internal to the storage is likely to be 20-40,000m3. This does not include any works to lower, reshape or modify or improve the embankments. It is not possible to quantify the exact amount of works required because of unknown levels through the waste water areas.

Signed:  Date: 14 December 2018

Simon Lott
Specialist Engineer
EnviroAg Australia Pty Limited

7. Appendices

Appendix A. Rangers Valley Site Plan – NW/SW Catchment



RANGERS VALLEY FEEDLOT - SITE PLAN

SCALE 1 : 2500

2

RANGERS VALLEY SITE PLAN - R2

Appendix B. Concept Design – Stage Identification

RANGERS VALLEY FEEDLOT EXPANSION 2D CONCEPT - PLAN

SCALE 1 : 5000

0 200 300 500

Scale - metres 1:5000
1cm = 50m

DRAWING NO.	REFERENCE DRAWING TITLE	REV	DATE	REVISION DESCRIPTION	DRAWN	DWG CHECK	DESIGN	ENG DES CHECK	DRAFT SUPER	PROJECT APPROVAL
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		C	13/11/2018	ISSUED FOR REVIEW - REVISED PEN LAYOUT	RDC	SL	PP			
		B	20/07/2018	ISSUED FOR REVIEW - REVISED PEN LAYOUT	RDC	SL	PP			
		A	06/07/2018	ISSUED FOR REVIEW	RDC	SL	PP			

APPROVALS

PREPARED FOR:

PREPARED BY:
3RE
RURAL REGIONAL AND REMOTE ENGINEERING
TOOWOOMBA OFFICE T: 07 4638 3033
PO BOX 411
3 FOUNDRY ST
TOOWOOMBA QLD 4350

PROJECT 30466 | DRAWING OFFICE TOOWOOMBA

	BY	DATE
DRAWN	RDC	27/11/2018
DWG CHECK	PP	27/11/2018
DESIGN	PP	
ENG DES CHECK	SL	
DRAFT, SUPER.		
PROJECT APPROVAL		

TITLE
RANGERS VALLEY PTY LTD
RANGERS VALLEY FEEDLOT EXPANSION
CONCEPT - STAGE IDENTIFICATIONS

PROJECT NO. 30466 | DRAWING NO. 30466.CC.001C | REVISION D
MOD NO.
SCALE AS SHOWN | CADFILE 30466.CC.001C 2D CONCEPT DESIGN - STAGE IDENTIFICATION - Rev D.dwg | A1

P:\3_WB\0030466 - EAG - RANGERS VALLEY FLOT CONCEPT DESIGN - 2016\GRAPHICS\AUTOCAD\MODELS\30466.CC.001C 2D CONCEPT DESIGN - STAGE IDENTIFICATION - REV D.DWG Remus Dela Cruz
Wed, 28 Nov 2018 - 3:42pm

30466.CC.001C - REV D

RANGERS VALLEY FEEDLOT EXPANSION 2D CONCEPT - PLAN

SCALE 1 : 5000

0 200 300 500

Scale - metres 1:5000
1cm = 50m

DRAWING NO.	REFERENCE DRAWING TITLE	REV	DATE	REVISION DESCRIPTION	DRAWN	DWG CHECK	DESIGN	ENG DES CHECK	DRAFT SUPER	PROJECT APPROVAL
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		F	20/07/2018	ISSUED FOR REVIEW - REVISED PEN LAYOUT	RDC	SL	PP			
		E	30/05/2018	ISSUED FOR REVIEW - REVISED ZONINGS and PEN NUMBERS	RDC	SL	PP			
		D	16/04/2018	ISSUED FOR REVIEW - REVISED ZONINGS and PEN NUMBERS	RDC	SL	PP			
		C	6/04/2018	ISSUED FOR REVIEW - REVISED ZONINGS	RDC	SL	PP			
		B	27/02/2018	ISSUED FOR REVIEW - ADDITIONAL 42.5 PENS	RDC	SL	PP			
		A	12/12/2017	ISSUED FOR REVIEW - ADDITIONAL 40 PENS	RDC	SL	PP			

APPROVALS

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PREPARED BY:

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PROJECT: 30466
DRAWING OFFICE: TOOWOOMBA

	BY	DATE
DRAWN	RDC	27/11/2018
DWG CHECK	PP	27/11/2018
DESIGN	PP	
ENG DES CHECK	SL	
DRAFT, SUPER.		
PROJECT APPROVAL		

TITLE:
RANGERS VALLEY PTY LTD
RANGERS VALLEY FEEDLOT EXPANSION
CONCEPT - STAGE IDENTIFICATIONS

PROJECT NO.: 30466
DRAWING NO.: 30466.CC.001A
REVISION: H
MOD NO.:
SCALE: AS SHOWN
CADFILE: 30466.CC.001A 2D CONCEPT DESIGN - STAGE IDENTIFICATION - Rev H.dwg
A1

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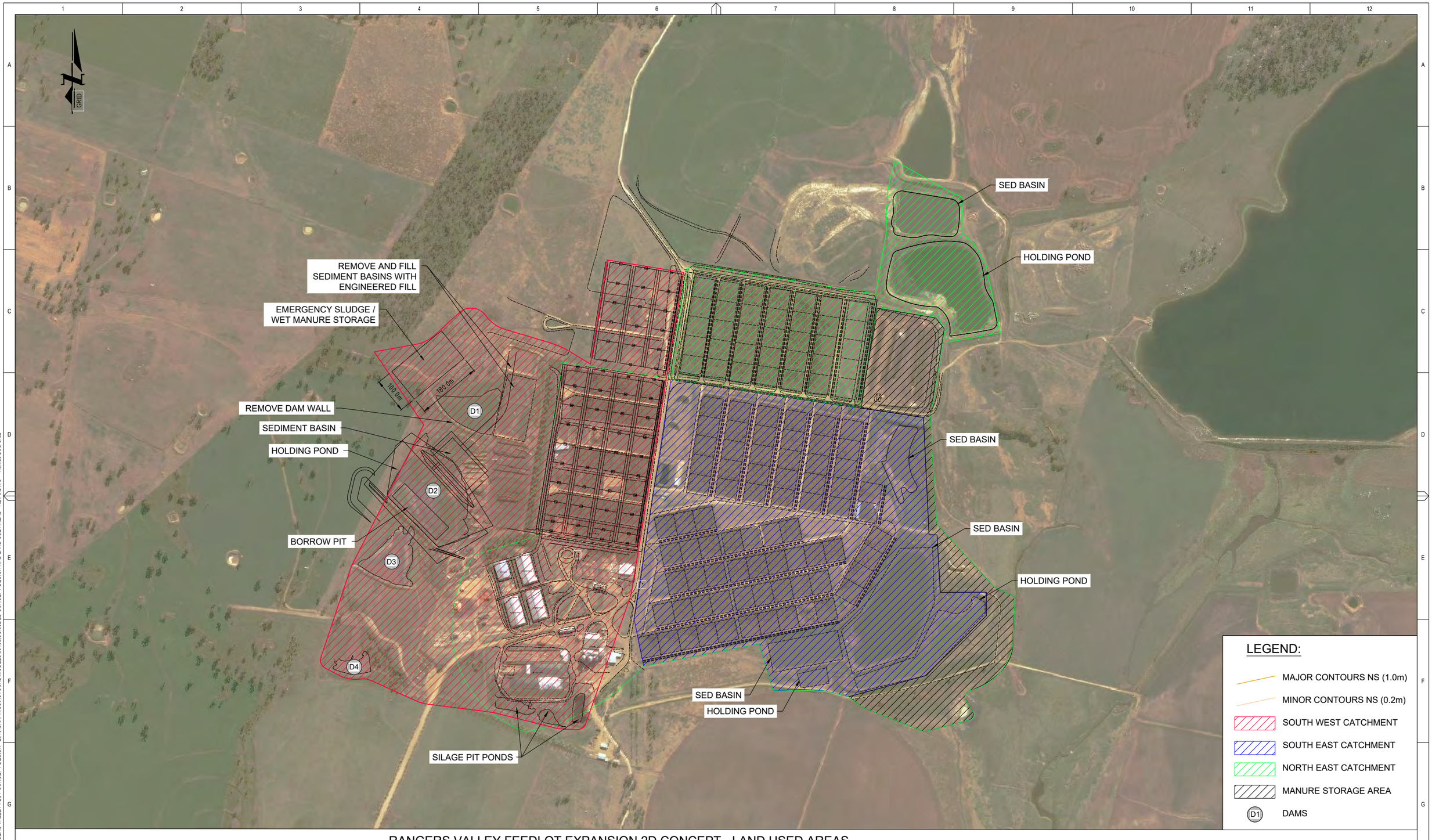
Wed, 28 Nov 2018 - 3:42pm

30466.CC.001A - REV H

Appendix C. Concept Design – Land Use Areas



RANGERS VALLEY FEEDLOT EXPANSION 2D CONCEPT - LAND USED AREAS

SCALE 1 : 5000

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Scale - metres 1:5000
1cm = 50m

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		I	13/11/2018	ISSUED FOR REVIEW, NEW PEN LAYOUT	RDC	SL	PP			
		H	20/07/2018	ISSUED FOR REVIEW, NEW PEN LAYOUT	DN/RDC	SL	PP			
		G	30/05/2018	ISSUED FOR REVIEW, NEW PENS	DN/RDC	SL	PP			
		F	18/04/2018	ISSUED FOR REVIEW, NEW PENS and ADDITIONAL CATCHMENT	DN	SL	PP			
		E	16/10/2017	ISSUED FOR REVIEW	DN	SL	PP			
		D	21/09/2017	ISSUED FOR REVIEW	AD	SL				
		C	15/09/2017	ISSUED FOR REVIEW	A.D.	SL/SG				
		B	02/08/2017	ISSUED FOR REVIEW	AD	KH				

APPROVALS

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PROJECT 30466

DRAWING OFFICE TOOWOOMBA

	BY	DATE
DRAWN	RDC	27/11/2018
DWG CHECK	PP	27/11/2018
DESIGN	PP	
ENG DES CHECK	SL	
DRAFT. SUPER.		
PROJECT APPROVAL		

TITLE
RANGERS VALLEY PTY LTD
RANGERS VALLEY FEEDLOT EXPANSION
CONCEPT - LAND USED AREAS

PROJECT NO. 30466

DRAWING NO. 30466.CC.002

REVISION J

MOD NO.

SCALE 1:5000

CADFILE 30466.CC.002 2D CONCEPT DESIGN AND LAND USE AREAS - Rev J.dwg

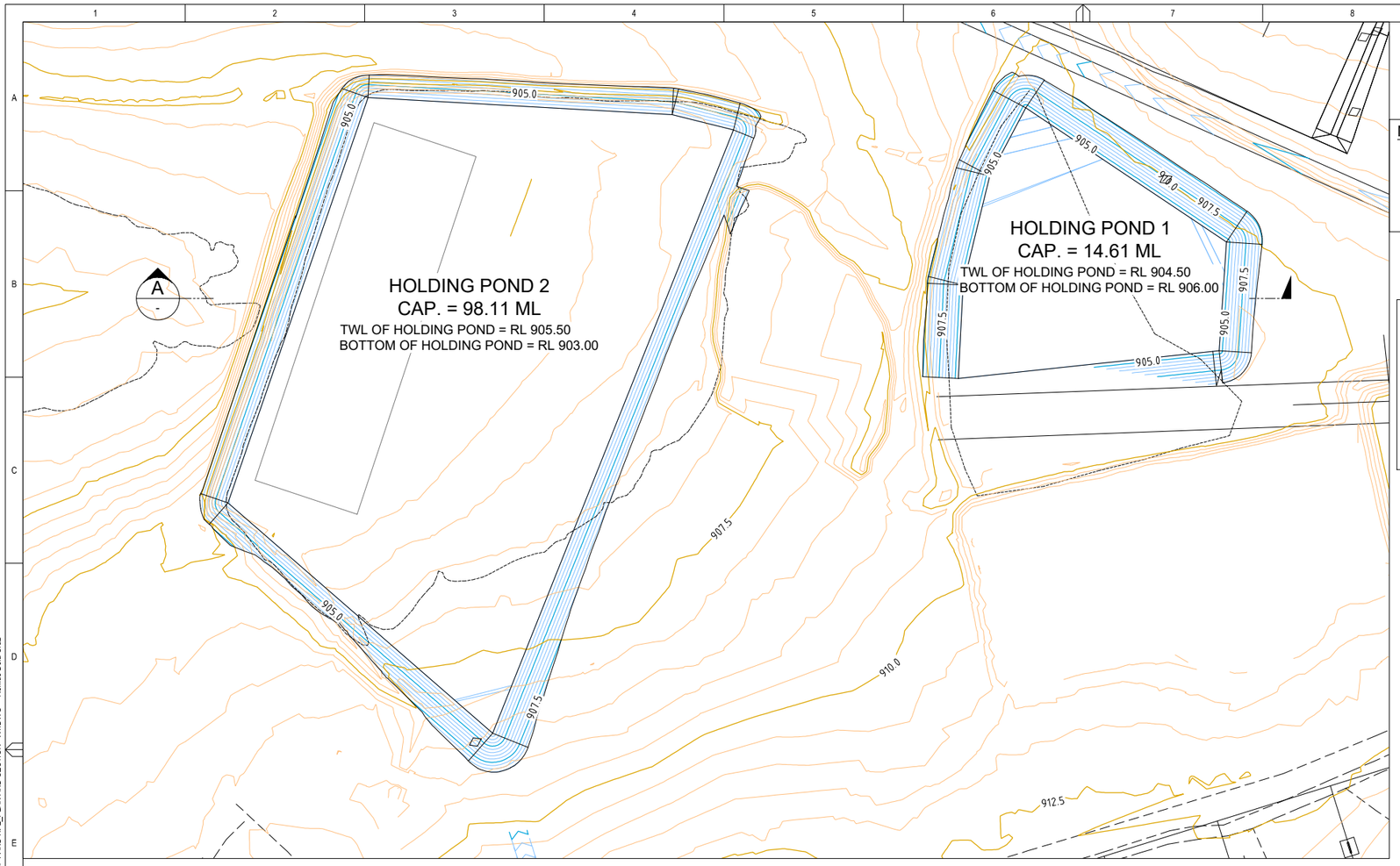
A1

P:\3_WB\00030466 - EAG - RANGERS VALLEY FLOT CONCEPT DESIGN - 2016\GRAPHICS\AUTOCAD\MODELS\30466.CC.002 2D CONCEPT DESIGN AND LAND USE AREAS - REV J.DWG Remus Dela Cruz

Wed, 28 Nov 2018 - 3:46pm

30466.CC.002 REV J

Appendix D. Holding Pond Plan and Section



PLAN
SCALE 1 : 1000

GRID

LEGEND

- 910.0 — MAJOR CONTOUR NS (2.50m)
- MINOR CONTOURS (0.50m)
- 905.0 — MAJOR CONTOUR DESIGN (2.50m)
- MINOR CONTOURS DESIGN (0.50m)
- NATURAL SURFACE NS
- STRIPPED SURFACE (NS - 0.20m)

NOTE:

1. ESTIMATED CLAY LINER VOLUMES ARE TO BE ADDED AS CUT VOLUME TO EARTHWORKS QUANTITIES
2. REFER DETAIL

EARTHWORKS:

HP1

* ESTIMATED CUT VOLUME = 13,118.41 cu.m.

HP2

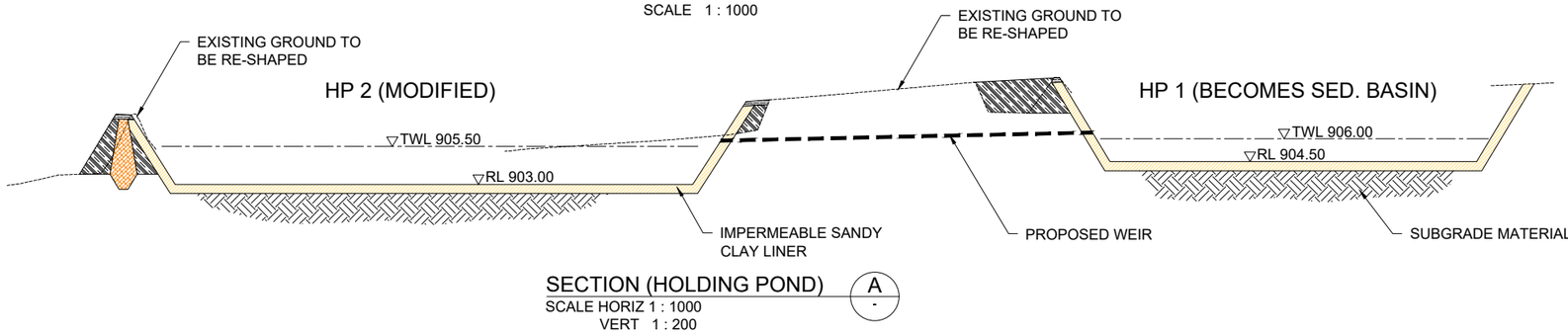
* ESTIMATED CUT VOLUME = 80,701.31 cu.m.

HP1 STORAGE TABLE

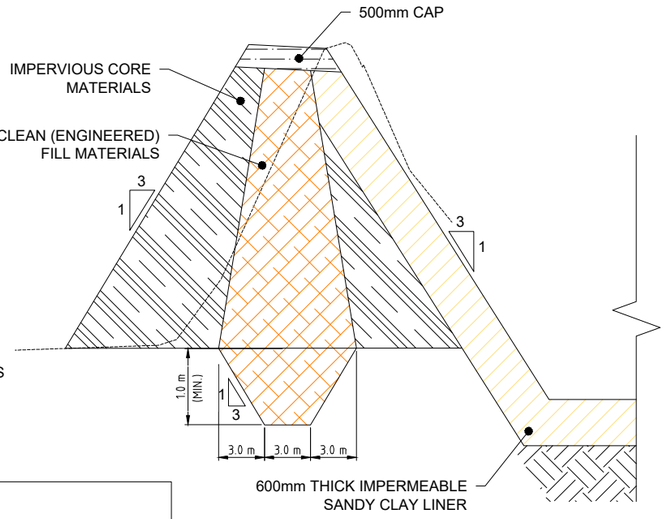
LEV	AREA (sq. m)	DEPTH (m)	AVG END TOTAL VOL. (cu. m)
904.50	9,342.50	N/A	0.00
905.00	11,223.86	0.50	2,805.96
905.50	11,801.83	0.50	8,562.39
906.00	12,382.28	0.50	14,608.41

HP2 STORAGE TABLE

LEV	AREA (sq. m)	DEPTH (m)	AVG END TOTAL VOL. (cu. m)
903.000	39,795.19	N/A	0.00
903.500	41,320.89	0.50	10,330.22
904.000	42,594.07	0.50	31,308.96
904.500	43,881.36	0.50	52,927.82
905.000	45,182.76	0.50	75,193.85
905.500	46,498.27	0.50	98,114.11



SECTION (HOLDING POND) A
SCALE HORIZ 1 : 1000
VERT 1 : 200



DETAIL
SCALE HORIZ 1 : 200
VERT 1 : 40

NOTES:

1. A CLAY LINER IS SHOWN.
2. THE LINER IS REQUIRED WHERE INSITU SOILS ARE FOUND TO BE INCOMPETENT AND/OR PERMEABLE.
3. WHERE SOILS HAVE SATISFACTORY STRENGTH AND SUFFICIENTLY LOW PERMEABILITY (IMPERMEABLE), THEN THE INSITU SOILS CAN BE USED AS THE LINER.
4. TESTING AND SUBSEQUENT TREATMENT OF THE SOILS IS REQUIRED TO THE APPROVAL OF THE DESIGN ENGINEER.

NOT FOR CONSTRUCTION

1:200 @ A1, 1:400 @ A3: 0 2 4 6 8 10 12 14 16 18 20 m

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		0	06/12/2018	ISSUED FOR INFORMATION - NOT FOR CONSTRUCTION	RDC	SL	SL	SL		

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PROJECT 30466 | DRAWING OFFICE TOOWOOMBA

	BY	DATE
DRAWN	RDC	14/12/2018
DWG CHECK	SL	14/12/2018
DESIGN	SL	
ENG DES CHECK		
DRAFT, SUPER.		
PROJECT APPROVAL		

TITLE
RANGERS VALLEY PTY LTD
RANGERS VALLEY FEEDLOT EXPANSION
HOLDING POND No. 3 - PLAN AND SECTIONS

PROJECT NO. 30466 | DRAWING NO. 30466.RV.080 | REVISION 1
MOD NO.
SCALE AS SHOWN | CADFILE 30466.RV.080 - HP1 and HP2_Plan and Section - R1.dwg | A1

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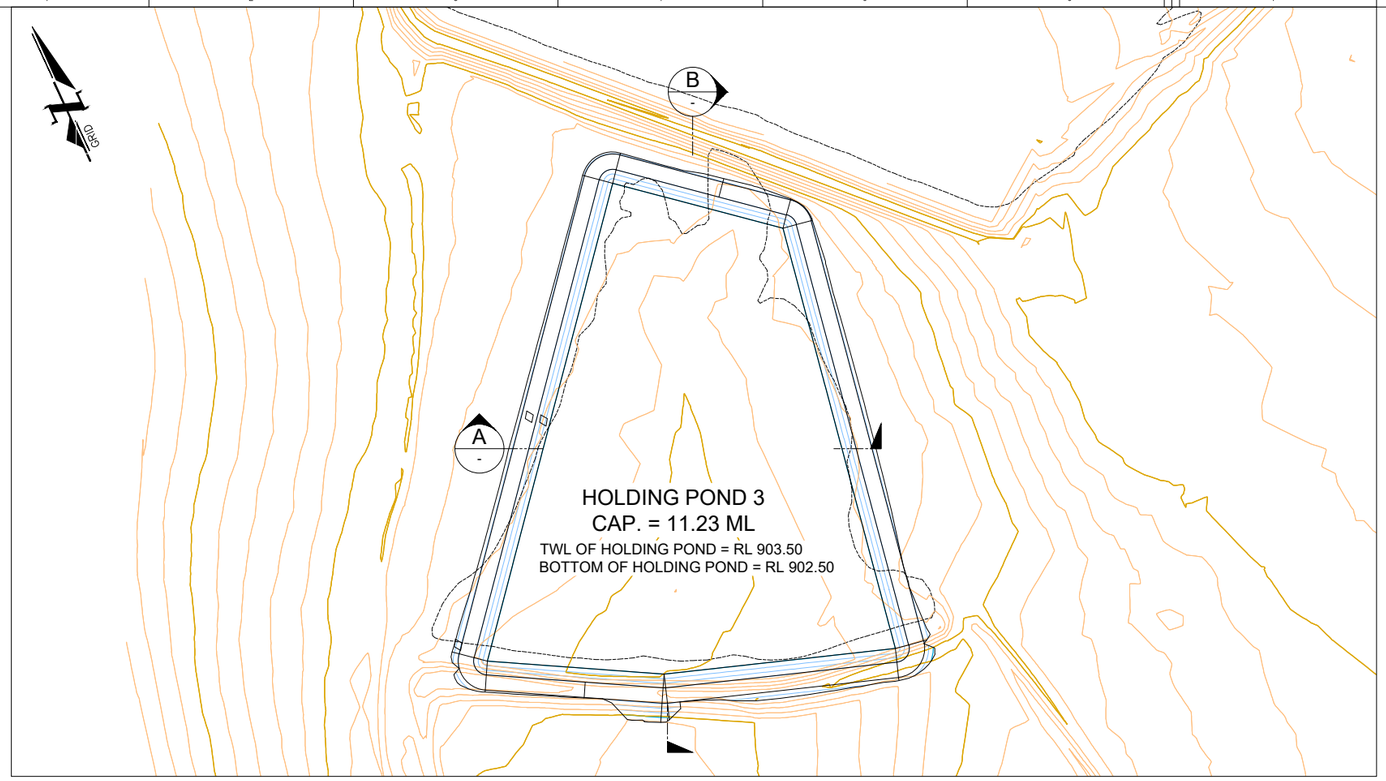
Fri, 14 Dec 2018 - 12:02pm

30466.RV.032 EARTHWORKS - ZONE 2



PLAN
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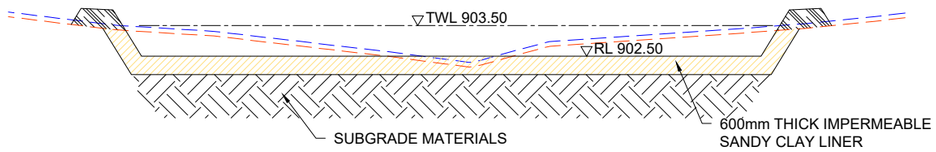
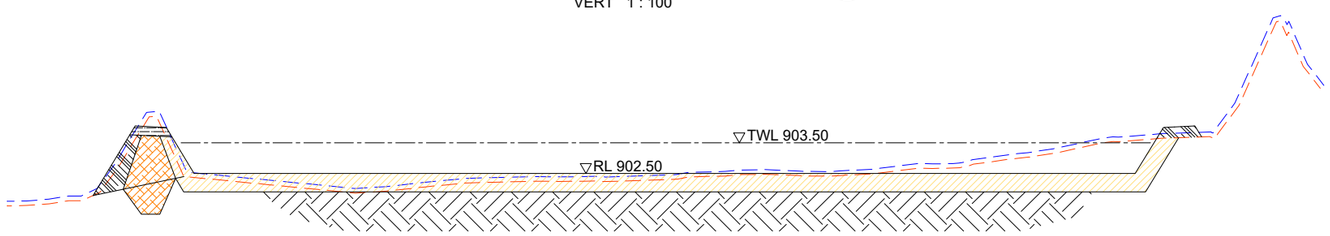


SECTION (HOLDING POND) A
SCALE HORIZ 1 : 500
VERT 1 : 100



SECTION (HOLDING POND) B
SCALE HORIZ 1 : 500
VERT 1 : 100

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1:500@ A1
1:1000@ A3
0 5 10 15 20 25 30 35 40 45 50 m

1:1000@ A1
1:2000@ A3
0 10 20 30 40 50 60 70 80 90 100 m

NOTE:

1. ESTIMATED CLAY LINER VOLUMES ARE TO BE ADDED AS CUT VOLUME TO EARTHWORKS QUANTITIES
2. REFER DETAIL

HP3 EARTHWORKS:

* ESTIMATED CUT VOLUME = 7,9423.25 cu.m.
* ESTIMATED FILL VOLUME = 1,666.32 cu.m.

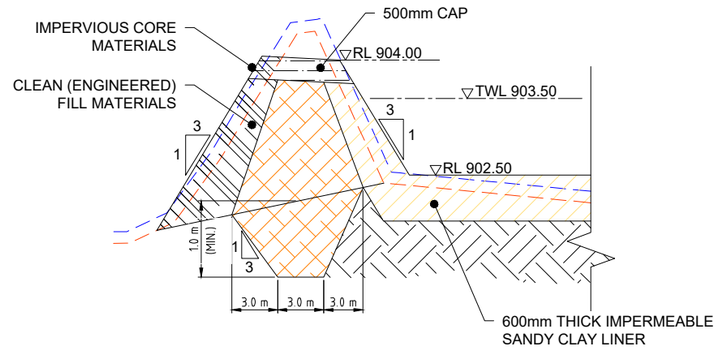
NET VOL. = 6,276.93 cu.m. (CUT)

LEGEND

- 910.0 — MAJOR CONTOUR NS (2.50m)
- MINOR CONTOURS (0.50m)
- 905.0 — MAJOR CONTOUR DESIGN (2.50m)
- MINOR CONTOURS DESIGN (0.50m)
- NATURAL SURFACE NS
- STRIPPED SURFACE (NS - 0.20m)

HOLDING POND STORAGE TABLE

LEV	AREA (sq. m)	DEPTH (m)	AVG END TOTAL VOL. (cu. m)	
902.50	14,216.69	N/A	0.00	
903.00	14,964.73	0.50	7,296.13	
903.50	15,726.90	0.50	11,229.28	
904.00	15,289.22	0.50	15,051.59	APPROXIMATE FULL CAPACITY



DETAIL
SCALE HORIZ 1 : 200
VERT 1 : 40

NOTES:

1. A CLAY LINER IS SHOWN.
2. THE LINER IS REQUIRED WHERE INSITU SOILS ARE FOUND TO BE INCOMPETENT AND/OR PERMEABLE.
3. WHERE SOILS HAVE SATISFACTORY STRENGTH AND SUFFICIENTLY LOW PERMEABILITY (IMPERMEABLE), THEN THE INSITU SOILS CAN BE USED AS THE LINER.
4. TESTING AND SUBSEQUENT TREATMENT OF THE SOILS IS REQUIRED TO THE APPROVAL OF THE DESIGN ENGINEER.

NOT FOR CONSTRUCTION

DRAWING NO.	REFERENCE DRAWING TITLE	REV	DATE	REVISION DESCRIPTION	DRAWN	DWG CHECK	DESIGN	ENG DES CHECK	DRAFT SUPER	PROJECT APPROVAL
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		0	06/12/2018	ISSUED FOR INFORMATION - NOT FOR CONSTRUCTION	RDC	SL	SL	SL		

APPROVALS

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PO BOX 411
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TOOWOOMBA QLD 4350

PROJECT 30466 | DRAWING OFFICE TOOWOOMBA

	BY	DATE
DRAWN	RDC	14/12/2018
DWG CHECK	SL	14/12/2018
DESIGN	SL	
ENG DES CHECK		
DRAFT. SUPER.		
PROJECT APPROVAL		

TITLE
RANGERS VALLEY PTY LTD
RANGERS VALLEY FEEDLOT EXPANSION
HOLDING POND No. 3 - PLAN AND SECTIONS

PROJECT NO. 30466
DRAWING NO. 30466.RV.079
REVISION 1
MOD NO.
SCALE AS SHOWN
CADFILE 30466.RV.079 - Holding Pond 3_Plan and Section - R1.dwg
A1

P:\3_WB\0030466 - EAG - RANGERS VALLEY FLOT CONCEPT DESIGN - 2016\GRAPHICS\AUTOCAD\PRODUCTION DRAWINGS\30466.RV.079 - HOLDING POND 3_PLAN AND SECTION - R1.DWG Remus Dela Cruz
Fri, 14 Dec 2018 - 12:01pm

30466.RV.032 EARTHWORKS - ZONE 2

Annexure E – NSW Office of Environment and Heritage – Submission and response

Annexure E.1 – OEH Biodiversity matters

NSW GOVERNMENT | Office of Environment & Heritage

Our Ref: DOC18/584487
Your Ref: DA 261-8-2002-I MOD 2

Department of Planning and Environment
GPO Box 39
Sydney NSW 2000

Attention: Mr Kane Winwood

Dear Mr Winwood

Re: Rangers Valley Cattle Feedlot – Proposed Modification 2

Thank you for your letter dated 10 August 2018 about the proposed modification to the Rangers Valley Cattle Feedlot approval, seeking advice from the Office of Environment and Heritage (OEH). I appreciate the opportunity to provide input.

The OEH understands that the proposal is being assessed as State Significant Development. We have reviewed the Environmental Assessment prepared by EnviroAg Australia dated 23 July 2018 and note that the report has not addressed:

1. Biodiversity matters – These relate to the potential impacts on biodiversity from the additional manure application areas, which appear to be located within vegetated parts of the property, and the possibility of the vegetation to be affected forming part of an Endangered Ecological Community. As the proposal is being assessed as State Significant Development, the application must be accompanied by a Biodiversity Development Assessment Report prepared by an accredited assessor.

2. Aboriginal cultural heritage matters – The report should detail the level of assessment that has been undertaken to consider any Aboriginal cultural heritage values that may be present on site and an Aboriginal Cultural Heritage Management Plan should be prepared if required.

The OEH recommends that the Modification application should be updated to address the outstanding information set out in points 1 and 2 above, before the application is again referred to OEH for further review.

If you have any further questions about this issue, Mr Krister Waern, Senior Operations Officer, Conservation and Regional Delivery, OEH, can be contacted on 6640 2503 or at krister.waern@environment.nsw.gov.au.

Yours sincerely

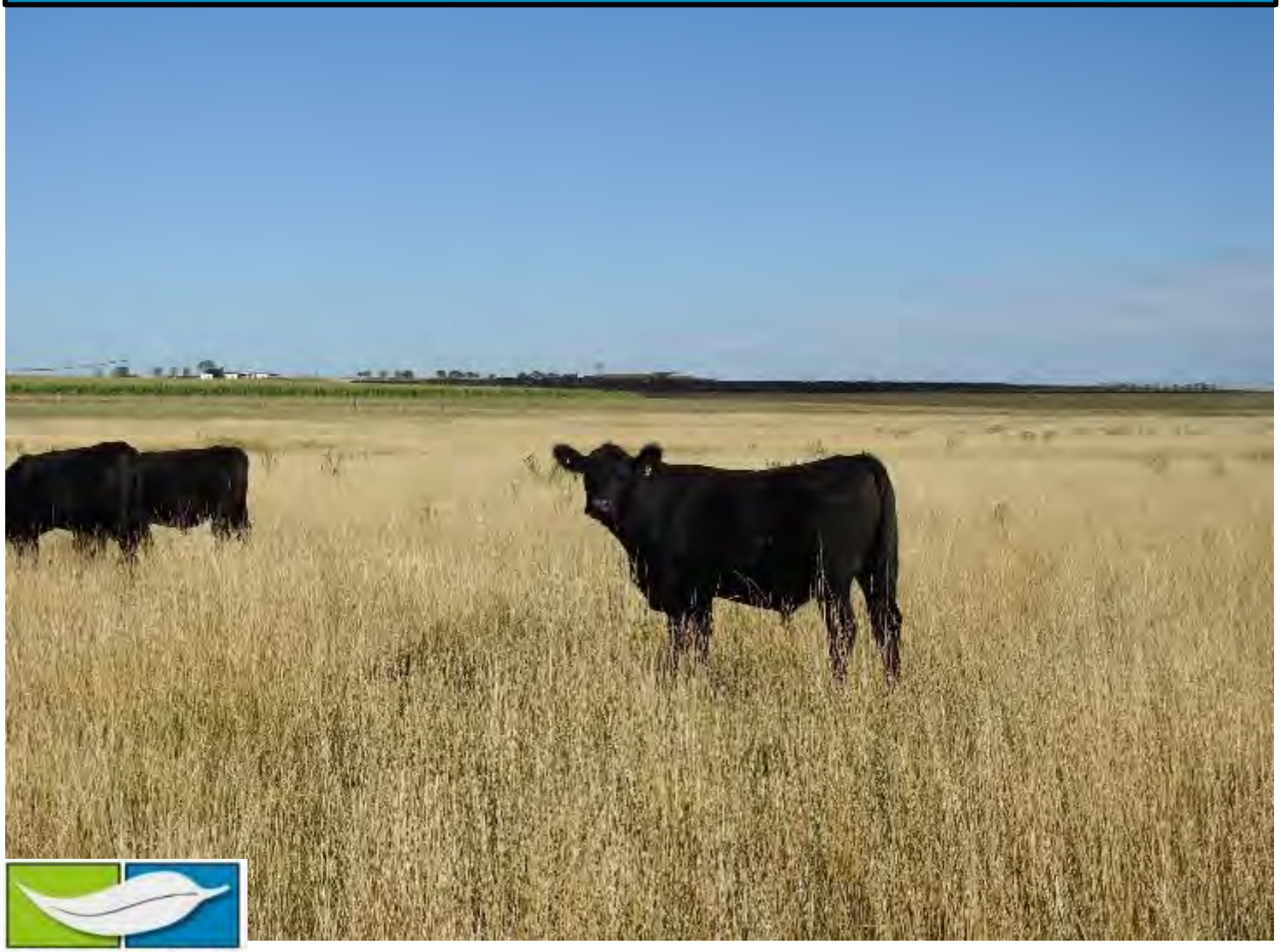
Dimitri Young 31 August 2018

DIMITRI YOUNG
Senior Team Leader Planning, North East Branch
Conservation and Regional Delivery

Locked Bag 914 Coffs Harbour NSW 2450
Federation House, Level 8, 24 Moonee Street
Coffs Harbour NSW 2450
Tel: (02) 6659 8200 Fax: (02) 6659 8281
ABN 30 841 387 271
www.environment.nsw.gov.au

Biodiversity Development Assessment Report
Rangers Valley Feedlot
Proposed manure and effluent utilisation areas

Glen Innes Severn LGA NSW
May 2019



AREA
ENVIRONMENTAL CONSULTANTS & COMMUNICATION

AREA Environmental Consultants & Communication
(a) 6 Belmore Street Dubbo NSW 2830
(b) “Thieles Gate” (Type 2 Conservation Agreement Area) 79 Huonbrook Rd Mullumbimby NSW 2482
Ph 0409 852 098
phil@areaenvironmental.com.au

ABN:29 616 529 867
Advanced Regional Environmental Assessments (AREA)

- ✓ Environmental impact assessment, approvals and auditing
- ✓ Preliminary environmental assessment (PEA)
- ✓ Review of environmental factors (REF)
- ✓ Peer review
- ✓ Community engagement
- ✓ Biobanking and biodiversity offsetting assessments
- ✓ Aboriginal heritage assessments and community walkovers
- ✓ Landscape planning and design

AREA Environmental Consultants & Communication acknowledge Traditional Owners of the country on which we work

Cover picture: Looking north east across Middle Swamp towards feedlot yards and corn crop.

Executive Summary

AREA Environmental Consultants & Communication (AREA) was commissioned by Rangers Valley Cattle Station Pty Ltd to assess the potential environmental impact associated with application of manure or effluent to proposed additional utilisation areas. Rangers Valley Cattle Station Pty Ltd wish to expand their beef cattle feedlot known as Rangers Valley Feedlot. As part of the expansion, additional manure and effluent utilisation areas are proposed. This biodiversity and impact assessment will be presented in this Biodiversity Development Assessment Report (BDAR).

The proposed development is both designated and integrated development under Part 4 of the *Environmental Planning and Assessment Act 1979*.

This assessment addresses requirements of the following legislative frameworks:

- *NSW Environmental Planning and Assessment Act 1979* (EP&A Act).
- *NSW Biodiversity Conservation Act 2016* (BC Act).
- *NSW Local Land Services Act 2013* (LLS Act).
- *State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017* (Veg SEPP).

The purpose of this proposal is to increase the productivity of the land by increasing the nutrients in the soil to support the swift and strong growth of the ground cover. The ground cover in the proposal area consists of native and not native vegetation.

Ten paddocks are the subject of this BDAR. These paddocks are referred to by name in this report (see below). The paddocks are also referred to as two groups – grouped by the type of impact addressed in this report.

- Seven paddocks are proposed **manure utilisation areas** (158.30 hectares)
  - These paddocks are known as Rixons, Back Paddock, Four Mile, Perkins 3, Perkins 4, Top Sugarloaf and Middle Swamp.
  - No tree removal will be required in these areas.
    - The impact consists of application of manure
- Four paddocks are proposed **effluent utilisation areas** (94.86 hectares).
  - These paddocks are known as Crouches, Show, Old 2 and Old 3.
  - Where trees are present, these will be removed as part of this proposal.
  - Effluent application will be achieved using an irrigator.

Vegetation Zones area allocated as:

- Zone 1 – Areas with more than 50 percent native ground cover (no tree removal required, and all of this zone is manure utilisation areas)
- Zone 2 – Areas with between zero and 50 percent native ground cover (removal of three dead trees in effluent utilisation areas and no tree removal in manure utilisation areas)
- Zone 3 – Areas with zero percent native ground cover (current cropped paddock with removal of five living trees required as paddock tree assessment. Also, removal of two dead trees is required)
- Zone 4 – Area with zero native ground cover (current cropped paddock with native tree removal required as PCT assessment)

Tree removal is required in:

- Crouches
  - 0.59 hectares of PCT 510 (This area consists of **12 trees**. Removal of these is in addition to the ten paddock trees listed in the points below) (This 0.59 hectares is assessed under full BAM assessment while the paddock trees listed in the points below are assessed as paddock trees and threatened species habitat)
  - **One dead tree** (20 – 50 centimetres Diameter at Breast Height (DBH), with a hollow <20 centimetres diameter)
- Show
  - **Three dead trees** to be removed (>50 centimetres DBH, two with hollows <20 centimetres diameter and one with hollow >20 centimetres diameter)
- Old 3
  - **Five living trees** to be removed
    - One *Eucalyptus caliginosa* (20 – 50 centimetres DBH, with hollow <20 centimetres)
    - One *Eucalyptus bridgesiana* (>50 DBH, Hollow >20 centimetres)
    - Three *Eucalyptus melliodora* (two 20 – 50 centimetres DBH and one >50 centimetres DBH, all with hollows <20 centimetres diameter)
  - **One dead tree** to be removed (>50 centimetres DBH with hollow <20 centimetres diameter)

Fifteen BAM (2017) vegetation plots were completed. These plots defined the vegetation in the proposal area, confirmed areas of not native vegetation and sort to understand native vegetation in areas outside the proposal area which had previously been the subject of fertilisation by inorganic fertilisers.

Threatened species searches were also conducted. Three species of threatened microbat were recorded using remote sensing SM2 bat recorders.

Plant Community Type 510 (a component of Box-gum Woodland EEC) was found to occur in all areas of native vegetation assessed and was identified as a candidate Serious and Irreversible Impact. While it is the appropriate regulatory authority who determine whether the impact to this community is in fact a Serious or Irreversible Impact, this report recommends that given the extent and nature of the impact, this proposal does not represent a Serious and Irreversible Impact to PCT510.

The Biodiversity Assessment Method Credit Calculator (BAMCC) was used to confirm predicted threatened species and determine any offset required as a result of the proposal. Nine threatened species were determined to have habitat within the proposal area and have a potential to be impacted by the proposal. These species generated a credit requirement in the BAMCC.

Two threatened species were identified as candidate Serious and Irreversible Impacts. Given the extent and nature of this proposal, this report recommends that this proposal does not constitute a Serious and Irreversible Impact for these species.

Impact to native vegetation communities mapped as PCT510 requires offsetting of one ecosystem credit.

Removal of the five living paddock trees requires offsetting with five ecosystem credits.

Potential impact to threatened species requires offsetting with 19 (plus some yet to be defined by OEH) species credits.

Document Controls

Proponent	Rangers Valley Cattle Station Pty Ltd		
Client	Rangers Valley Cattle Station Pty Ltd		
Document Description	Biodiversity Development Assessment Report: Proposed manure and effluent utilisation areas		
Clients Representative Managing this Document	AREA Person(s) Managing this Document		
Rod Davis Director RDC Engineers	Phil Cameron (PJC) - Principal Consultant		
Location	AREA Job No. QU-0129		
\Clients\RDC Engineers\Rangers Valley			
Document Status: **DRAFT**	Version	Date	Action
Series V1.X = Internal edits	V1.0 V1.1	March 2019	AW to PJC PJC to AW
Series V2.X = Client internal edits	V2.0 V2.1 V2.2 V2.3	09.04.2019	AREA to Client AREA to Client AREA to external review AREA to Client
FINAL when draft is approved by client	V3.0 V3.1	29.05.2019	AREA to Client
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BAM definitions and acronyms used in this document

Definitions

Accredited person: has the same meaning as in the BC Act, referred to in the BAM as 'assessor'.
Ancillary rules: has the same meaning as set out in clause 6.5 of the BC Regulation.
Annual probability of decline in vegetation and habitat condition: an estimate of the average probability of decline of each attribute through clearing, stochastic factors or ongoing degrading actions (firewood removal, weed invasion, livestock grazing).
Areas of geological significance: geological features such as karst, caves, crevices, cliffs.
Assessment area surrounding the subject land: the area of land in the 1500m buffer zone around a development site, or land to be biodiversity certified or a biodiversity stewardship site, that is determined in accordance with Subsection 4.3.2.
Assessor: the person accredited under the BC Act referred to in Subsection 2.1.2 and who has been engaged by the proponent.
Averted loss: the gain in vegetation and habitat condition that arises from managing the proposed land as an offset compared to the probable future vegetation condition if the land was to be left unmanaged (see *Annual probability of decline*).
Avoid: measures taken by a proponent such as careful site selection or actions taken through the design, planning, construction and operational phases of the development to completely avoid impacts on biodiversity values, or certain areas of biodiversity. Refer to the BAM for operational guidance.
BAM: the Biodiversity Assessment Method.
BC Act: the Biodiversity Conservation Act 2016.
BC Regulation: the Biodiversity Conservation Regulation 2017.
Benchmark data: for a PCT, vegetation class or vegetation formation benchmark data is contained in the BioNet Vegetation Classification. A local reference site may also be used to establish benchmark data for a PCT that may be used in a BAM assessment.
Benchmarks: the quantitative measures that represent the 'best-attainable' condition, which acknowledges that native vegetation within the contemporary landscape has been subject to both natural and human-induced disturbance. Benchmarks are defined for specified variables for each PCT. Vegetation with relatively little evidence of modification generally has minimal timber harvesting (few stumps, coppicing, cut logs), minimal firewood collection, minimal exotic weed cover, minimal grazing and trampling by introduced or overabundant native herbivores, minimal soil disturbance, minimal canopy dieback, no evidence of recent fire or flood, is not subject to high frequency burning, and has evidence of recruitment of native species.
Biodiversity certification: has the same meaning as in the BC Act.
Biodiversity Certification Assessment Report (BCAR): has the same meaning as in the BC Act.
Biodiversity credit report: the report produced by the Credit Calculator that sets out the number and class of biodiversity credits required to offset the remaining adverse impacts on biodiversity values at a development site, or on land to be biodiversity certified, or that sets out the number and class of biodiversity credits that are created at a development area.
Biodiversity Development Assessment Report (BDAR): has the same meaning as in the BC Act.
Biodiversity offsets: management actions that are undertaken to achieve a gain in biodiversity values on areas of land in order to compensate for losses to biodiversity values from the impacts of development.
Biodiversity stewardship agreement: has the same meaning as in the BC Act.
Development Area: has the same meaning as in the BC Act.
Biodiversity Stewardship Assessment Report (BSAR): the report that must be prepared in accordance with the BAM and submitted as part of an application for a biodiversity stewardship agreement.

Biodiversity values: has the same meaning as clause 1.5(2) of the BC Act.
Biodiversity values map: is established according to clause 7.3 of the BC Regulation. Development within an area identified on the map requires assessment using the BAM.
BioNet Atlas: the OEH database of flora and fauna records (formerly known as the NSW Wildlife Atlas). The Atlas contains records of plants, mammals, birds, reptiles, amphibians, some fungi, some invertebrates (such as insects and snails listed under the BC Act) and some fish.
BioNet Vegetation Classification: the master vegetation community-level classification for use in vegetation mapping programs and regulatory biodiversity impact assessment frameworks in NSW. The BioNet Vegetation Classification is published by OEH and available at www.environment.nsw.gov.au/research/Visclassification.htm.
Broad condition state: areas of the same PCT that are in relatively homogenous condition. Broad condition is used for stratifying areas of the same PCT into a vegetation zone for the purpose of determining the vegetation integrity score.
Certified more appropriate local data: has the same meaning as set out in Subsection 2.2.2.
Change in vegetation integrity score for a development area: the difference (gain) between the estimated vegetation integrity score without management at a development area and the predicted future vegetation integrity score with management at a development area, calculated in accordance with Equation 28.
Class of biodiversity credit: as defined in Section 11.3.
Clearing site: the site proposed to be cleared of native vegetation where approval is sought under Part 5A of the *Local Land Services Act 2013* or the *State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017*.
Clonal species: flora species that propagate asexually at a site or have a limited degree of sexual reproduction, either within or between sites. Modes of asexual reproduction will include vegetative reproduction such as by rhizomes, root suckers or bulb replication.
Connectivity: the measure of the degree to which an area(s) of native vegetation is linked with other areas of vegetation.
Credit Calculator: the computer program that provides decision support to assessors and proponents by applying the BAM, in particular by using the data required to be entered and the equations in Appendix 6 and Appendix 9 to calculate the number and class of biodiversity credits required to offset the impacts of a development or created at a development area.
Critically endangered ecological community (CEEC): an ecological community specified as critically endangered in Schedule 2 of the BC Act and/or listed under Part 13, Division 1, Subdivision A of the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).
Crown cover: the vertical projection of the periphery of tree crowns within a designated area.
Derived vegetation: PCTs that have changed to an alternative stable state as a consequence of land management practices since European settlement. Derived communities can have one or more structural components of the vegetation entirely removed or severely reduced (e.g. over-storey of grassy woodland) or have developed new structural components where they were previously absent (e.g. shrubby mid-storey in an open woodland system).
Development footprint: the area of land that is directly impacted on by a proposed development, including access roads, and areas used to store construction materials. The term *development footprint* is also taken to include clearing footprint except where the reference is to a small area development or a major project development.
Development site: an area of land that is subject to a proposed development that is under the EP&A Act. The term *development site* is also taken to include clearing site except where the reference is to a small area development or a major project development.
Ecosystem credits: a measurement of the value of threatened ecological communities, threatened species habitat for species that can be reliably predicted to occur with a PCT, and PCTs generally. Ecosystem credits measure the loss in biodiversity values at a development site and the gain in biodiversity values at a development area.

Endangered ecological community (EEC): an ecological community specified as endangered in Schedule 2 of the BC Act, or listed under the EPBC Act.
Environment Agency Head: has the same meaning as in the BC Act.
EP&A Act: the NSW Environmental Planning and Assessment Act 1979.
EPBC Act: the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.
Ephemeral flora species: flora species where the abundance of the species above ground fluctuates in response to the plant life history in combination with environmental conditions and/or disturbance regimes. Fluctuations in abundance may be short-term (seasonal) or long-term (yearly to decadal). Many ephemeral species persist underground through unfavorable conditions via soil seed banks or dormant vegetative organs (bulbs, tubers, rootstocks).
Estuarine area: a semi-enclosed body of water having an open or intermittently open connection with the ocean, in which water levels do not vary with the ocean tide (when closed to the sea) or vary in a predictable, periodic way in response to the ocean tide at the entrance (when open to the sea).
Expert: a person who has the relevant experience and/or qualifications to provide expert opinion in relation to the biodiversity values to which an expert report relates.
Foliage cover: the percentage of a plot area that would be covered by a vertical projection of the foliage and branches and trunk of a plant, or plants or a growth form group. Foliage cover can also be referred to as percent foliage cover.
Gain: the gain in biodiversity values at a development area, over time from undertaking management actions at a development area. Gain in biodiversity values is the basis for creating biodiversity credits at the development area.
Grassland: native vegetation classified in the vegetation formation 'Grasslands' in Keith (2004)[2]. Grasslands are generally dominated by large perennial tussock grasses, lack of woody plants, the presence of broad-leaved herbs in inter-tussock spaces, and their ecological association with fertile, heavy clay soils on flat topography in regions with low to moderate rainfall.
Growth form: the form that is characteristic of a particular flora species at maturity. Growth forms are set out in Appendix 4.
Habitat: an area or areas occupied, or periodically or occasionally occupied, by a species or ecological community, including any biotic or abiotic component.
Habitat component: the component of habitat that is used by a threatened species for either breeding, foraging or shelter.
Habitat surrogates: measures of habitat that predict the occurrence of threatened species and communities: IBRA subregion, PCT, percent vegetation cover and vegetation condition.
Herbfield: native vegetation which predominantly does not contain an over-storey or mid-storey and where the ground cover is dominated by non-grass species.
High threat exotic plant cover: plant cover composed of vascular plants not native to Australia that if not controlled will invade and outcompete native plant species. Also referred to as high threat weeds.
Hollow bearing tree: a living or dead tree that has at least one hollow. A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the entrance width is at least 5cm; (c) the hollow appears to have depth (i.e. you cannot see solid wood beyond the entrance); (d) the hollow is at least 1m above the ground. Trees must be examined from all angles.
IBRA region: a bioregion identified under the Interim Biogeographic Regionalisation for Australia (IBRA) system[3], which divides Australia into bioregions on the basis of their dominant landscape-scale attributes.
IBRA subregion: a subregion of a bioregion identified under the IBRA system.
Impact assessment: an assessment of the impact or likely impact of a development on biodiversity values which is prepared in accordance with the BAM.
Impacts on biodiversity values: loss in biodiversity values from direct or indirect impacts of development in accordance with Chapters 8, 1 and 10.
Important wetland means:

(a) a wetland that is listed in the Directory of Important Wetlands of Australia (DIWA) from time to time, and
(b) for the purposes of all paragraphs except 4.2.1.6 the actual location on the ground that corresponds to a SEPP 14 Coastal wetland
(c) for the purposes of Paragraph 4.2.1.6:
(i) a SEPP 14 Coastal Wetland, and
(ii) the actual location on the ground that corresponds to a SEPP 14 Coastal Wetland.

Individual: in relation to organisms, a single, mature organism that is a threatened species, or any additional threatened species listed under Part 13 of the EPBC Act.

Intact vegetation: vegetation where all tree, shrub, grass and/or forb structural growth form groups expected for a plant community type are present.

Intrinsic rate of increase (*ir*): an estimate of the rate of gain for an attribute at a development area from actions undertaken as part of the management plan. The intrinsic rate of increase is specified for an attribute according to the formation of the PCT being assessed (see Appendix 8).

Landscape attributes: in relation to a development site or a development area, native vegetation cover, vegetation connectivity, patch size and the strategic location of a development area.

Large tree benchmark: is the largest stem size class for a PCT as determined by the benchmark for the PCT.

Life cycle: the series of stages of reproduction, growth, development, aging and death of an organism.

Life form: the form that is characteristic of a particular species at maturity. In the BAM, life form has the same meaning as growth form for flora species.

Linear shaped development: development that is generally narrow in width and extends across the landscape for a distance greater than 3.5 kilometres in length.

Litter cover: the percentage ground cover of all plant material that has detached from a living plant, including leaves, seeds, twigs, branchlets and branches (<10cm in diameter).

Local population: the population that occurs in the proposal Area. In cases where multiple populations occur in the proposal area or a population occupies part of the proposal area, impacts on each subpopulation must be assessed separately.

Local wetland: any wetland that is not identified as an important wetland (refer to definition of *Important wetland*).

Loss of biodiversity: the loss of biodiversity values from a development site, native vegetation clearing site or land where biodiversity certification is conferred.

Major project: State Significant Development and State Significant Infrastructure.

Minimise: a process applied throughout the development planning and design life cycle which seeks to reduce the residual impacts of development on biodiversity values.

Mitchell landscape: landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000.

Multiple fragmentation impact development: developments such as wind farms and coal seam gas extraction that require multiple extraction points (wells) or turbines and a network of associated development including roads, tracks, gathering systems/flow lines, transmission lines.

Native ground cover: all native vegetation below 1m in height, including all such species native to NSW (i.e. not confined to species indigenous to the area).

Native ground cover (grasses): native ground cover composed specifically of native grasses.

Native ground cover (other): native ground cover composed specifically of non-woody native vegetation (vascular plants only) <1m in height that is not grass (e.g. herbs, ferns).

Native ground cover (shrubs): native ground cover composed specifically of native woody vegetation <1m in height.

Native mid-storey cover: all vegetation between the over-storey stratum and a height of 1m (typically tall shrubs, under-storey trees and tree regeneration) and including all species native to NSW (i.e. native species not local to the area can contribute to mid-storey structure).

Native over-storey cover: the tallest woody stratum present (including emergent) above 1m and including all species native to NSW (i.e. native species not local to the area can contribute to over-storey structure). In a woodland community, the over-storey stratum is the tree layer, and in a shrubland community the over-storey stratum is the tallest shrub layer. Some vegetation types (e.g. grasslands) may not have an over-storey stratum.
Native plant species richness: the number of different native vascular plant species that are characteristic of a PCT.
Native vegetation: has the same meaning as in section 1.6 of the BC Act.
Native vegetation cover: the percentage of native vegetation cover on the subject land and the surrounding buffer area. Cover estimates are based on the cover of native woody and non-woody vegetation relative to the approximate benchmarks for the PCT, taking into account vegetation condition and extent. Native over-storey vegetation is used to determine the percent cover in woody vegetation types, and native ground cover is used to assess cover in non-woody vegetation types.
Number of trees with hollows: a count of the number of living and dead trees that are hollow bearing.
Offset rules: are those established by the BC Regulation.
Onsite measures: measures and strategies that are taken or are proposed to be taken at a development site to avoid and minimise the direct and indirect impacts of the development on biodiversity values.
Operational Manual: the Operational Manual published from time to time by OEH, which is a guide to assist assessors when using the BAM.
Patch size: an area of intact native vegetation that:
a) occurs on the development site or development area, and
b) includes native vegetation that has a gap of less than 100m from the next area of moderate to good condition native vegetation (or ≤30m for non-woody ecosystems).
Patch size may extend onto adjoining land that is not part of the development site or development area.
PCT classification system: the system of classifying native vegetation approved by the NSW Plant Community Type Control Panel and described in the BioNet Vegetation Classification.
Percent cleared value: the percentage of a PCT that has been cleared as a proportion of its pre-1750 extent, as identified in the BioNet Vegetation Classification.
Plant community type (PCT): a NSW plant community type identified using the PCT classification system.
Plot: an area within a vegetation zone in which site attributes are assessed.
Population: a group of organisms, all of the same species, occupying a particular area.
Probability of reaching benchmark: the probability of a specific attribute or growth form group reaching benchmark conditions in the vegetation zone at the end of the management timeframe.
Proponent: a person who intends to apply for consent or approval to carry out development, clearing, biodiversity certification or for approval for infrastructure.
Reference sites: the relatively unmodified sites that are assessed to obtain local benchmark information when benchmarks in the Vegetation Benchmarks Database are too broad or otherwise incorrect for the PCT and/or local situation. Benchmarks can also be obtained from published sources.
Regeneration: the proportion of over-storey species characteristic of the PCT that are naturally regenerating and have a diameter at breast height <5cm within a vegetation zone.
Residual impact: an impact on biodiversity values after all reasonable measures have been taken to avoid and minimise the impacts of development. Under the BAM, an offset requirement is calculated for the remaining impacts on biodiversity values.
Retirement of credits: the retirement of biodiversity credits from a biobank site or a development area secured by a biodiversity stewardship agreement.
Riparian buffer: an area of land determined according to Appendix 3.

Risk of extinction: the likelihood that the local population or CEEC or EEC will become extinct either in the short term or in the long term as a result of direct or indirect impacts on the viability of that population or CEEC or EEC.
SEPP 14 Coastal wetland: a wetland to which *State Environmental Planning Policy No 14 – Coastal Wetlands* applies or an area that is identified as a coastal wetland within the meaning of the term *coastal wetlands and littoral rainforests area* for the purposes of *Coastal Management Act 2016*.
Site attributes: the matters assessed to determine vegetation integrity. They include: native plant species richness, native over-storey cover, native mid-storey cover, native ground cover (grasses), native ground cover (shrubs), native ground cover (other), exotic plant cover (as a percentage of total ground and mid-storey cover), number of trees with hollows, proportion of over-storey species occurring as regeneration, and total length of fallen logs.
Site-based development: a development other than a linear shaped development, or a multiple fragmentation impact development.
Site context: the value given to landscape attributes of a development site or development area after an assessment undertaken in accordance with Section 4.3.
Species credit species: are threatened species or components of species habitat that are identified in the Threatened Species Data Collection as requiring assessment for species credits.
Species credits: the class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the Threatened Biodiversity Data Collection.
State Significant Development: has the meaning given by Division 4.1 of Part 4 of the EP&A Act.
State Significant Infrastructure: has the meaning given by Part 5.1 of the EP&A Act.
Stream order: has the same meaning as in Appendix 3.
Subject land: is land to which the BAM is applied in Stage 1 to assess the biodiversity values of the land. It includes land that may be a development site, clearing site, proposed for biodiversity certification or land that is proposed for a biodiversity stewardship agreement.
Threat status class: the extent to which a species or ecological community is threatened with extinction, or the extent to which a PCT is estimated to have been cleared (see *Percent cleared value*).
Threatened Biodiversity Data Collection: part of the BioNet database, published by OEH and accessible from the BioNet website at www.bionet.nsw.gov.au.
Threatened ecological community (TEC): means a critically endangered ecological community, an endangered ecological community or a vulnerable ecological community listed in Schedule 2 of the BC Act.
Threatened species: critically endangered, endangered or vulnerable threatened species as defined by Schedule 1 of the BC Act, or any additional threatened species listed under Part 13 of the EPBC Act as critically endangered, endangered or vulnerable.
Threatened species survey: a targeted survey for threatened species undertaken in accordance with Section 6.5.
Threatened species survey guidelines: survey methods or guidelines published by OEH from time to time at www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/about-threatened-species/surveys-and-assessments.
Total length of fallen logs: the total length of logs present in a vegetation zone that are at least 10cm in diameter and at least 0.5m long.
Transect: a line or narrow belt along which environmental data is collected.
Upland Swamp Policy: the document entitled *Addendum to NSW Biodiversity Offsets Policy for Major Projects: Upland swamps impacted by longwall mining subsidence* as in force on the day when the BAM is published until such time as the Environment Agency Head publishes any further document for the purpose of it being adopted by the BAM as the Upland Swamp Policy.

Vegetation Benchmarks Database: a database of benchmarks for vegetation classes and some PCTs. The Vegetation Benchmarks Database is published by OEH and is part of the BioNet Vegetation Classification. It is available at www.environment.nsw.gov.au/research/Visclassification.htm.
Vegetation class: a level of classification of vegetation communities defined in Keith (2004)[4]. There are 99 vegetation classes in NSW.
Vegetation formation: a broad level of vegetation classification as defined in Keith (2004)[4]. There are 16 vegetation formations and sub-formations in NSW.
Vegetation integrity: the condition of native vegetation assessed for each vegetation zone against the benchmark for the PCT.
Vegetation integrity score: the quantitative measure of vegetation condition calculated in accordance with Equation 15 or Equation 16.
Vegetation zone: a relatively homogenous area of native vegetation on a development site, land to be biodiversity certified or a development area that is the same PCT and broad condition state.
Viability: the capacity of a species to successfully complete each stage of its life cycle under normal conditions so as to retain long-term population densities.
Vulnerable ecological community (VEC): an ecological community specified as vulnerable in Schedule 2 of the BC Act and/or listed under Part 13, Division 1, Subdivision A of the EPBC Act.
Wetland: an area of land that is wet by surface water or ground water, or both, for long enough periods that the plants and animals in it are adapted to, and depend on, moist conditions for at least part of their life cycle. Wetlands may exhibit wet and dry phases and may be wet permanently, cyclically or intermittently with fresh, brackish or saline water (see also *Important wetland* and *Local wetland*).
Woody native vegetation: native vegetation that contains an over-storey and/or mid-storey that predominantly consists of trees and/or shrubs.

Acronyms

Acronym	Definition
BAR	Biodiversity Assessment Report
BAMCC	Biodiversity Assessment Method Credit Calculator
BASSR	Biodiversity Steward Site Assessment Report
BAMCC	BioBanking Credit Calculator
BOM	Bureau of Meteorology
BC Act	Biodiversity Conservation Act 2016
BOS	Biodiversity Offset Strategy
BVT	Biometric Vegetation Types
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environment Management Plan
CMA	Catchment Management Authority
DEC	Department of Environment and Conservation
DECC	Department of Environment and Climate Change
DECCW	Department of Environment, Climate Change and Water
DEE	Department of Environment and Energy formerly the Department of the Environment
DEWHA	Department of Environment, Water, Heritage and the Arts
DPE	Department of Planning and the Environment
DPI	Department of Primary industries
DotE	Department of the Environment
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EPBC	Environment Protection and Biodiversity Conservation Act 1999
FBA	Framework of Biodiversity Assessment
GDE	Groundwater dependent ecosystems
GIS	Geographic information system
GPS	Global positioning system
IBRA	Interim Biogeographic Regionalisation for Australia
KTP	Key threatening process
LEP	Local Environmental Plan
LGA	Local Government Area
MNES	Matters of National Environmental Significance
NP&W Act	National Parks and Wildlife Act 1974
NPWS	National Parks and Wildlife Services
NSW	New South Wales
OEH	Office of Environment and Heritage
PCT	Plant Community Types
PMST	Protected Matters Search Tool
Proposal	Highview Country Estate Dubbo Regional LGA
SAT	Scat Assessment Technique
SEARS	Secretary's Environmental Assessment Requirement
SEPP	State Environmental Planning Policy
SIS	Species Impact Statement
SSD	State Significant Development
Proposal Area	Cumulatively all components in the proposal i.e. Residential lots, roads, drains, APZ etc
TAFE	Technical and Further Education Institute
TEC	Threatened Ecological Community
TSPD	Threatened Species Profile Database
VEC	Vulnerable Ecological Community

Acronym	Definition
VIS	Vegetation Information System
WIRES	Wildlife Information, Rescue and Education Services

1 Introduction to the proposal and the assessment team

1.1 Background

AREA Environmental Consultants & Communication (AREA) was commissioned by Rangers Valley Cattle Station Pty Ltd to assess the potential environmental impact associated with application of manure or effluent to proposed additional utilisation areas. Rangers Valley Cattle Station Pty Ltd wish to expand their beef cattle feedlot known as Rangers Valley Feedlot. As part of the expansion, additional manure and effluent utilisation areas are proposed. This biodiversity and impact assessment will be presented in this Biodiversity Development Assessment Report (BDAR).

Rangers Valley Cattle Station Pty Ltd own and operate an existing beef cattle feedlot, which is located about 28 kilometres north of Glen Innes on the central New England Tablelands, New South Wales.

In 2004, Development Consent (DA-261-8-2002-i) (DIPNR, 2004) was granted to Rangers Valley Cattle Station for the expansion of the Rangers Valley Feedlot from 24,000 head to 50,000 head.

In 2018, Rangers Valley Cattle Station lodged a Development Application (DA-261-8-2002-I MOD 2) with the Department of Planning and Environment (DPE) to modify Development Consent (DA-261-8-2002-I) for the Rangers Valley Feedlot. The Development Application is being assessed as State Significant Development. Development Application (DA-261-8-2002-I MOD 2) is being sought under Section 4.55(1A) of the Environmental Planning and Assessment Act (1974).

The Development Application (DA-261-8-2002-I MOD 2) seeks to modify site layout and staging; incorporate an emergency wet weather manure storage area; amend traffic movement hours; incorporate additional effluent and manure utilisation areas; and modify conditions of consent for the Rangers Valley Feedlot.

AREA was engaged to implement a biodiversity assessment to clarify which areas are native and not native in the proposed manure and effluent utilisation areas in response to OEH's submission to DPE on biodiversity issues.

The proposed feedlot expansion is both designated and integrated development under Part 4 of the *Environmental Planning and Assessment Act 1979*.

This BDAR addresses the environmental assessment requirements of the following legislative frameworks:

- *NSW Environmental Planning and Assessment Act 1979* (EP&A Act).
- *NSW Biodiversity Conservation Act 2016* (BC Act).
- *NSW Local Land Services Act 2013* (LLS Act).
- *State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017* (Veg SEPP).

The purpose of this proposal is to increase the productivity of the land by increasing the nutrients in the soil to support the swift and strong growth of the ground cover. The ground cover in the proposal area is both native and not native.

Eleven paddocks are the subject of this BDAR. These paddocks are referred to by name in this report (see below). The paddocks are also referred to as two groups – grouped by the type of impact addressed in this report.

- Seven paddocks – proposed **manure utilisation areas** (158.30 hectares)
    - These paddocks are known as Rixons, Back Paddock, Four Mile, Perkins 3, Perkins 4, Top Sugarloaf and Middle Swamp.
    - No tree removal will be required in these areas
    - The impact consists of:
        - Application of manure
- Four paddocks - proposed **effluent utilisation areas** (94.86 hectares).
    - These paddocks are known as Crouches, Show, Old 2 and Old 3.
    - The impact consists of
        - Removal of trees (total of five living and five dead trees)
        - Effluent application will be achieved using an irrigator.

The manure and effluent are generated at the Rangers Valley Feedlot and are processed on site to develop a product suitable for direct application.

To identify environmental constraints for the proposal, the following survey effort has been completed:

- February 2019 – Two ecologists from AREA conducted surveys over five days. This assessment included a reconnoitre of the proposal to refine the proposed field methods followed by completion of 15 BAM plots (OEH 2016), targeted bat ultrasonic assessment, species credit species transects throughout the proposal area. The width of the species credit transects reflected the environmental sensitivity and type of impact to the vegetation zone.

The proposal has been assessed under the Biodiversity Assessment Method (BAM) 2017 in two parts.

- Full BAM assessment
    - All areas where native vegetation is present (identified as PCT510)
- Streamlined assessment for paddock trees
    - Five living trees to be removed in Old 3.

The BAM paddock tree definition (Appendix 1: BAM) which applies to this assessment is

b) the native vegetation that comprises the groundcover is:

i. Less than 50% of the cover of indigenous species of vegetation. *Groundcover is a cropped paddock of soybean or corn and there is no native vegetation*

ii. Not less than 10% of the area is covered with vegetation (whether dead or alive) *Groundcover was more than 10% as it is a cropped paddock with virtually full growth.*

iii. The assessment is made at the time of year when the proportion of the amount of indigenous vegetation in the area to the amount of non-indigenous vegetation in the area is likely to be at its maximum, *The area is a cropped paddock and indigenous vegetation is unlikely to be there at any time* AND

c) the foliage cover for the tree growth form group is less than 25% of the benchmark for tree cover for the most likely plant community type. *Tree cover benchmark for PCT510 is 47%. Paddock trees in this assessment are in stands of one or two trees and which do not constitute cover of 11.75 percent or more.*

Five dead trees will also be removed by the proposal which could not be included in a PCT and were unable to be added to the BAMCC under the paddock tree assessment. They will be considered for the impact of tree removal on threatened species. These trees occur in the proposed effluent utilisation areas being:

- Old 3 – one
- Show - three
- Crouches - one

1.2 Report structure

This BDAR documents Stage 1 (assessing biodiversity values) and Stage 2 (Impact assessment to biodiversity values) of the Biodiversity Assessment Method (2017), hereafter 'BAM'.

This BDAR supports a Development Application under Division 4.1, Part 4 of the EP&A Act.

The structure of the report is summarised in **Table 1-1**.

Table 1-1: Report structure

Section reference	Section heading / BAM requirement	Description
Executive summary	Executive summary	Concise summary of this technical paper and the key findings
viii and ix	Definitions and acronyms	Provides definitions and summarises the acronyms used throughout this report.
1	Introduction to the proposal and the assessment team • Background • Report structure • Project personnel	Description of the proposal. Provides an overview of the assessment objectives, structure of technical report and staff contributing to this document.
Stage 1 BAM document (assessing biodiversity values)		
2	Introduction to the biodiversity assessment • identification of development site footprint, including: ○ operational footprint ○ construction footprint indicating clearing associated with temporary construction facilities and infrastructure • general description of development/proposal • sources of information used in the assessment, including reports and spatial data.	Description of the proposal relevant to assessing biodiversity values in the proposal area. Provides an overview of the assessment objectives and structure of technical report.
3	Landscape features • IBRA bioregions and subregions, NSW landscape region and area (hectares) • native vegetation extent in the buffer area • cleared areas • evidence to support differences between mapped vegetation extent and aerial imagery • rivers and streams classified according to stream order • wetlands within, adjacent to and downstream of the site • connectivity features • areas of geological significance and soil hazard features o site context components, including:	Identifies landscape features at the development site footprint.

Section reference	Section heading / BAM requirement	Description
	o identification of method applied (i.e. linear or site-based) o percent native vegetation cover in the landscape (development site).	
4	Native vegetation Describes PCTs within the proposal area, including: • vegetation class • vegetation type • area (hectares) for each vegetation type • species relied upon for identification of vegetation type and relative abundance • justification of evidence used to identify a PCT (as outlined in Paragraph 5.2.1.12 of the BAM) • TEC status (as outlined in Paragraphs 5.2.1.14–5.2.1.15 of the BAM) • estimate of percent cleared value of PCT (as outlined in Paragraph) Vegetation integrity assessment of the development site, including: • mapping vegetation zones (Subsection 5.3.1 of the BAM) • patch size (development site and proposal) • assessing vegetation integrity using benchmark data (Subsection) • survey effort as described in Subsection 5.3.4 (number of plots) • determining the vegetation integrity score (Appendix 6 of the BAM): o composition condition score o structure condition score o function condition score o vegetation integrity score. Where use of local data is proposed: • identify relevant vegetation type • identify source of information for local benchmark data • justify use of local data in preference to database values.	Identifies native vegetation extent within the proposal area, including cleared areas and evidence to support differences between mapped vegetation extent and aerial imagery.
5	Threatened species Identify ecosystem credit species associated with PCTs in the proposal area as outlined in Section 6.2, including: • list of species derived • justification for exclusion of any ecosystem credit species predicted above. Identify species credit species on both the development site and the proposal as outlined in Sections 6.3 to 6.5, including: • list of candidate species • justification for inclusions and exclusions based on habitat features • indication of presence based on targeted survey or expert report • details of targeted survey technique, effort, timing and weather • species polygons • biodiversity risk weighting for the species • threatened species survey • additional requirements for wind farm developments. Where use of local data is proposed: • identify relevant species • identify aspect of species data • identify source of information for local data • justify use of local data in preference to database values. Where expert reports are used in place of targeted survey: • identify the relevant species • justify the use of an expert report • indicate and justify the likelihood of presence of the species and information considered in making this assessment • estimate the number of individuals or area of habitat (whichever unit of measurement applies to the species/individual) for the development site or proposal, including a description of how the estimate was made • identify the expert and provide evidence of their expert credentials.	Identifies the list of species and habitat components and their sensitivity classes and risk to development

Section reference	Section heading / BAM requirement	Description
Stage 2 BAM document - Impact assessment (biodiversity values)		
6	Matters of National Environmental Significance	Provides information of MNES species, populations or communities with potential to be recorded in the proposal.
7	Minimise impacts and nature of impact • Demonstration of efforts to avoid and minimise impact on biodiversity values in accordance with Chapter 8 of BAM (2017). • Assessment of direct and indirect impacts unable to be avoided at the development site in accordance with Sections 9.1 and 9.2 of BAM (2017). The assessment would include but not be limited to: type, frequency, intensity, duration and consequence of impact. • For major projects: details of the adaptive management strategy proposed to monitor and respond to impacts on biodiversity values that are uncertain (Section 9.4 of BAM (2017). • Identification and an assessment of the impacts which are potential serious and irreversible impacts, in accordance with Subsections 10.2.2 for impacts on CEECs and 10.2.3 for threatened species. • Identification of impacts requiring offset in accordance with Section 10.3. Identification of impacts not requiring offset in accordance with Paragraph 10.3.2.2. • Identification of areas not requiring assessment in accordance with Section 10.4.	Provides information on minimising harm to the environment in the proposal Provides information on residual harm to the environment in the proposal
8	Mitigation measures	Provides actions to minimise harm to the environment
9	Biodiversity offsets	Identifies if biodiversity offsets have been triggered
10	Conclusions and recommendations • Conclusions • Recommendations	Concise statement of key findings of biodiversity values in the proposal.
11	References	Information sources used

1.3 Project personnel

This assessment was carried out by appropriately qualified and experienced ecologists (refer to Table 1-1).

Table 1-1: Summary of AREA project teams' qualifications

Name	Position	CV Details	Role in this project
Phillip Cameron	Principal Consultant	• BSc. Major in Biology. Macquarie University • Ass Dip App Sci. University of Queensland • Certified Environmental Practitioner (EIANZ) and practicing member • NSW OEH BioBanking and Bio-certification Assessor: accreditation number 0117 • NSW OEH Biodiversity Assessment Method Assessor: accreditation number BAAS17082 • NSW OEH Scientific License: 101087 • NSW DPI Ethics Approval 17/459 (3) • Practicing member of the NSW Ecological Consulting Association	Certification. Fieldwork Project Management. Report editing
Addy Watson	Principal Environment and Community Consultant	• Grad. Dip. Captive Vertebrate Management, Charles Sturt University • Grad. Cert. Social Impact, University of NSW (current) • B. Env. Sc. University of New England. • Diploma Project Management	Fieldwork Report writing
Heidi Kolkert	Principal Ecologist	• PhD candidate (Science) University of New England 2013 to current • BSc. (Hons) and Bachelor of Arts University of Tasmania Graduated 2005 • NSW OEH BioBanking and Bio-certification Assessor TAFE NSW • Practicing member of the NSW Ecological Consulting Association • WHS White Card and Blue Card • Apply First Aid (Medilife), Remote First Aid (St John)	Bat call analysis

STAGE 1 BAM: BIODIVERSITY ASSESSMENT

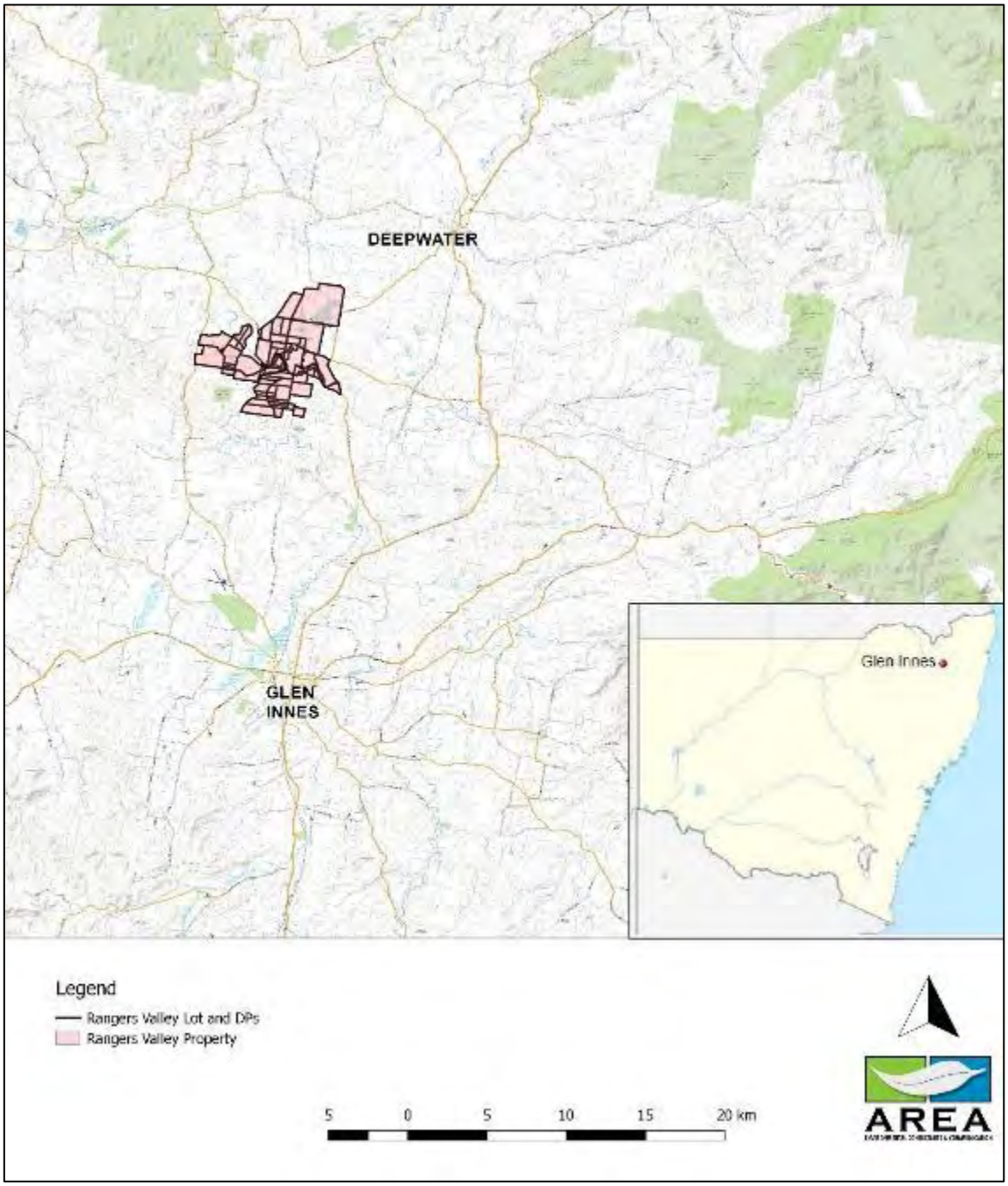
2 Introduction to the biodiversity assessment

This chapter has been prepared in accordance with Chapters 3 and 4 of the BAM.

2.1 Identification of proposal footprint

The proposal affects 253.16 hectares of land on the Rangers Valley property which is owned by Rangers Valley Cattle Station Pty Ltd and is located approximately 28 kilometres north of Glen Innes, NSW (Figure 2-1). Rangers Valley is also a locality based on a pastoral run much larger than the current property.

Figure 2-1: Location of Rangers Valley property



The proposal area is eleven paddocks across the Rangers Valley property (Figure 2-2). These are identified as proposed manure utilisation areas and effluent utilisation areas.

The proposal area falls within the following Lot and DPs (Figure 2-3):

- Lots F, G and H, DP32737
- Lots 1, 2 and 3, DP1111949
- Lots 15, 21 and 24, DP 753278
- Lot 83, DP40605
- Lots 6, 8, 21, 22, 23, 120, DP753291
- Lot A, DP38870
- Lot 1, DP1111657.

Figure 2-2: Location of proposal footprint

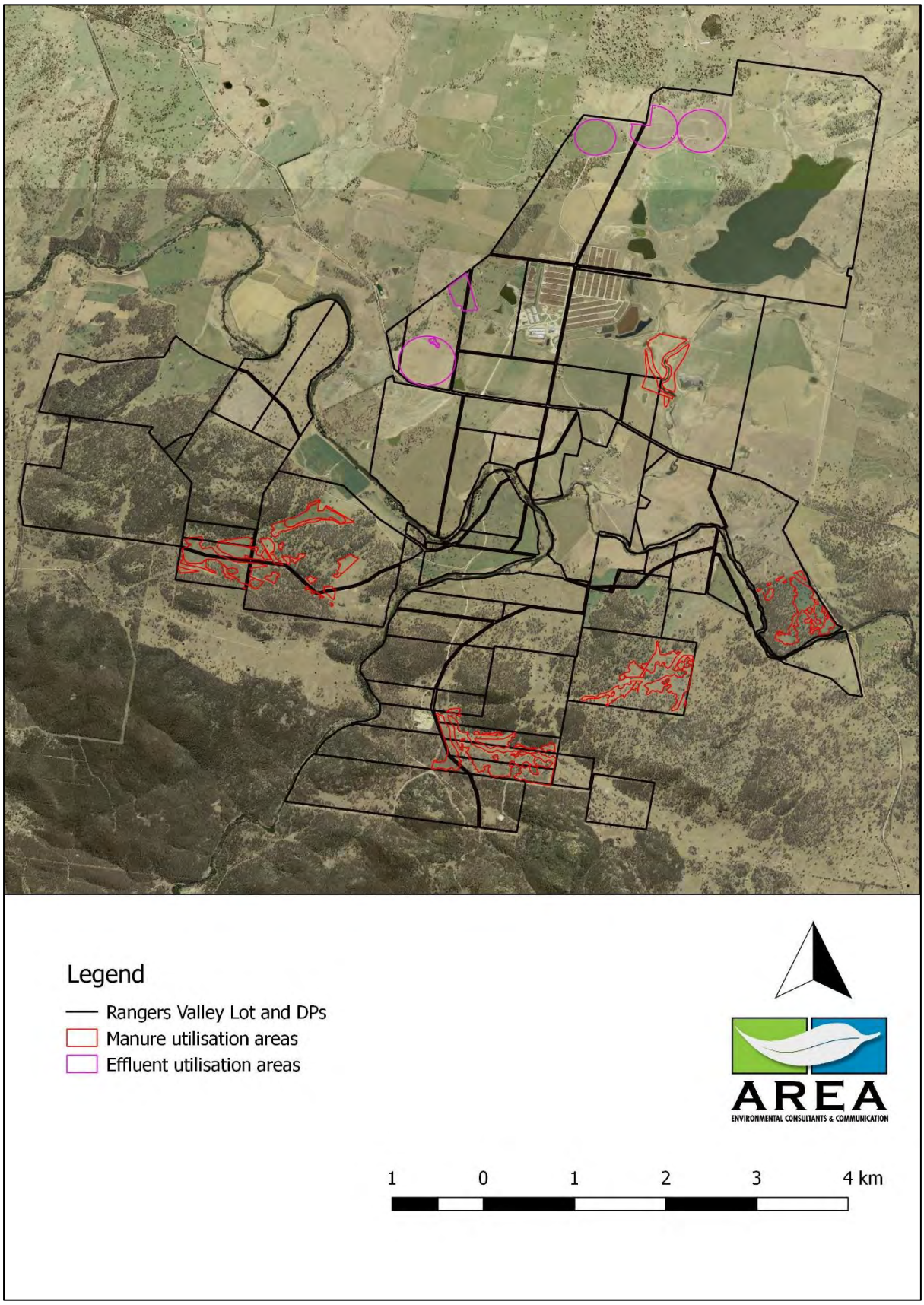
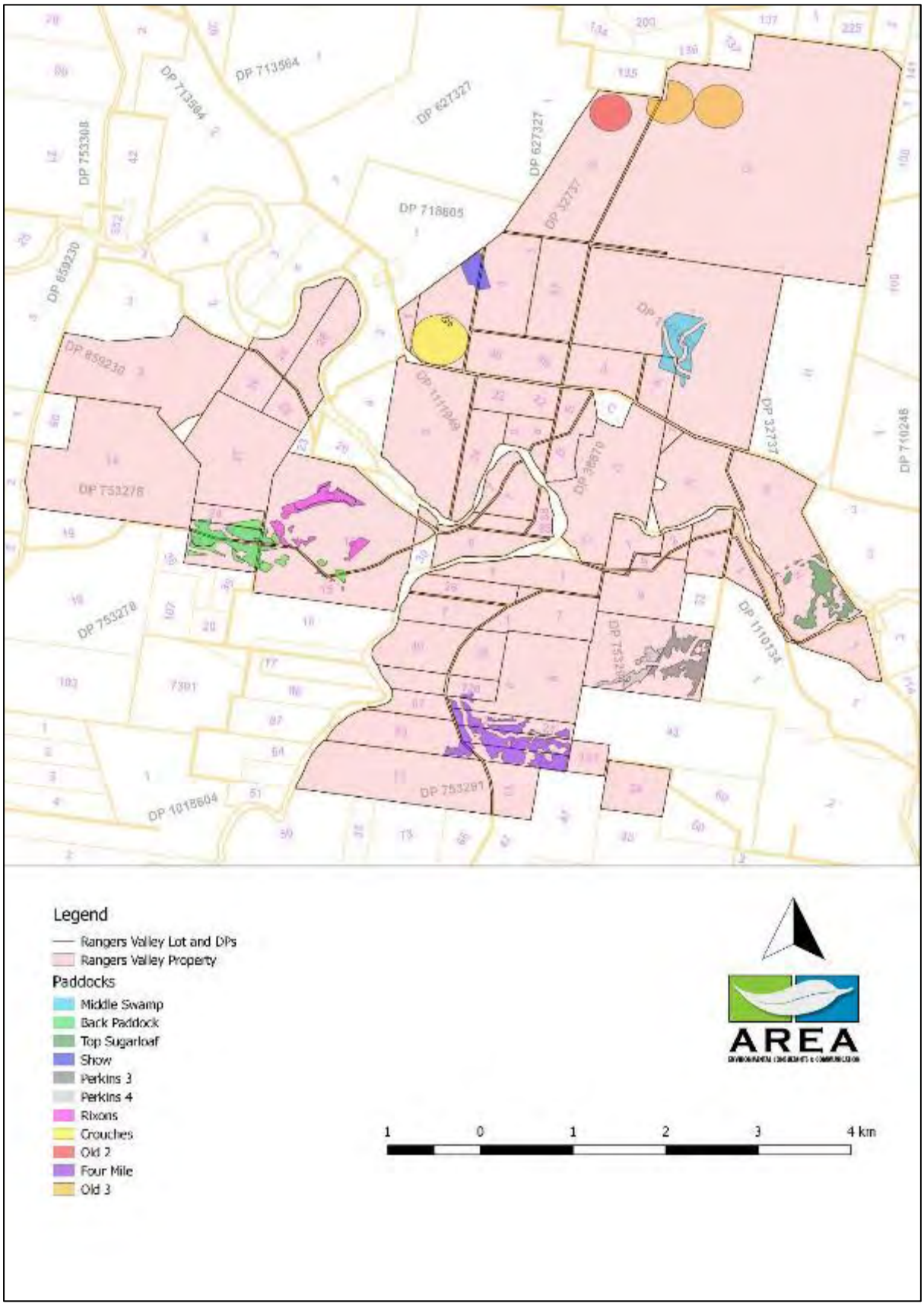


Figure 2-3: Lots and DPs (per Section 4.2 of BAM)



2.1.1 History of disturbance

Rangers Valley was settled by Europeans in 1839. Sheep wool production was the industry developed and the area was renowned for quality wool.

Within six years Rangers Valley had grown to cover an area of 45,000 acres and was stocked with sheep and cattle. Property acquisition and expansion of the operation continued until it was sold in the 1900s.

From the 1900s cattle became the primary stock farmed at Rangers Valley, and a feedlot was established in the 1960s.

Clearing of vegetation has been occurring throughout the region since farming commence, however the Rangers Valley property and surrounding property still support large areas of native forest.

Rangers Valley now consists of around 4856 hectares of grazing and feedlot land. Rangers Valley feedlot is the one of the largest in Australia, having a capacity of around 32,000 cattle.

2.1.2 The regional context of the proposal area

The regional context of the proposal area is provided in Table 2-1.

Table 2-1: Regional context of the proposal

Attribute	Response
Interim Biogeographic Regionalisation for Australia (IBRA Region)	New England Tablelands Bioregion. Deepwater Downs subregion and Severn River Volcanics subregion (**Figure 2-4**)
State	New South Wales
Topographical map sheet	Glen Innes (9237) / Clive (9239)
Local Government Area	Glen Innes Severn LGA
Nearest town / locality	Glen Innes (**Figure 2-1**)
Accessed from nearest town by	Yarraford Road, Rangers Valley Road and New England Highway
Lot and Development Portion of the proposal	18 Lots within 7 DPs – See section 2.1(**Figure 2-3)**.
Land use / disturbance	See section 2.11.
Nearest drainage line (Name, Strahler Order)	The Severn River and Beardy Waters both run across the property between proposal area. The run closest to the Top Sugarloaf paddock, running approximately 50 metres from the proposal. There are also numerous minor watercourses and drainage lines across the property.
Spot point Australian Height Datum (AHD)	900 - 1000 m..
Surrounding land use	Grazing agriculture**.**

Regional context is depicted in Figure 2-4, Figure 2-5 and Figure 2-6. Images of each paddock are provided in section 2.1.3 as Figure 2-7 to Figure 2-13.

Figure 2-4: LGA and IBRA subregions

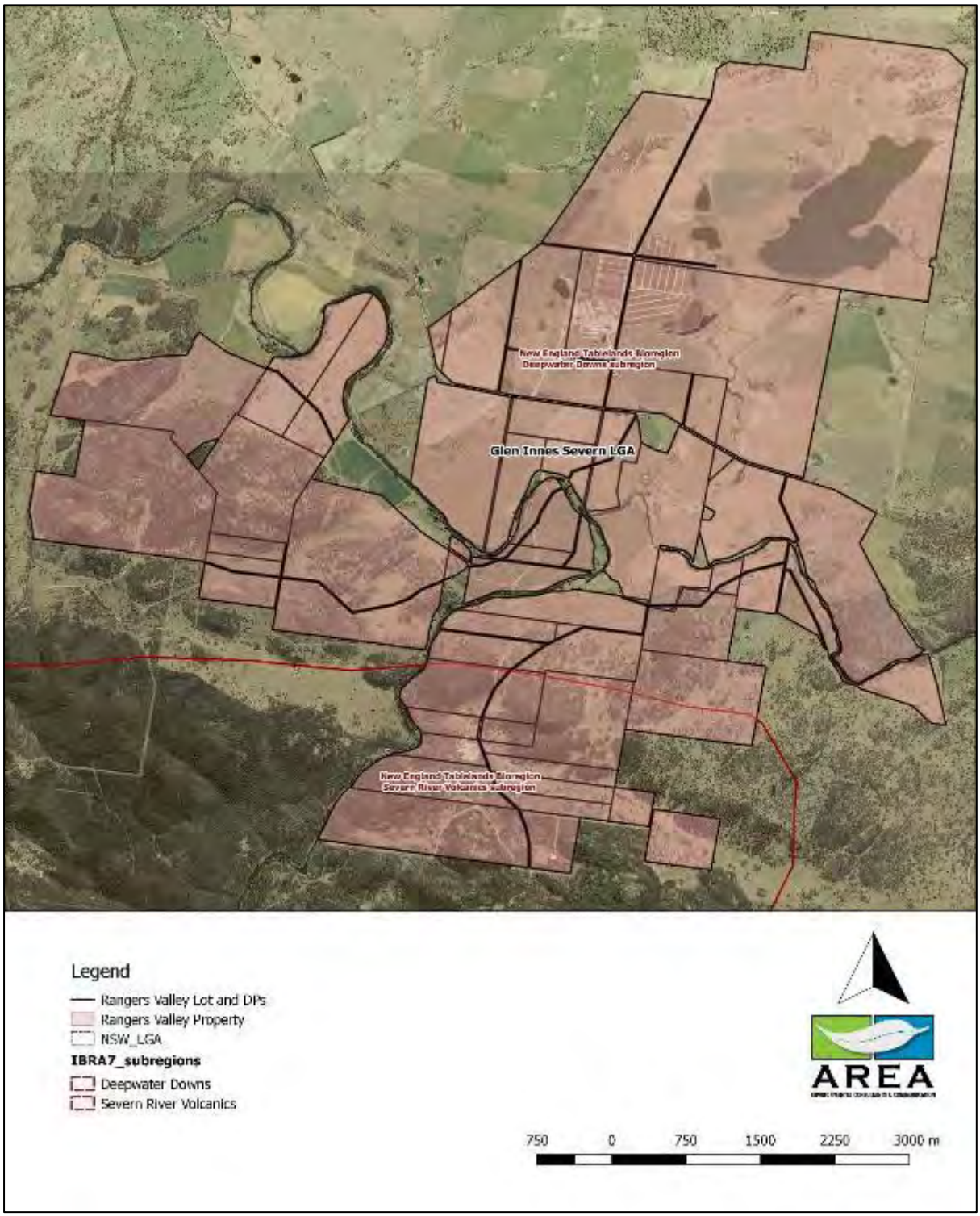


Figure 2-5: Aerial location map of Rangers Valley property (per Section 4.2 of BAM)

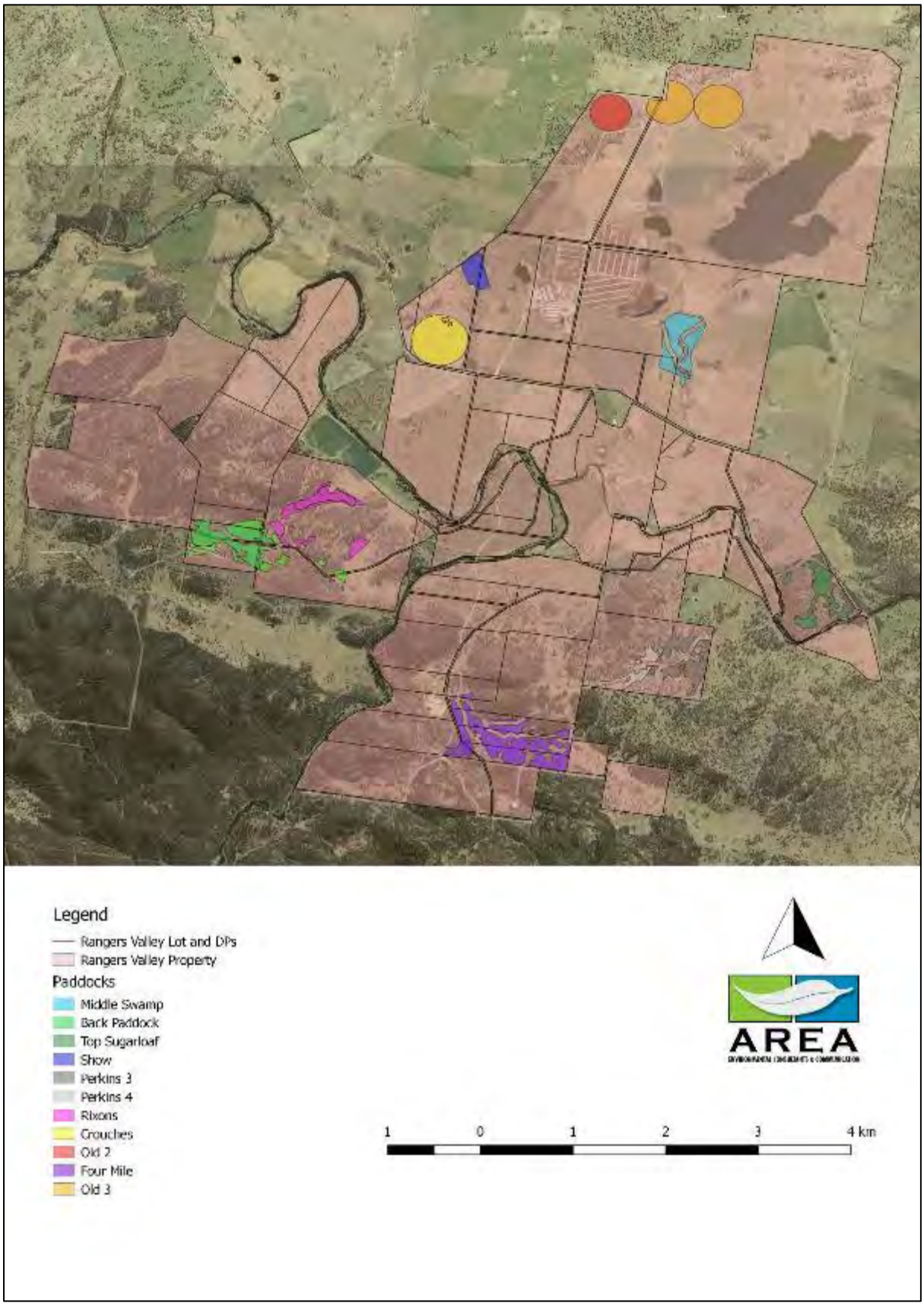
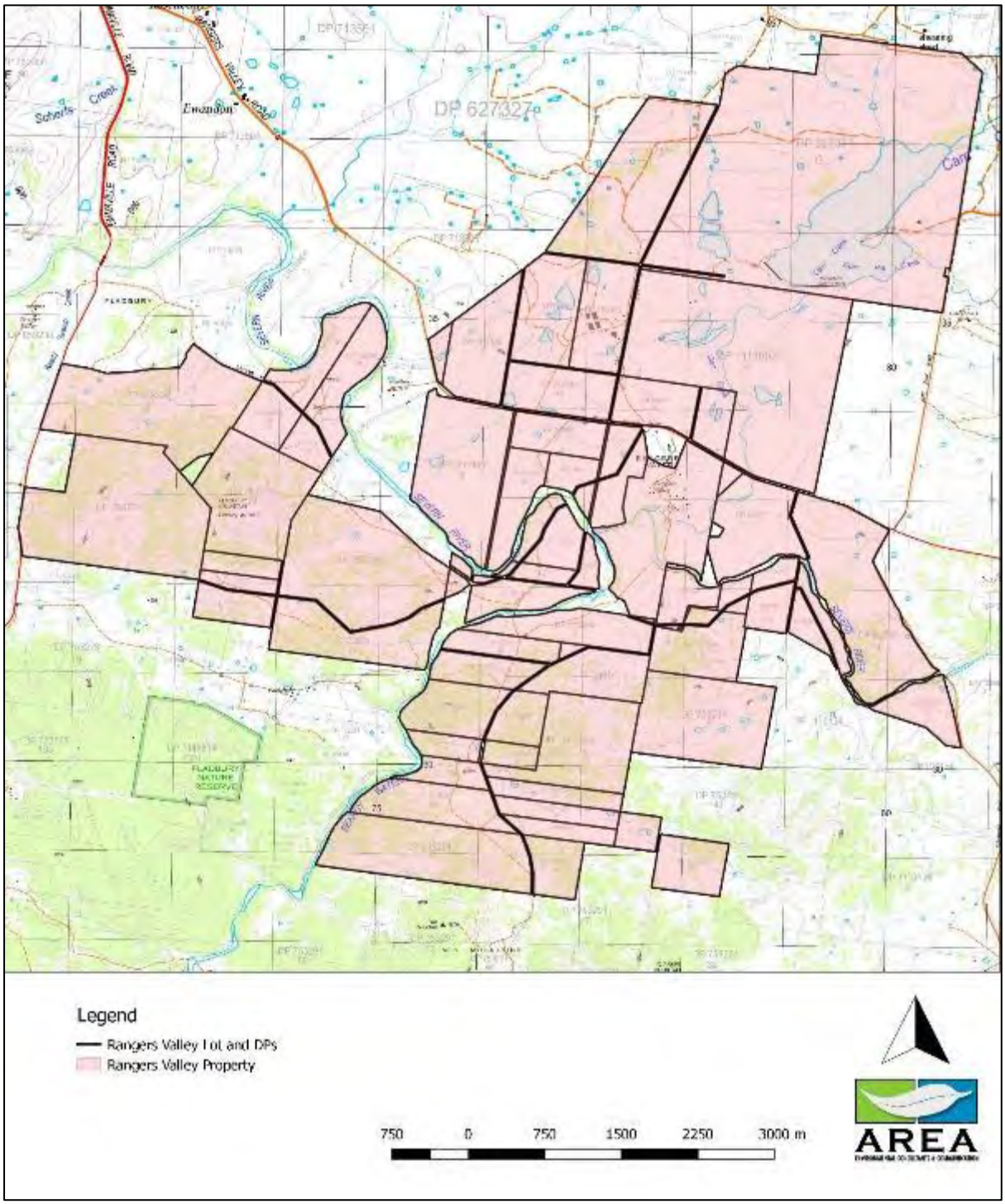


Figure 2-6: Topographic location map of the Rangers Valley property (per Section 4.2 of BAM)



2.1.3 Operational footprint

The operational footprint is all the area assessed by this report and is the proposal area. This is a total of 253.16 hectares (183.33 hectares of native vegetation and 69.83 hectares of not native vegetation).

The areas occupied by this proposal area are summarised in Table 2-2.

Table 2-2 Proposal areas

Paddock name	Proposed utilisation	Total (hectares)	Native or Not native
Rixons	Manure	19.86	Native
Back Paddock	Manure	33.02	Native
Four Mile	Manure	42.71	Native
Perkins 3	Manure	17.01	Native
Perkins 4	Manure	7.67	Native
Top Sugarloaf	Manure	17.33	Native
Middle Swamp	Manure	20.69	Native
Old 2	Effluent	15.89	Native
Old 3	Effluent	40.25	Not Native Five living and one dead paddock tree
Show	Effluent	8.55	Native
Crouches	Effluent	0.59	Native
		29.58	Not Native with one dead paddock tree
Total		253.16	

Figure 2-7: Proposal detail. Old 2 (area on left) and Old 3 (two areas on right)

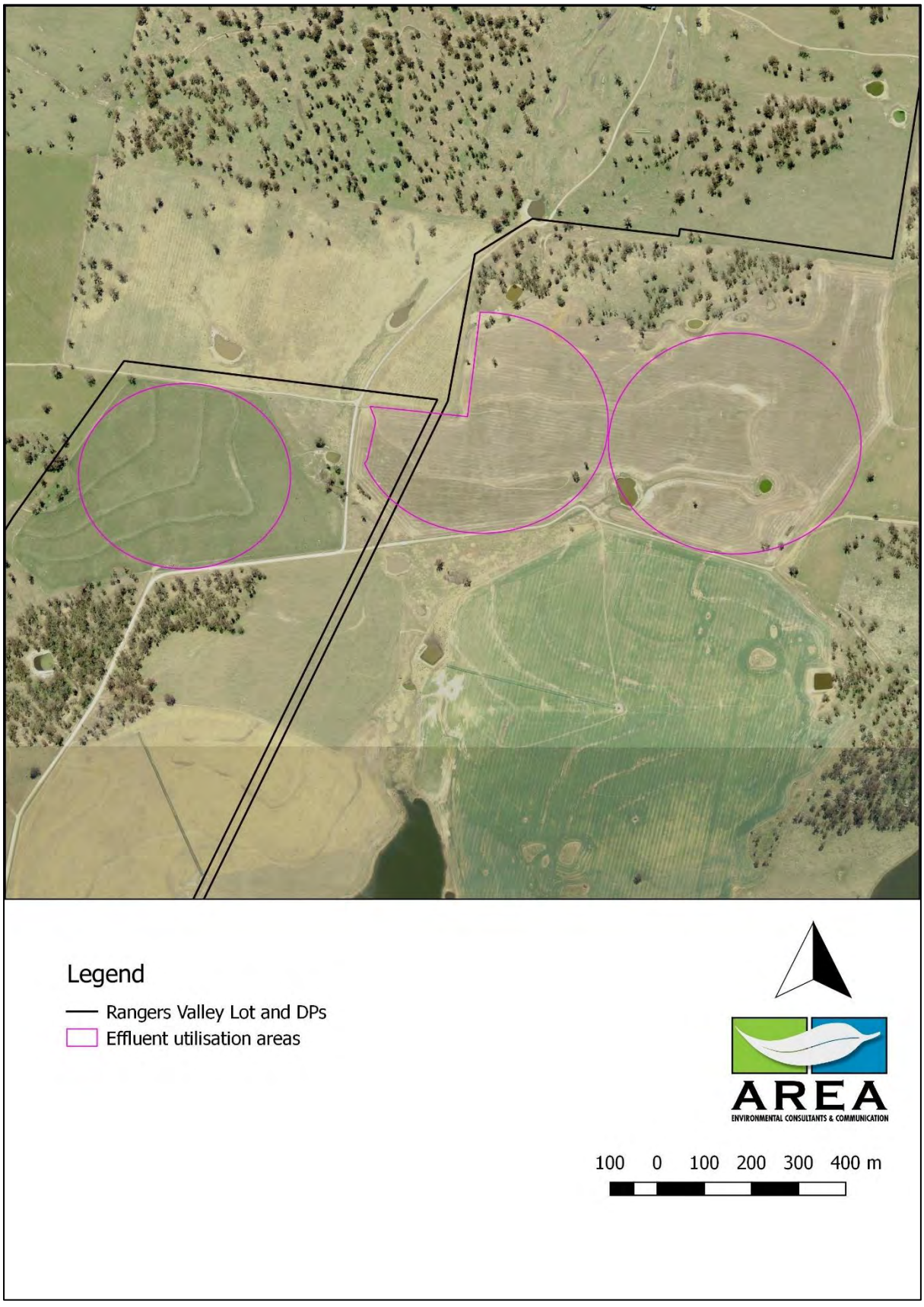


Figure 2-8: Proposal detail. Crouches (lower area with patch of PCT510 indicated) and Show (upper area)

Figure 2-9: Proposal detail. Rixons and Back Paddock

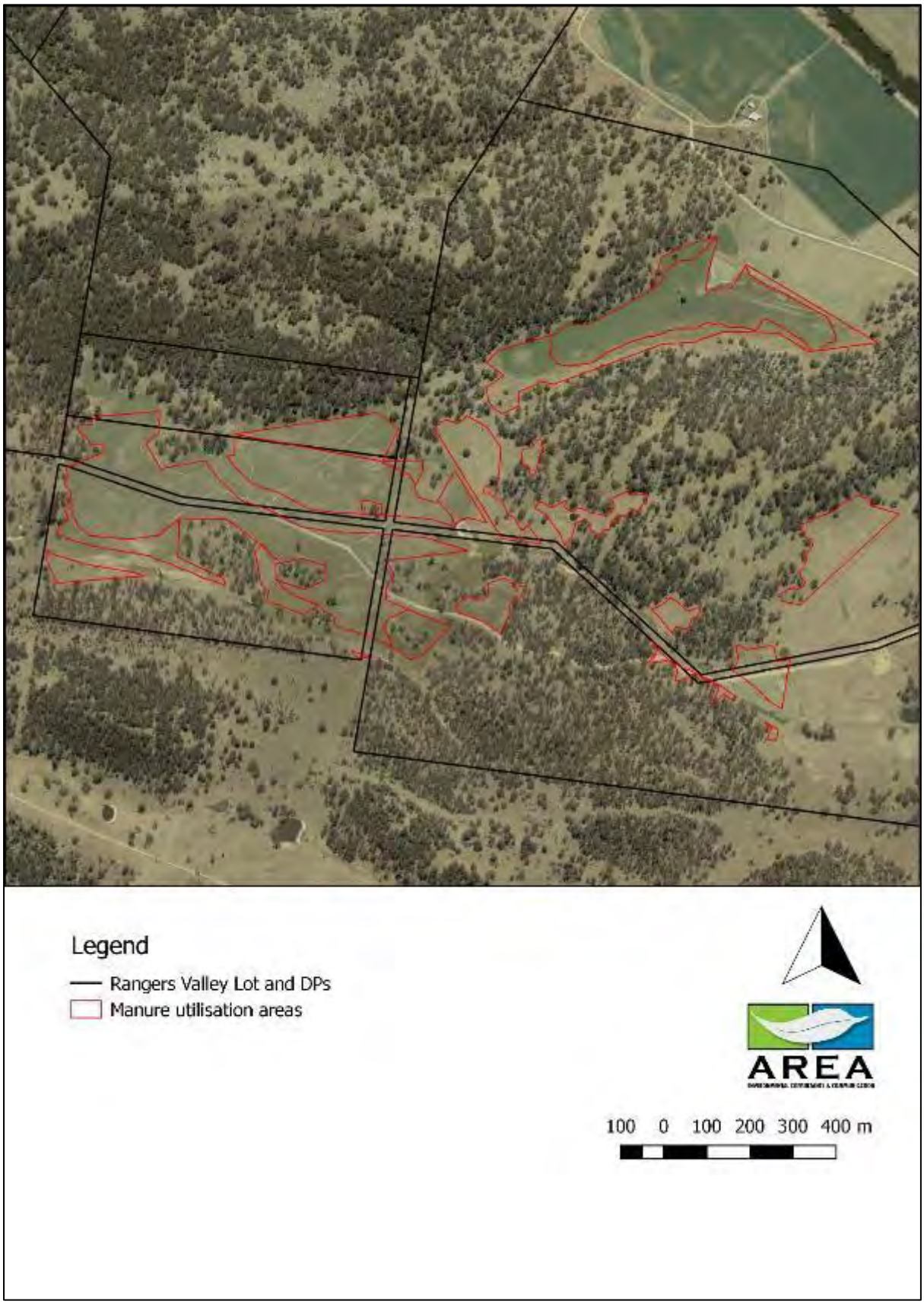


Figure 2-10: Proposal detail. Four Mile

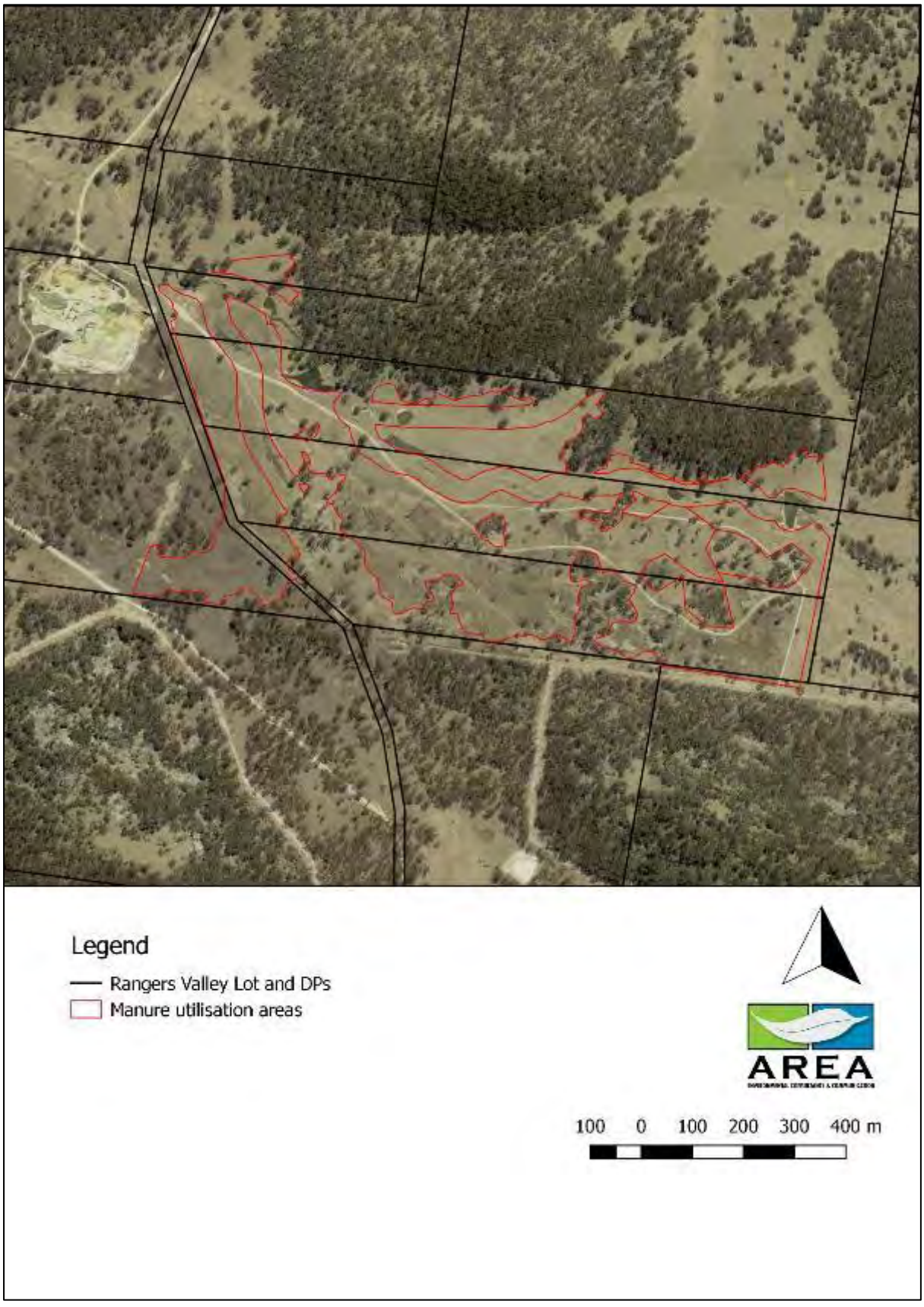


Figure 2-11: Proposal detail. Perkins 3 and Perkins 4.

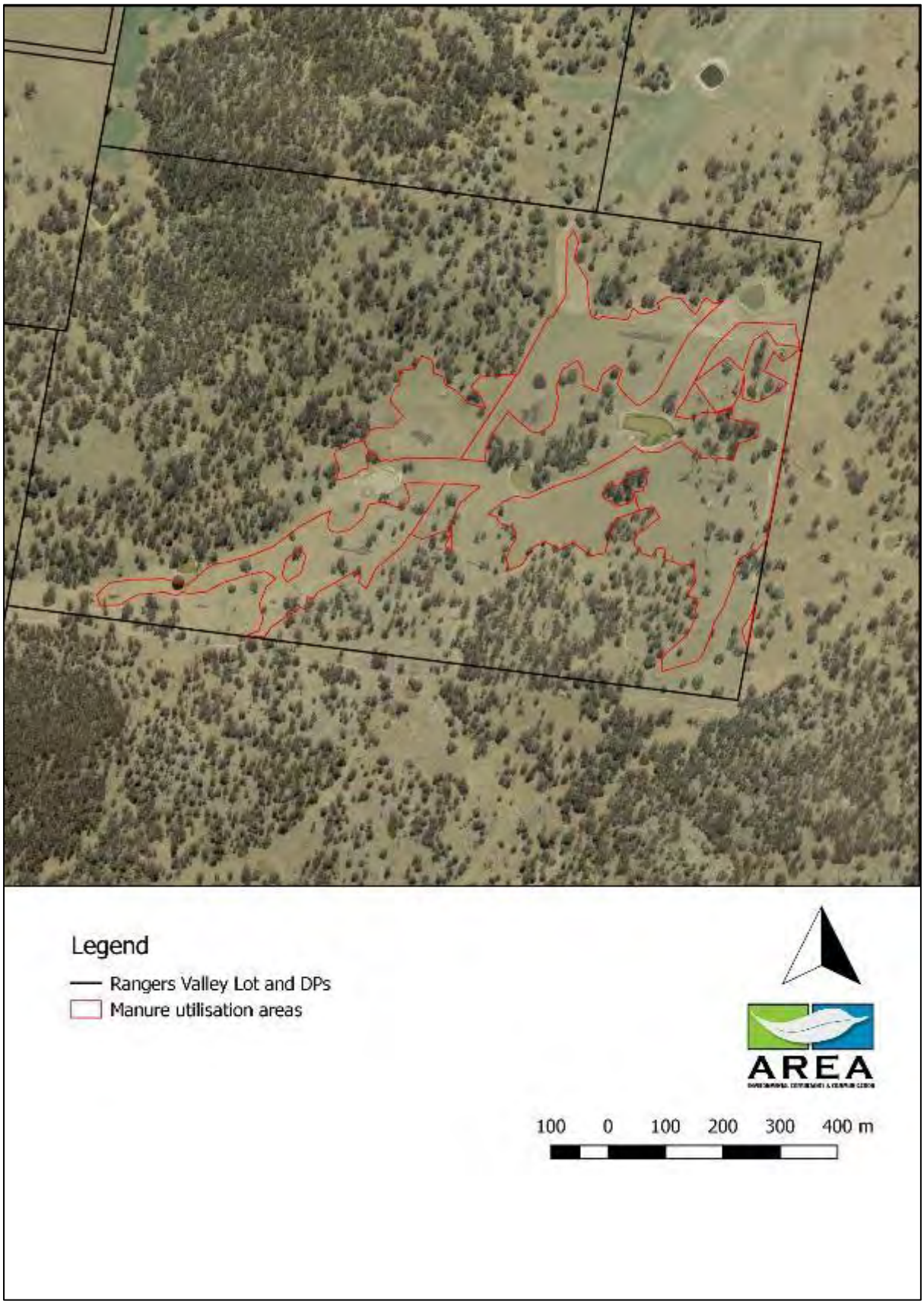


Figure 2-12: Proposal detail. Top Paddock

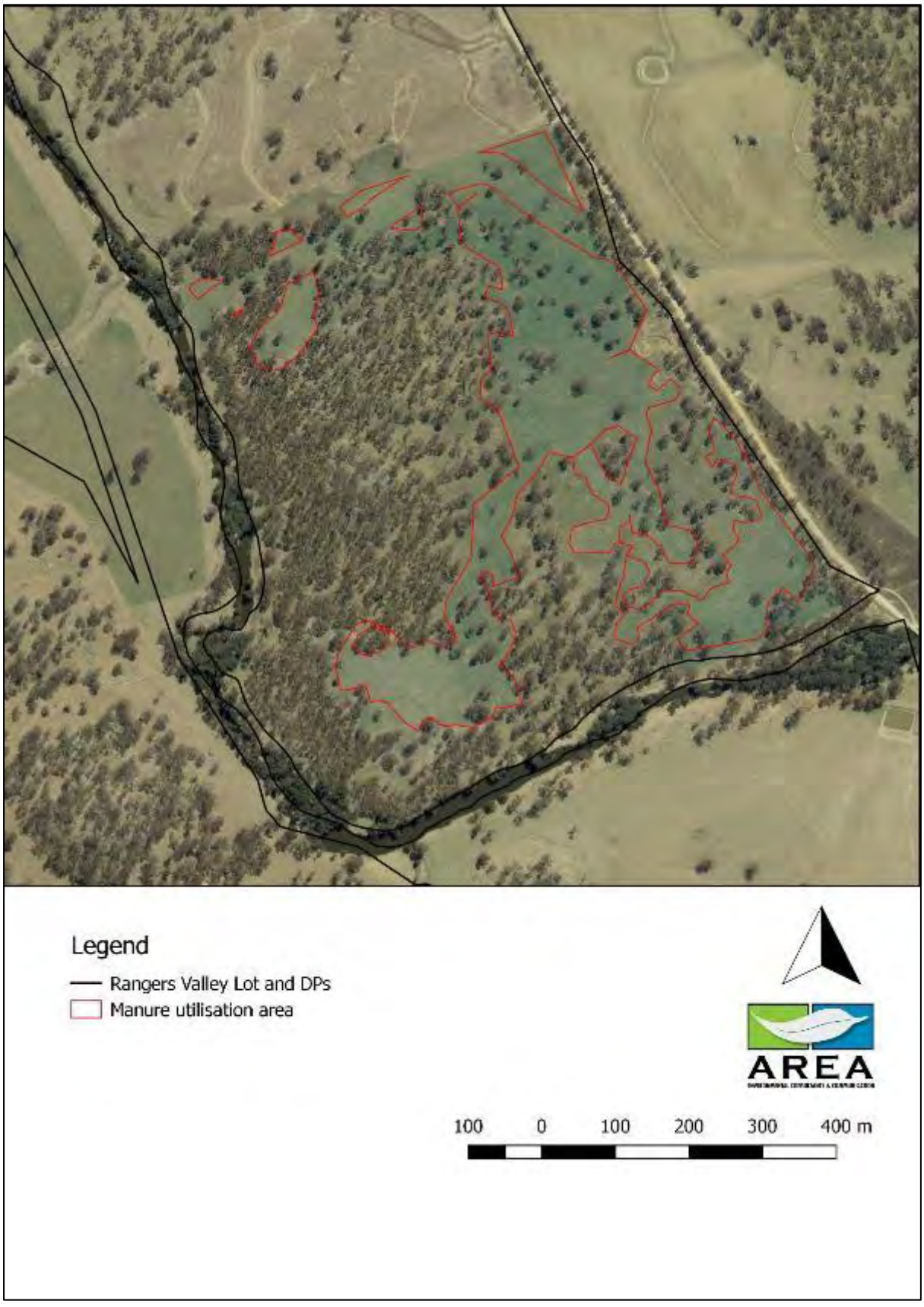


Figure 2-13: Proposal detail. Middle Swamp.

2.1.4 Construction footprint

No additional construction footprint is required for this proposal.

2.2 General description of the proposal

The proposal will allow manure to be applied to seven paddocks and the effluent to be applied to four paddocks via centre pivot or other irrigation systems. This proposal aim is to increase the productivity of the land, increasing ground cover and growth. The definition of manure and effluent is outlined below.

Currently, improved pasture and crops are grown in the proposed manure and effluent utilisation areas. Inorganic fertilisers are applied to pasture and crops as required. No manure or effluent is currently applied to these paddocks.

Manure application

Manure is harvested from the production pens every 8-10 weeks, taken to the manure stockpile area, the manure is screened to remove gravel and breakdown large clumps and placed into windrows. Windrows may remain for up to 12 months in the stockpile area over which time the manure ages and breaks down further. Aged manure is taken to the manure utilisation area on an as-required basis in line with cropping program and weather conditions and spread on the utilisation area with a tractor drawn manure spreader prior to incorporation into the soil if crops are to be grown or directly onto pasture.

Effluent application

Stormwater runoff from the controlled drainage areas of the development (production/hospital/induction pens, cattle washing, cattle handling facility, solid waste stockpile, roads etc) is termed effluent and is directed towards a sedimentation basin. The effluent is temporarily held in a sedimentation basin where most of the sediment entrained in the runoff settles out. The effluent then flows to holding pond(s) where it is temporarily held pending irrigation to land when weather conditions permit. Effluent may be held in the holding ponds for weeks to months depending on volume of effluent generated, cropping program etc. Effluent is applied to land with a low pressure overhead centre pivot irrigator or similar system.

In proposed manure utilisation areas, no trees or other vegetation will be cleared. Manure utilisation areas have been selected to avoid areas of dense trees, steep and significantly rocky areas.

All trees within the proposed effluent utilisation areas will be removed to enable centre pivot or other irrigator to travel across the paddocks. Effluent utilisation areas have been designed to avoid tree removal as much as possible. A total of 22 trees will be removed by this proposal. Tree removal is required in:

- Crouches
  - 0.59 hectares (**12 trees**) of PCT 510 Removal of these is in addition to the ten paddock trees listed in the points below) (This 0.59 hectares is assessed under full BAM assessment while the paddock trees listed in the points below are assessed as paddock trees and threatened species habitat)
  - **One dead tree** (20 – 50 centimetres DBH, with a hollow <20 centimetres diameter)
- Show
  - **Three dead trees** to be removed (>50 centimetres DBH, two with hollows <20 diameter and one with hollow >20 centimetres diameter)
- Old 3
  - **Five trees** to be removed

- One *Eucalyptus caliginosa* (20 – 50 centimetres DBH, with hollow <20 centimetres)
- One *Eucalyptus bridgesiana* (>50DBH, Hollow >20 centimetres)
- Three *Eucalyptus melliodora* (two 20 – 50 centimetres DBH and one >50 centimetres DBH, all with hollows <20 centimetres diameter)

o **One dead tree** to be removed (>50 centimetres DBH with hollow <20 centimetres diameter)

Access roads to the proposal already exist and no additional work on these are required for the proposal.

Application of manure and effluent will be done so to avoid impact to sensitive areas such as waterways in accordance with Rangers Valley feedlot's POEO licence conditions.

Areas of native vegetation were mapped as part of the biodiversity assessment process. Vegetation zones were defined as:

Vegetation Zones area allocated as:
• Zone 1 – Areas with more than 50 percent native ground cover (no tree removal required, and all of this zone is manure utilisation areas)
• Zone 2 – Areas with between zero and 50 percent native ground cover (removal of three dead trees in effluent utilisation areas and no tree removal in manure utilisation areas)
• Zone 3 – Areas with zero percent native ground cover (current cropped paddock with removal of five living trees required as paddock tree assessment. Also, removal of two dead trees is required)
• Zone 4 – Area with zero native ground cover (current cropped paddock with native tree removal required as PCT assessment)

Examples of these zones are provided in Plate 2-1 and Plate 2-4.

Plate 2-1: Example of Zone 1 - proposed manure utilisation area (Rixons)

Plate 2-2: Example of Zone 2 - proposed manure utilisation area (Perkins 3). Note manure utilisation areas avoid stands of trees.

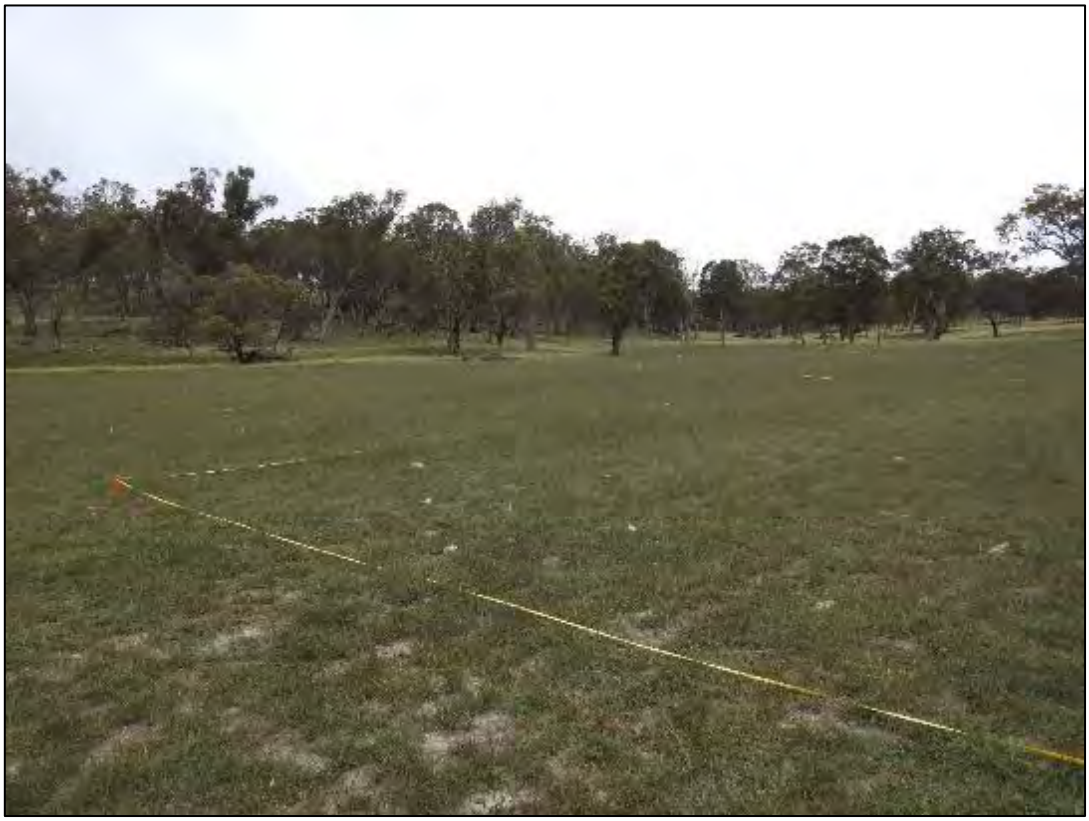


Plate 2-3: Example of Zone 3 - proposed effluent utilisation area with paddock trees only (Soybean crop - Old 3)

Plate 2-4: Example of Zone 4 (patch of trees) surrounded by Zone 3 (corn crop) - proposed effluent utilisation area (Crouches)

2.3 Sources of information used in the assessment, including reports and spatial data.

Information used to inform this BDAR has been provided in the following sections of this report and in Table 2-3 and Table 2-4.

2.3.1 Spatial data

Table 2-3: Spatial data used in this report

GIS layer name	Reference
IBRA bioregions and subregion	NSW data porthole
NSW landscape regions	Mitchell Landscapes V3
Rivers and streams	Six Viewer / SEED WMS topographic layer
Wetlands	Directory of Important Wetlands
Waterways	Waterways_NSW_Final
Key Fish Habitat	DPI Key Fish Habitat GIS layer
Connectivity of different areas of habitat	Namoi VIS 4467 veg map and Six Viewer
Native vegetation extent	Namoi VIS 4467 veg map and Six Viewer

2.3.2 Web sites (and links to documents)

The resources in Table 2-4 were reviewed for Stage 1 of this BDAR:

Table 2-4: Web sites and links to documents used in this report

Title	Web address
Legislation	
Commonwealth Environment Protection & Biodiversity Conservation Act 1999	http://www.austlii.edu.au/au/legis/cth/consol_act/epabca1999588/
Environmental Planning and Assessment Act 1979	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+203+1979+cd+0+N
Fisheries Management Act 1994	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+38+1994+cd+0+N
National Parks and Wildlife Act 1974	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+80+1974+cd+0+N
Biodiversity Conservation Act 2016	https://www.legislation.nsw.gov.au/~/view/act/2016/63
Water Management Act 2000	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+92+2000+cd+0+N
Local Land Services Act 2013	https://www.legislation.nsw.gov.au/~/view/act/2013/51
Biodiversity	
Biodiversity Assessment Methodology (OEH, 2017)	http://www.environment.nsw.gov.au/biobanking/assessmethodology.htm
BAM Credit Calculator	http://www.environment.nsw.gov.au/biobanking/calculator.htm
Threatened Species Survey and Assessment Guidelines: Field Survey Methods for Fauna – Amphibians (DECCW, 2009)	http://www.environment.nsw.gov.au/resources/threatenedspecies/09213amphibians.pdf
Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities – Working Draft (DEC, 2004)	http://www.environment.nsw.gov.au/resources/nature/TBSAGuidelinesDraft.pdf
Survey requirements (birds, bats, reptiles, frogs, fish and mammals) for species listed under the EPBC Act	http://www.environment.gov.au/topics/environmentprotection/environment-assessments.
Guide to Surveying Threatened Plants (OEH, 2015)	http://www.environment.nsw.gov.au/resources/threatenedspecies/160129-threatened-plants-survey-guide.pdf
Threatened biodiversity profile search	http://www.environment.nsw.gov.au/threatenedspeciesapp/
NSW BioNet	http://www.bionet.nsw.gov.au/
Vegetation Types databases	http://www.environment.nsw.gov.au/biobanking/vegtypedatabase. htm
PlantNET	http://plantnet.rbgsyd.nsw.gov.au/
Online Zoological Collections of Australian Museums	http://www.ozcam.org.au/
Threatened Species Assessment Guideline - The Assessment of Significance (DECCW, 2007)	http://www.environment.nsw.gov.au/resources/threatenedspecies/tsaguide07393.pdf
Significant Impact Guidelines 1.1 - Matters of National Environmental Significance	http://www.environment.gov.au/epbc/publications/significant-impact-guidelines-11-matters-national-environmental-significance
Principles for the use of biodiversity offsets in NSW	http://www.environment.nsw.gov.au/biodivoffsets/oehoffsetprincip .htm

2.3.3 Reports and books

The following articles were reviewed to inform decisions of the impact of applying inorganic fertiliser to native grasses

1. Campbell M. H., Bowman A. M., Bellotti W. D., Munich D. J. & Nicol H. I. (1996). Recruitment of curly Mitchell grass (Astrebla lappacea) in North-Western New South Wales. *The Rangeland Journal* **18**, 179-87.
2. Carr D. B. (2014). Expert advice regarding EPBC Act-listed Natural Grasslands on alluvial basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland, in relation to the alleged clearing of native vegetation on a property located near Moree, NSW. Stringybark Ecological, Armidale, NSW.
3. Clarke P. J. (2003). Composition of grazed and cleared temperate grassy woodlands in eastern Australia: patterns in space and inferences in time. *Journal of Vegetation Science* **14**, 5-14.
4. Clarke P., Gardener M., Nano C. & Whalley R. (1998). *The vegetation and plant species of Kirramingly*. Division of Botany, University of New England, Armidale, NSW.
5. Cunningham, G., Mulham, W., Milthorpe, P., & Leigh, J. (1992). *Plants of Western New South Wales*. Collingwood, VIC: CSIRO Publishing.

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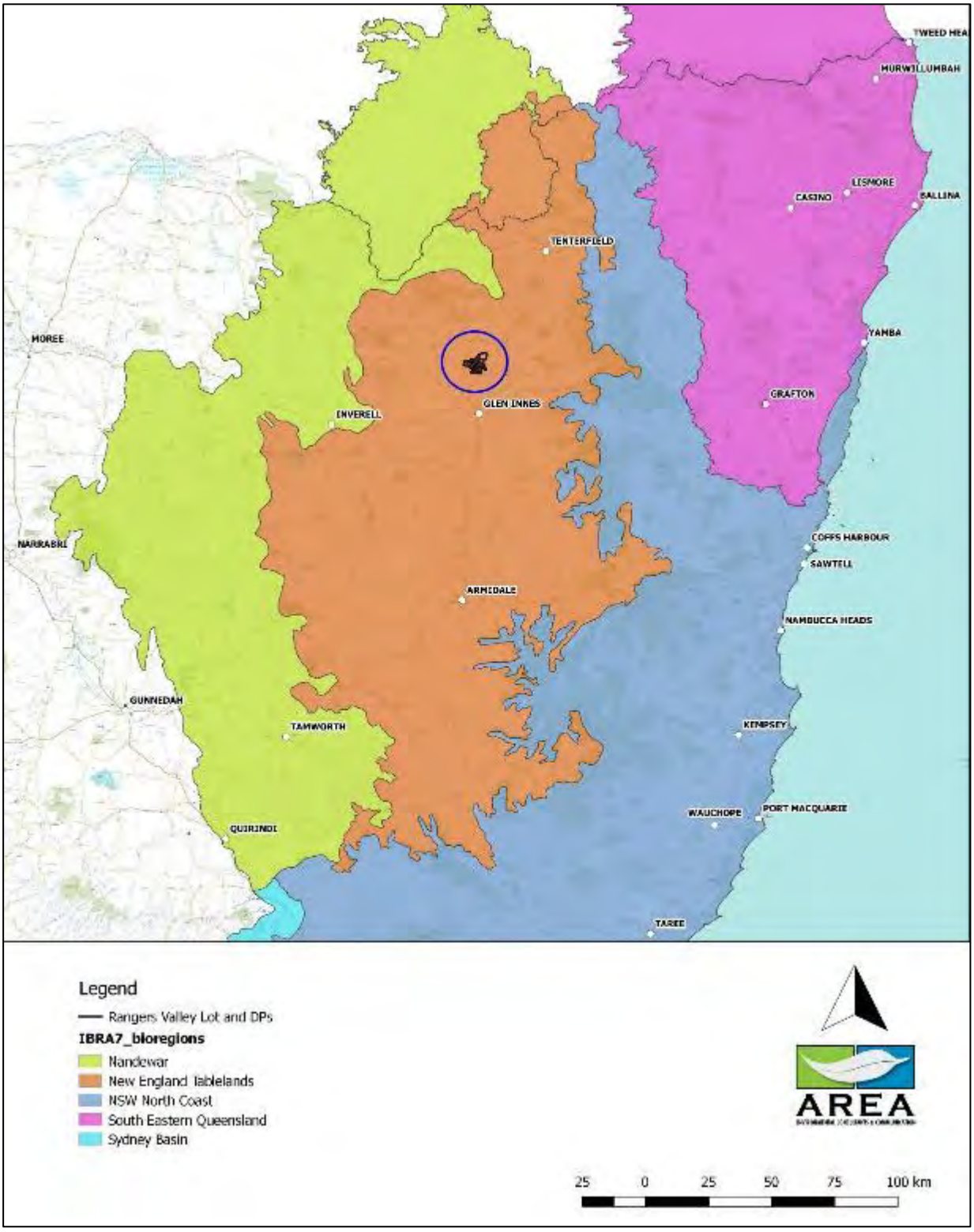
3 Landscape features

Landscape features of the proposal area are provided in Table 3-1.

Table 3-1: Landscape features of the proposal

Landscape feature	BAM reference	Response
IBRA bioregions and subregions See figure below and Figure 2.2.	IBRA bioregions and subregions (as described in Paragraphs 4.2.1.3–4.2.1.4)	The New England Tableland Bioregion has an area of 3,004,202 hectares of which 2,860,758 hectares or 95.23 per cent of the bioregion lies within NSW. This bioregion is one of the smaller bioregions in NSW, occupying 3.57 per cent of the state. The bioregion lies between the North Coast and Nandewar bioregions in north-east NSW, extending north just into Queensland. In NSW, the bioregional boundary extends from north of Tenterfield to south of Walcha and includes towns such as Armidale and Guyra, with Inverell just outside the boundary. The bioregion includes parts of the MacIntyre, Clarence, Gwydir, Macleay, Namoi and Manning River catchments. https://www.environment.nsw.gov.au/bioregions/NewEnglandTablelandBioregion.htm The proposal area is within the Deepwater Downs and Severn River Volcanics subregions. **Overview of the Deepwater Downs Subregion** (Source: OEH https://www.environment.nsw.gov.au/bioregions/NewEnglandTableland-Subregions.htm) **Geology** Permian diorite, acid volcanics and small areas of shales. **Characteristic landforms** Hilly to undulating with broad valleys, elevation 950 m. **Typical soils** Harsh red and yellow texture contrast soils with thin gritty topsoils. **Vegetation** Woodland of Blakely's red gum, apple box, New England stringybark, narrow-leaved peppermint, New England peppermint, rough-barked apple and bull oak. **Overview of the Severn River Volcanics Subregion** (Source: OEH https://www.environment.nsw.gov.au/bioregions/NewEnglandTableland-Subregions.htm) **Geology** Permian mixed volcanics and fine sedimentary rock. Granite intrusions and ridge top patches of Tertiary basalt with underlying sand and gravel. **Characteristic landforms** Undulating to hilly and rugged, elevation range 600 -1200 m. Well developed dendritic drainage with rocky gorges. Rock outcrop common on steep slopes.. **Typical soils** Shallow stony sandy loams on steep slopes, harsh texture contrast soils with gritty topsoils common, structured brown loams on small areas of basalt. Some evidence of salinity. **Vegetation** Low western slopes; woodland or heath of orange gum, Caley's ironbark, tumbledown gum, and black cypress pine. Woodlands and forest of red stringybark, western New England blackbutt, narrow-leaved ironbark, white box, yellow box and rough-barked apple. Highest eastern slopes; open forest of New England stringybark, Tenterfield wollybutt, yellow box, narrow-leaved ironbark, apple box, Blakely's red gum with orange gum in rocky outcrops.

Landscape feature	BAM reference	Response



Landscape feature	BAM reference	Response
NSW landscapes region and area (hectares). See figure below.	Sections 4.2 and 4.3, Appendix 3 NSW landscape regions (as described in Paragraph 4.2.1.5)	The proposal and the associated patches of native vegetation are entirely within the Inverell Plateau Granites Mitchell Landscapes. Widely distributed and defined undulating plateau with domed peaks on Permian New England granites and granodiorites. Several intrusions have distinctive contact ridges of metamorphosed sedimentary rocks. The area includes Permian acid volcanics and pyroclastics and some undifferentiated Permo-Carboniferous mudstone and lithic sandstone. General elevation 900 to 1500m, local relief 200m. The highest elevations are along the eastern edge above the Great escarpment, most of the plateau lies ate 900 to 1200m. As mapped this is a large landscape and it might require subdivision on the basis of vegetation. Domed rock outcrop is common with tors. Shallow gritty loam thickens downs lope to red or yellow earthy sand and red, red-yellow and yellow texture-contrast soil on lower slopes and valley floors. Wide valleys may have deep dark clay deposits in swampy streamlines. The vegetation varies with topography, soil, drainage and temperature. In dry areas open forest of; silvertop stringybark (Eucalyptus laevopinea), broad-leaved stringybark (Eucalyptus caliginosa), Blakely's red gum (Eucalyptus blakelyii), narrow-leaved peppermint (Eucalyptus radiata), yellow box (Eucalyptus melliodora), apple box (Eucalyptus bridgesiana), red ironbark (Eucalyptus sideroxylon), Caley's ironbark (Eucalyptus caleyi), rough-barked apple (Angophora floribunda) and black cypress pine (Callitris endlicheri). In moist areas open forest of; New England peppermint (Eucalyptus cinerea), manna gum (Eucalyptus viminalis), mountain gum (Eucalyptus dalrympleana), New England blackbutt (Eucalyptus andrewsii ssp. campanulata), diehard stringybark (Eucalyptus cameronii), Deane's gum (Eucalyptus deanei), messmate (Eucalyptus obliqua), privet-leaved stringybark (Eucalyptus ligustrina), Youman's stringybark (Eucalyptus youmanii), swamp gum (Eucalyptus camphora), Gibraltar rock blackbutt (Eucalyptus pyrocarpa), tumbledown red gum (Eucalyptus dealbata) and orange gum (Eucalyptus prava) sometimes with closed forest species in the understorey especially in the eastern parts of the landscape. In cold areas snow gum (Eucalyptus pauciflora), black sallee (Eucalyptus stellulata) woodlands are the norm with manna gum and mountain gum along some streams. Most granite peaks have specialised joint crevice heath communities typically with about 100 plant genera and almost always containing local endemic species. In this landscape the following communities are recognised; Gonocarpus teucriodes - Isotoma axillaris herbfield with black cypress pine, orange gum, tumbledown red gum, Caley's ironbark, and western New England blackbutt. Babingtonia densifolia - Homoranthus prolixus shrubland with black cypress pine, orange gum, tumbledown red gum, and Acacia neriifolia. New England tea tree - Brachyloma saxicola heath on the escarpment of the Gibraltar Range with New England mallee ash (Eucalyptus approximans), diehard stringybark, apple box, forest oak (Allocasuarina torulosa), black cypress pine and orange gum.

Landscape feature	BAM reference	Response

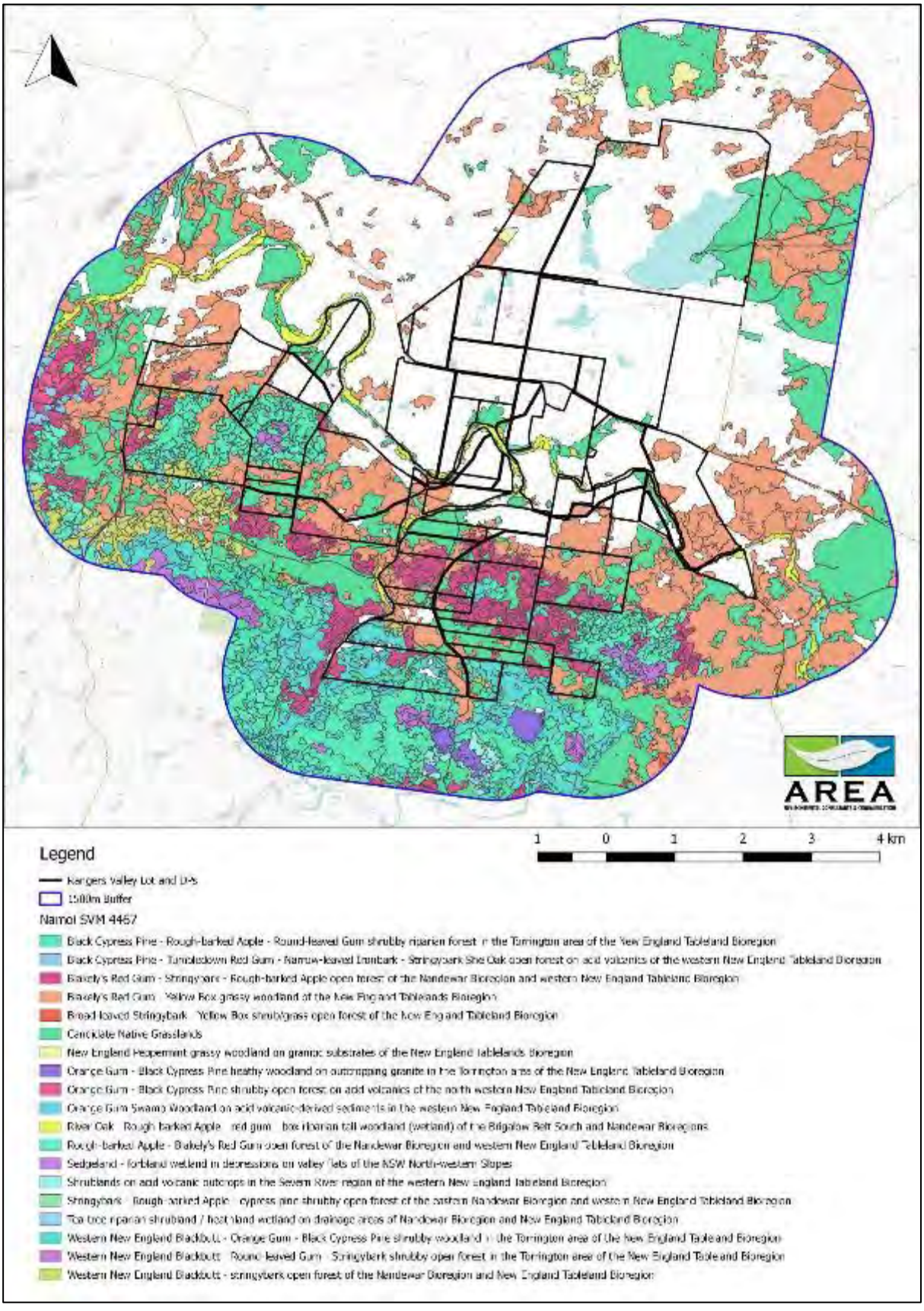
<table>
<tr><th>Landscape feature</th><th>BAM reference</th><th>Response</th></tr>
<tr><td>Native vegetation extent in the buffer* area

See figure below – areas of no shading indicate ‘not native’.

* Within 1500 metres</td><td>Native vegetation extent (as described in Subsection 4.3.2)</td><td>59.22 percent of vegetation within a 1500 metre buffer area of the property is native vegetation (See figure below). The native vegetation cover in the landscape was determined by QGIS software with reference to vegetation maps provided by the Namoi SVM 4467. Native vegetation cover per cent was calculated as a proportion of all land within the assessment buffer area containing mapped native vegetation and is comprised of the following Plant Community Types:
<table>
<tr><th colspan="2">PCTs within 1500 metre buffer around the property (12070.14 hectares)</th><th>Hectares</th></tr>
<tr><td>1</td><td>Candidate Native Grassland</td><td>1891.77</td></tr>
<tr><td>84</td><td>River Oak - Rough-barked Apple - red gum - box riparian tall woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar Bioregion</td><td>191.71</td></tr>
<tr><td>447</td><td>Sedgeland - forbland wetland in depressions on valley flats of the NSW North-western Slopes</td><td>0.78</td></tr>
<tr><td>505</td><td>Black Cypress Pine - Tumbledown Red Gum - Narrow-leaved Ironbark - Stringybark She Oak open forest on acid volcanics of the western New England Tableland Bioregion</td><td>34.36</td></tr>
<tr><td>508</td><td>Blakely’s Red Gum - Stringybark - Rough-barked Apple open forest of the Nandewar Bioregion and western New England Tableland Bioregion</td><td>553.90</td></tr>
<tr><td>510</td><td>Blakely’s Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion</td><td>2332.06</td></tr>
<tr><td>514</td><td>Black Cypress Pine - Rough-barked Apple - Round-leaved Gum shrubby riparian forest in the Torrington area of the New England Tableland Bioregion</td><td>936.44</td></tr>
<tr><td>533</td><td>New England Peppermint grassy woodland on granitic substrates of the New England Tableland Bioregion</td><td>45.62</td></tr>
<tr><td>535</td><td>Orange Gum - Black Cypress Pine heathy woodland on outcropping granite in the Torrington area of the New England Tableland Bioregion</td><td>49.00</td></tr>
<tr><td>536</td><td>Orange Gum - Black Cypress Pine shrubby open forest on acid volcanics of the north western New England Tableland Bioregion</td><td>36.73</td></tr>
<tr><td>538</td><td>Rough-barked Apple – Blakely’s Red Gum open forest of the Nandewar Bioregion and western New England Tableland Bioregion</td><td>140.09</td></tr>
<tr><td>542</td><td>Stringybark - Rough-barked Apple - cypress pine shrubby open forest of the eastern Nandewar Bioregion and western New England Tableland Bioregion</td><td>3.87</td></tr>
<tr><td>557</td><td>Western New England Blackbutt - Round-leaved Gum - Stringybark shrubby open forest in the Torrington area of the New England Tableland Bioregion</td><td>125.71</td></tr>
</table>
</td></tr>
</table>

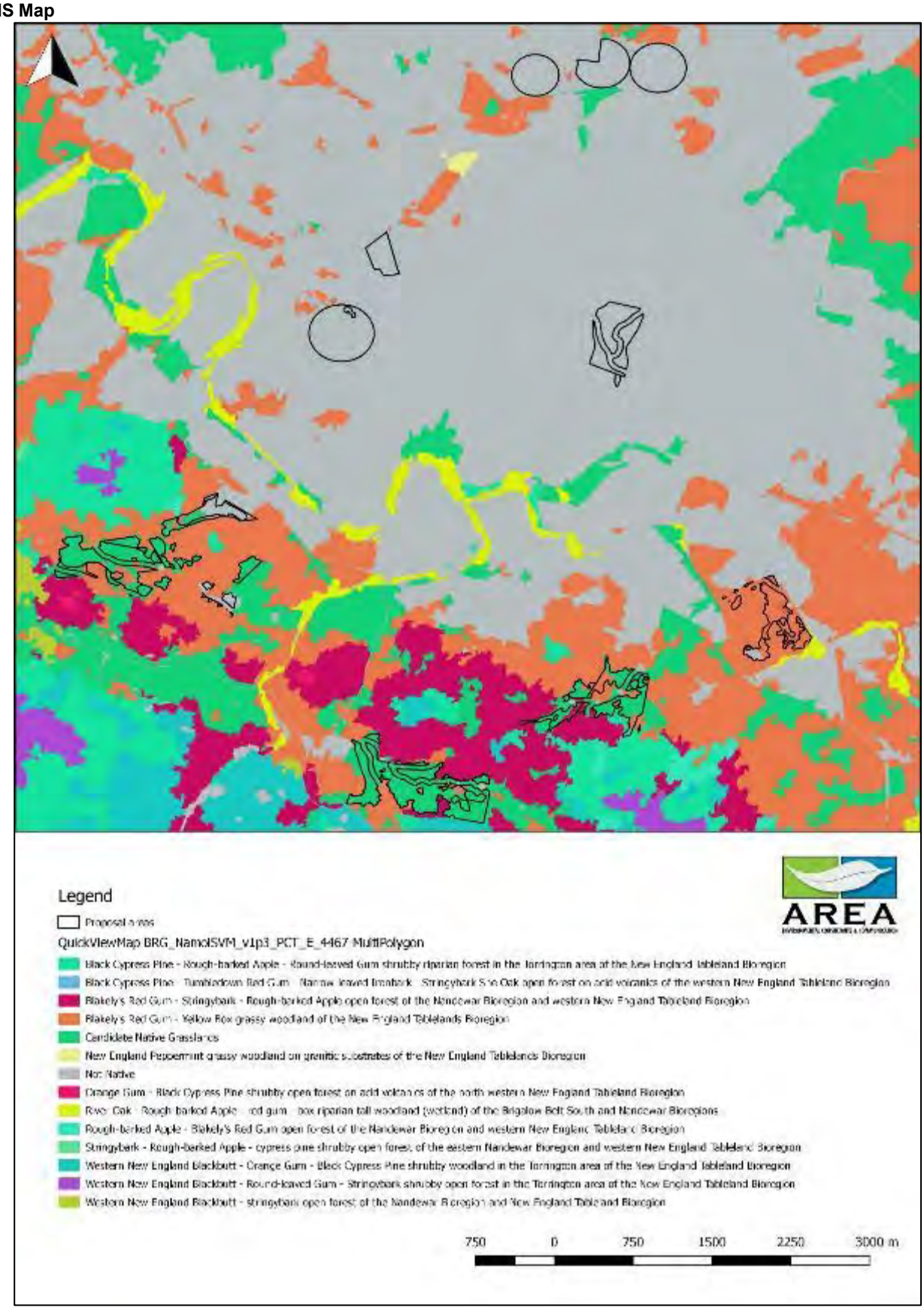
Landscape feature	BAM reference	Response		
		558	Western New England Blackbutt - stringybark open forest of the Nandewar Bioregion and New England Tableland Bioregion	171.08
		561	Shrublands on acid volcanic outcrops in the Severn River region of the western New England Tableland Bioregion	29.83
		567	Broad-leaved Stringybark - Yellow Box shrub/grass open forest of the New England Tableland Bioregion	4.21
		574	Tea-tree riparian shrubland / heathland wetland on drainage areas of Nandewar Bioregion and New England Tableland Bioregion	8.73
		585	Western New England Blackbutt - Orange Gum - Black Cypress Pine shrubby woodland in the Torrington area of the New England Tableland Bioregion	591.03
		605	Orange Gum Swamp Woodland on acid volcanic-derived sediments in the western New England Tableland Bioregion	1.05
		Not Native	N/A	4922.17
		Total		**12070.14**
		Native veg (%)		59.22
		Not Native (%)		40.78

Landscape feature	BAM reference	Response

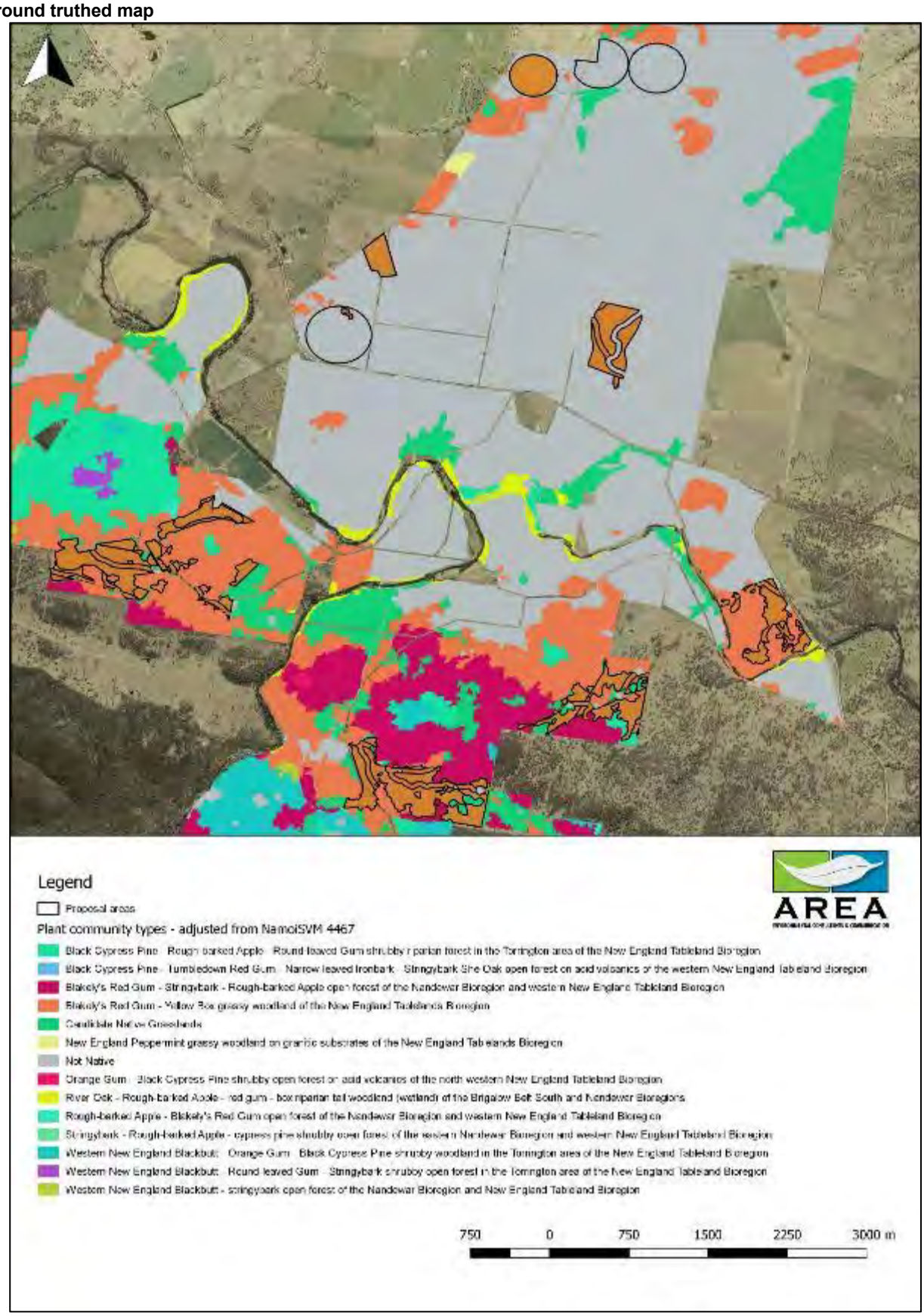


Landscape feature	BAM reference	Response
Cleared areas. See uncoloured areas in figure above	As above	4922.17 hectares or 40.78 percent of the 1500 metre buffer area is cleared area/ mapped as not native vegetation. Cleared areas (non-native vegetation) in the landscape was determined as per vegetation mapping within the 1500 metre buffer (above).
Evidence to support differences between mapped vegetation extent and aerial imagery	Sections 5.1.1.6 and 5.1.1.7	The PCT map, Namoi VIS 4467 was not completely accurate for the area assessed. PCT510 was determined to occur across all areas where native vegetation occurred within or adjacent to the proposal areas. The determination of PCT510 was based on the following factors: • Proximity: PCT510 was mapped in the area of the proposal and therefore an expected community for the area. • Floristics – the vegetation seen included species which best matched PCT510, namely: o Blakely's Red Gum o Yellow Box o Rough Bark Apple o Apple Box o Broadleaved Stringybark o Tussock grass/ snow grass. • Vegetation structure: o Very space shrub layer consistent with the PCT description. • Landscape position: o The areas assessed are largely valley flats or lower slopes of undulating hills. Where candidate native grasslands were mapped in the proposal area, these were remapped as either pact of a PCT or as not native.

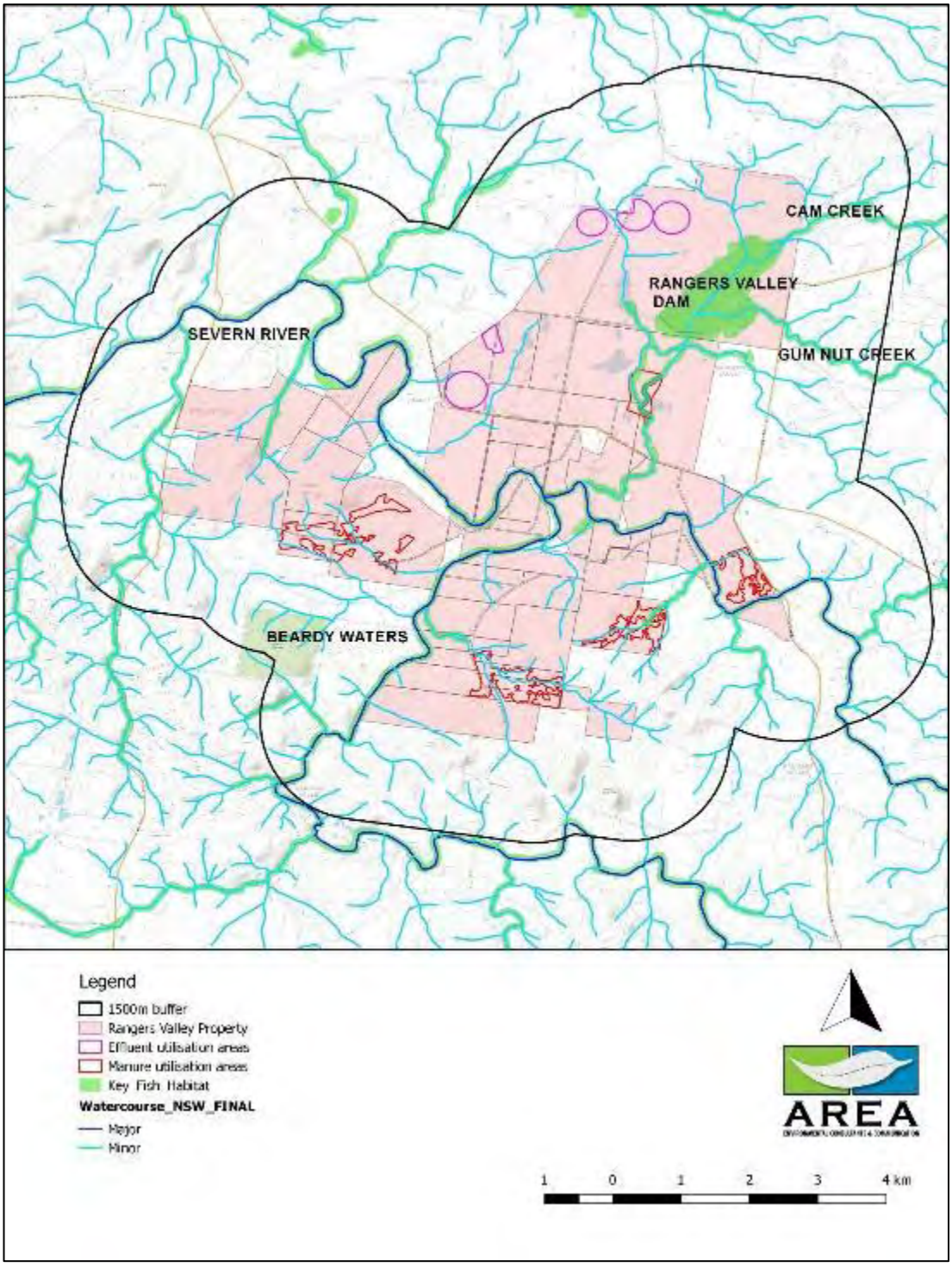
VIS Map


Legend
Proposal Area
QuickViewMap BRG_NamoiSVM_v1p3_PCT_E_4467 MultiPolygon
Black Cypress Pine - Rough-barked Apple - Round-leaved Gum shrubby riparian forest in the Torrington area of the New England Tableland Bioregion
Black Cypress Pine - Tumbledown Red Gum - Narrow-leaved Ironbark - Stringybark Silver Oak open forest on acid volcanics of the western New England Tableland Bioregion
Blakely's Red Gum - Stringybark - Rough-barked Apple open forest of the Nandewar Bioregion and western New England Tableland Bioregion
Blakely's Red Gum - Yellow Box grassy woodland of the New England Tablelands Bioregion
Candidate Native Grasslands
New England Peppermint grassy woodland on granitic substrates of the New England Tablelands Bioregion
Non Native
Orange Gum - Black Cypress Pine shrubby open forest on acid volcanics of the north western New England Tableland Bioregion
River Oak - Rough barked Apple - red gum - box riparian tall woodland (wetland) of the Brigalow Belt South and Nandewar Bioregions
Rough-barked Apple - Blakely's Red Gum open forest of the Nandewar Bioregion and western New England Tableland Bioregion
Stringybark - Rough-barked Apple - cypress pine shrubby open forest of the eastern Nandewar Bioregion and western New England Tableland Bioregion
Western New England Blackbutt - Orange Gum - Black Cypress Pine shrubby woodland in the Torrington area of the New England Tableland Bioregion
Western New England Blackbutt - Round-leaved Gum - Stringybark shrubby open forest in the Torrington area of the New England Tableland Bioregion
Western New England Blackbutt - stringybark open forest of the Nandewar Bioregion and New England Tableland Bioregion
AREA
750 0 750 1500 2250 3000 m

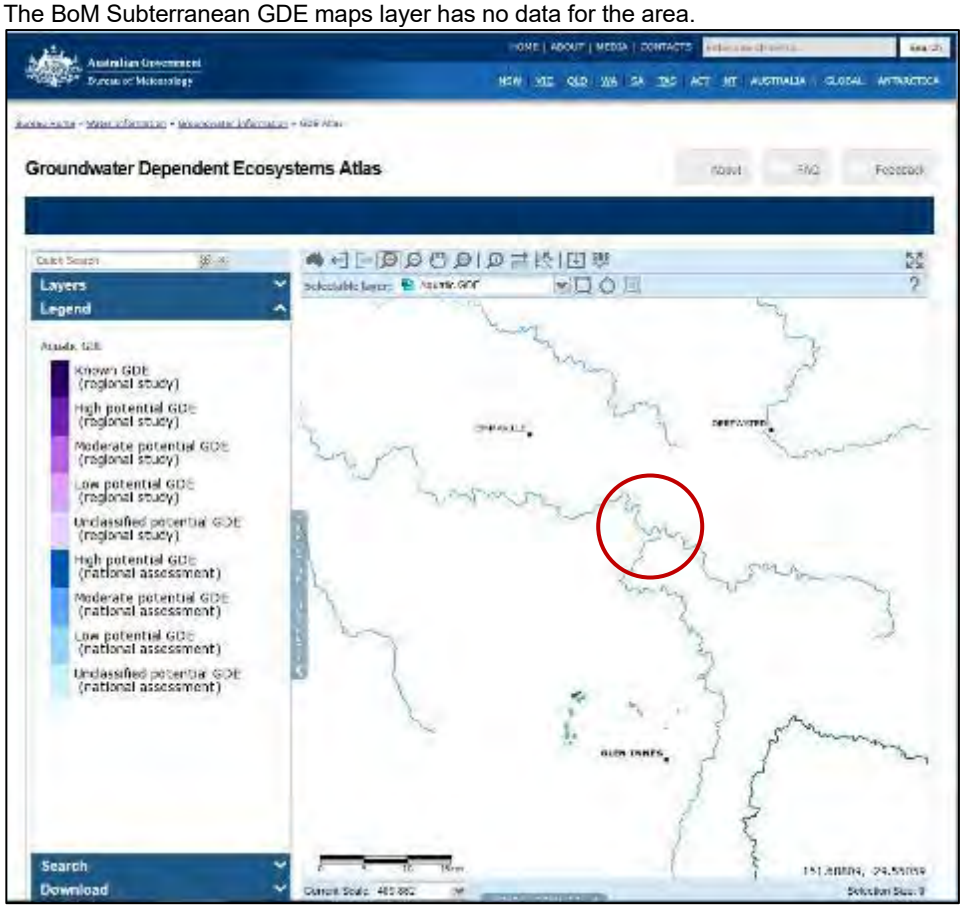
Ground truthed map

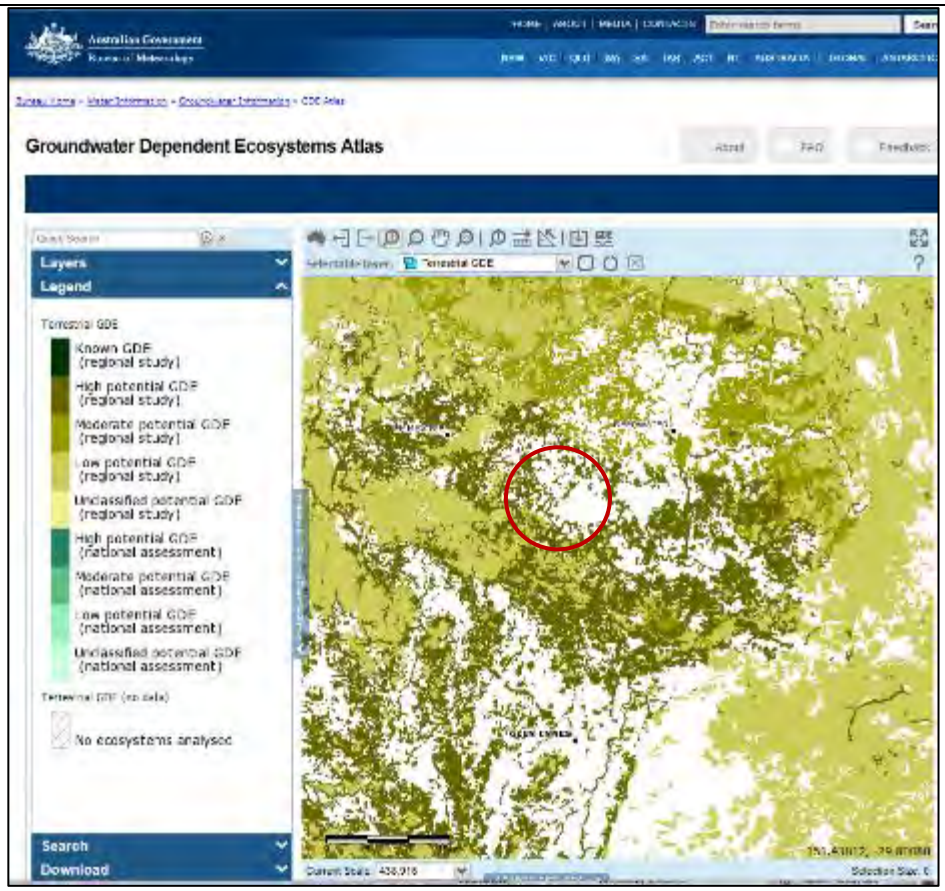


Rivers and streams classified according to stream order. See figure below.	Rivers and streams (as described in Paragraph 4.2.1.6)	Within the property, there are four named waterways – Severn River, Cam Creed, Beardy Waters and Gum Nut Creek. The Severn River is the only major waterway and it bisects the property and the proposal area. It runs closest to Top Sugarloaf about 70 metres as its closest. The Severn River is a perennial third and fourth order waterway. Beardy Waters into the Severn River from the south. It is approximately 70 metres from Back Paddock and Four Mile at its closest to the proposal area. It is a perennial third and fourth order waterway. Cam Creek is a minor waterway and runs from north to south, through the Rangers Valley Dam before joining the Severn River. Cam Creek runs through the Middle Swamp paddock. It is a perennial third order waterway. Gum Nut Creek runs into the Rangers Valley Dam from the east and is at least two kilometres from the proposal area. It is a perennial third order waterway. Numerous non-perennial first and second order waterways occur on the property and in the proposal area. These area ephemeral drainage lines, with the second order drainage lines occasionally sustaining pools with little or no aquatic vegetation during times of no flow. See figure below.



Wetlands within, adjacent to and downstream of the site. See figure above	Wetlands (as described in Paragraph 4.2.1.7)	No wetlands of International Importance occur in the property 10 kilometre buffer. One wetland occurs within 1500 metres of the property and this is Rangers Valley Dam and is located on the Rangers Valley property. The wetlands of the broader locality provide suitable breeding and foraging habitat for a range of fauna species of birds, fish (possibly), frogs, mammals and reptiles and provide a movement corridor and important habitat for migratory bird species. The BioNet database shows one no wetland migratory birds have been recorded within 10 kilometres of the property.

		The BioNet search criteria used was: Public Report of all Valid Records of Threatened (listed on BC Act 2016), Commonwealth listed, CAMBA listed, JAMBA listed or ROKAMBA listed entities within an area of greater than 10 kilometres around the property. This returned a total of 113 records of 27 species. Report generated on 26.03.2019.
Groundwater dependant ecosystems		Groundwater plays an important ecological role in directly and indirectly supporting terrestrial and aquatic ecosystems. Groundwater sustains terrestrial and aquatic ecosystems by supporting vegetation and providing discharge to channels, lacustrine and palustrine wetlands, and both the estuarine and marine environment. Aquifer ecosystems are inherently groundwater dependent (DEHP, 2017). The BoM Aquatic GDE maps Moderate Potential GDE (national assessment) as occurring in the vicinity of the proposal. The BoM Terrestrial GDE maps High, Moderate and Low Potential GDE (regional study) as occurring in the vicinity and in the location of the proposal. The BoM Subterranean GDE maps layer has no data for the area. 


Groundwater Dependent Ecosystems Atlas
Layers
Legend
Terrestrial GDE
Known GDE (regional study)
High potential GDE (regional study)
Moderate potential GDE (regional study)
Low potential GDE (regional study)
Unclassified potential GDE (regional study)
High potential GDE (national assessment)
Moderate potential GDE (national assessment)
Low potential GDE (national assessment)
Unclassified potential GDE (national assessment)
No ecosystems analysed
Search
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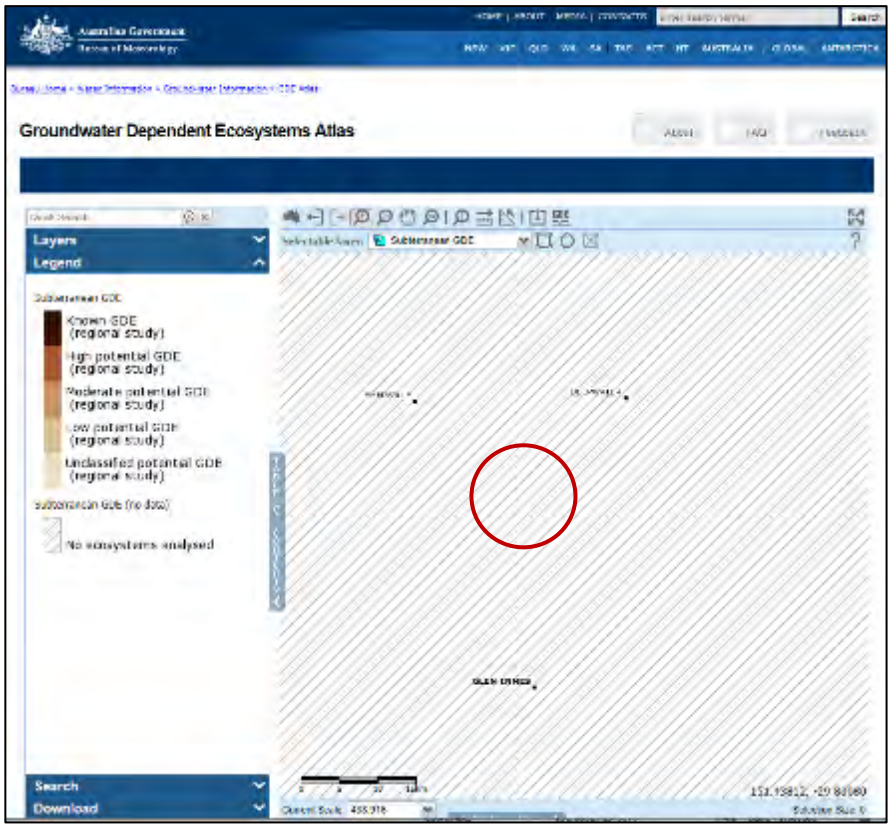

Groundwater Dependent Ecosystems Atlas
Layers
Legend
Search
Download

Connectivity features	Connectivity of different areas of habitat (as described in Paragraphs 4.2.1.8–4.2.1.11)	A connectivity site-based assessment was undertaken in accordance with the BAM. No formal state or regional biodiversity links are recorded across the proposal or Rangers Valley property. Rangers Valley Dam occurs on the property and the Severn River and Beardy Waters bisect the property. These waterways may be used as habitat for migratory species. The assessment of the impact of the development on movement of threatened species that maintains their life cycle must: a) *identify movement patterns key to the life cycle of relevant threatened species that intersect with the subject land* ➢ No migratory species have been recorded or were observed in the proposal. Movement patterns for migratory species will therefore not be affected. b) *describe the nature, extent and duration of short and long-term impacts* ➢ Application of manure and effluent is expected to commence in 2019 and will be ongoing as required. ➢ No other construction impacts will occur. c) *describe, with reference to relevant literature and other reliable published sources of information, the importance of the movement of the threatened species to their life cycle* ➢ BioNet shows 42 individual records of listed species within 10 kilometres of the property. i. 10 records are from five species of birds ii. 15 records are from Eastern Bent-wing Bat (2), Spotted-tailed Quoll (1) and Koala (12). iii. Two records are from one species of plant iv. Four records are from one species of reptile (Bell's Turtle/ Western Sawshelled Turtle ➢ None of these species will have their movement affected by the proposal. d) *predict the consequences of the impacts for the bioregional persistence of the threatened species, with reference to relevant literature and other published sources of information* ➢ The impact to movement of threatened species in the proposal area would not be affected as there is significant residual habitat within 1500m, vegetation and habitat are not being removed from most of the proposal area and 12 trees are the only vegetation that will be removed.
Areas of geological significance and soil hazard features	Areas of geological significance and soil hazard features (as described in Paragraphs 4.2.1.12–4.2.1.15)	Rocky outcrops exist on the property however these do not include cliff, cave or karst formations. Dialogue with RDC Engineers did not identify areas of geological significance and soil hazard features in the proposal area. The MNES report did not identify area areas of geological significance in the proposal area.
Site context: identification of method applied (i.e. linear or site-based)		The proposal is a site-based project.
Site context: percent native vegetation cover in the landscape (proposal).	Section 4.3.2	The proposal (the impact footprint) is 253.16 hectares, of this 183.33 hectares is native vegetation (72.08 percent native vegetation). The 1500m buffer (12070.14 hectares) is 59.22 is estimated to be covered by native vegetation.

4 Native vegetation

4.1 Plant community types (PCTs) within the proposal area

One PCT was recorded in the proposal area: *PCT510 Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion* (Table 4-1).

Table 4-1: PCT510: Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion - Vegetation zone, PCT and management zone

PCT 510: Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	
Vegetation zones:	Zone 1 (High Native Ground Cover – no tree removal) **86.99 hectares**
	Zone 2 (Low Native Ground Cover – Some dead paddock tree removal) **95.75 hectares**
	Zone 3 (No native ground cover) – Paddock trees **69.82 hectares**
	Zone 4 (No native ground cover – PCT **0.59 hectares**
PCT Code:	510
Vegetation formation:	Grassy woodlands
Vegetation class:	New England Grass Woodlands
Conservation status:	Endangered (BC Act) and Critically Endangered (EPBC Act)
PCT Percent cleared:	79
Composition condition score (BAMCC): Zone 1	10.5
Structure condition score (BAMCC): Zone 1	54.2
Function condition score (BAMCC): Zone 1	15
Current vegetation integrity score (BAMCC): Zone 1	20.4
Extent in the Proposal: Zone 1	86.99 hectares
Plots completed in vegetation zones: Zone 1	7 (Plots 1, 2, 5, 6, 7, 13 and 14)
Composition condition score (BAMCC): Zone 2	5
Structure condition score (BAMCC): Zone 2	5.7
Function condition score (BAMCC): Zone 2	15
Current vegetation integrity score (BAMCC): Zone 2	7.5
Extent in the Proposal: Zone 2	95.75 hectares
Plots completed in vegetation zones: Zone 2	6 (Plots 3, 4, 10, 11, 12 and 15)
Zone 3 – cropped paddock (corn and soybean – no native plot data collected)	N/A
Composition condition score (BAMCC): Zone 4	10.3
Structure condition score (BAMCC): Zone 4	0.6
Function condition score (BAMCC): Zone 4	38.2
Current vegetation integrity score (BAMCC): Zone 4	6.1
Extent in the Proposal: Zone 4	0.59
Plots completed in vegetation zones: Zone 4	Modelled/ estimated data used.
An overview of vegetation attributes collected from the plot data is provided in section 4.2.3.	

Plot 1 midline

Plot 1 Leaf Litter Plots

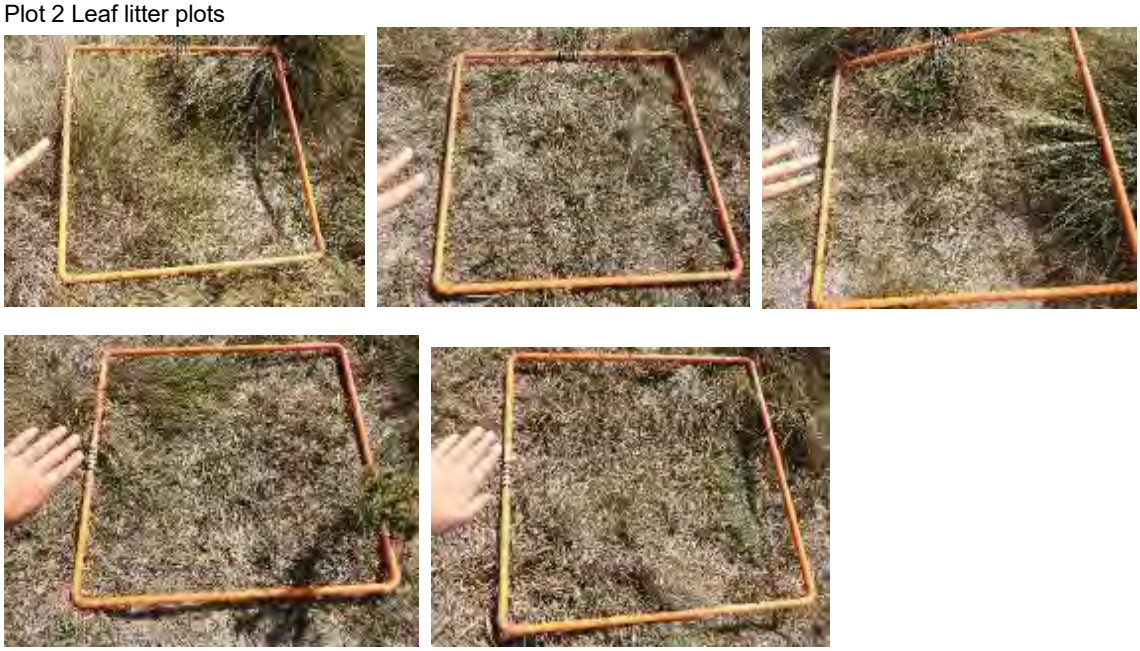




Plot 1 end of midline

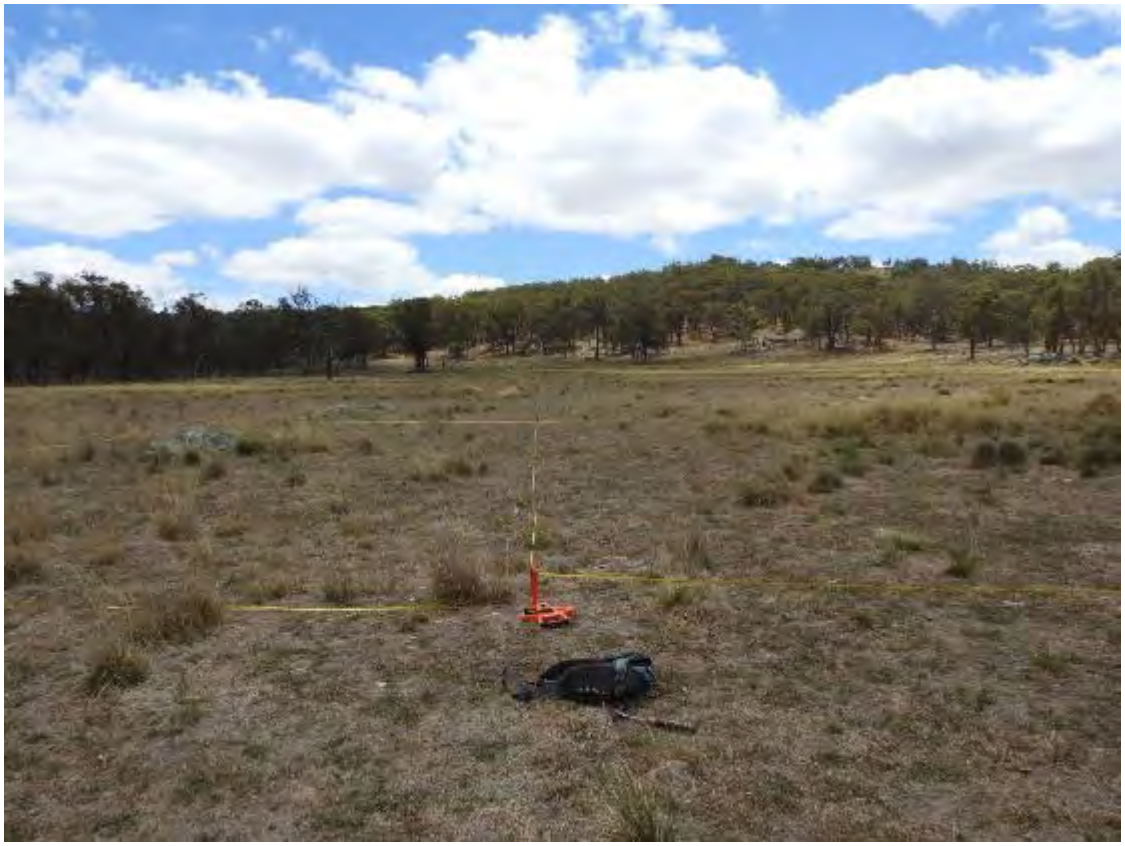
Plot 2 Midline

Plot 2 Leaf litter plots



Plot 2 end of midline

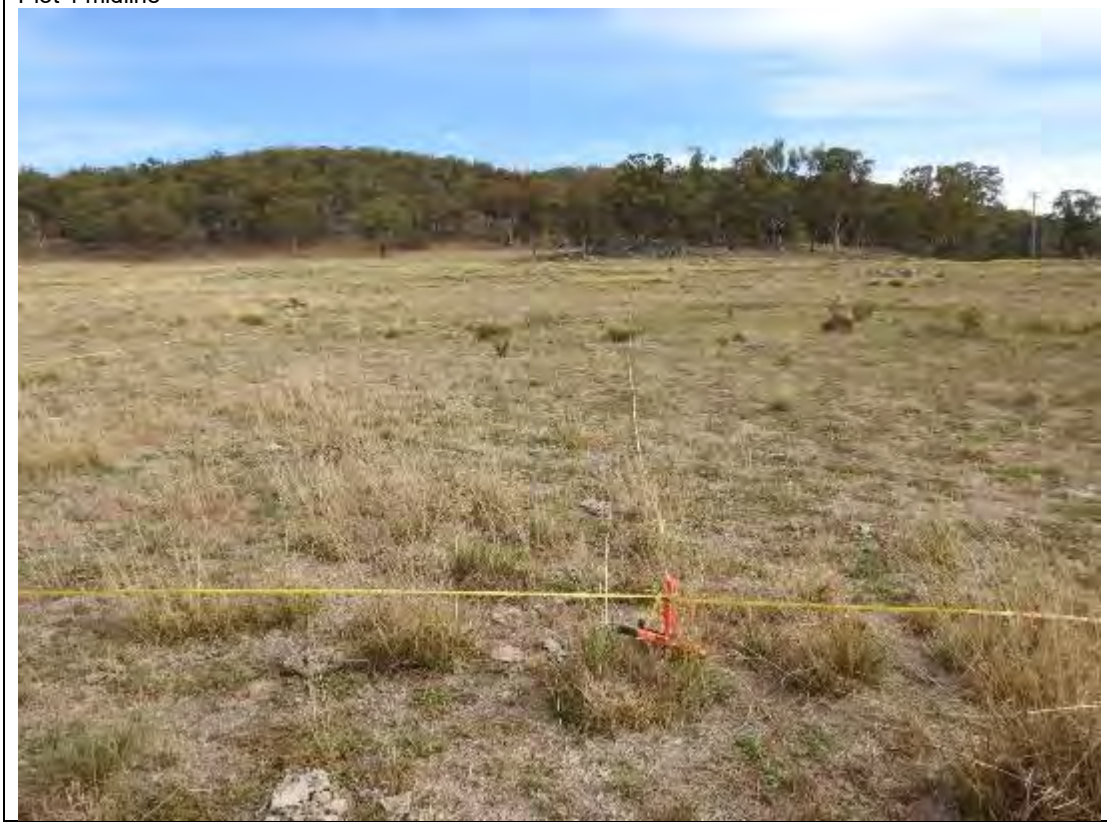
Plot 3 midline



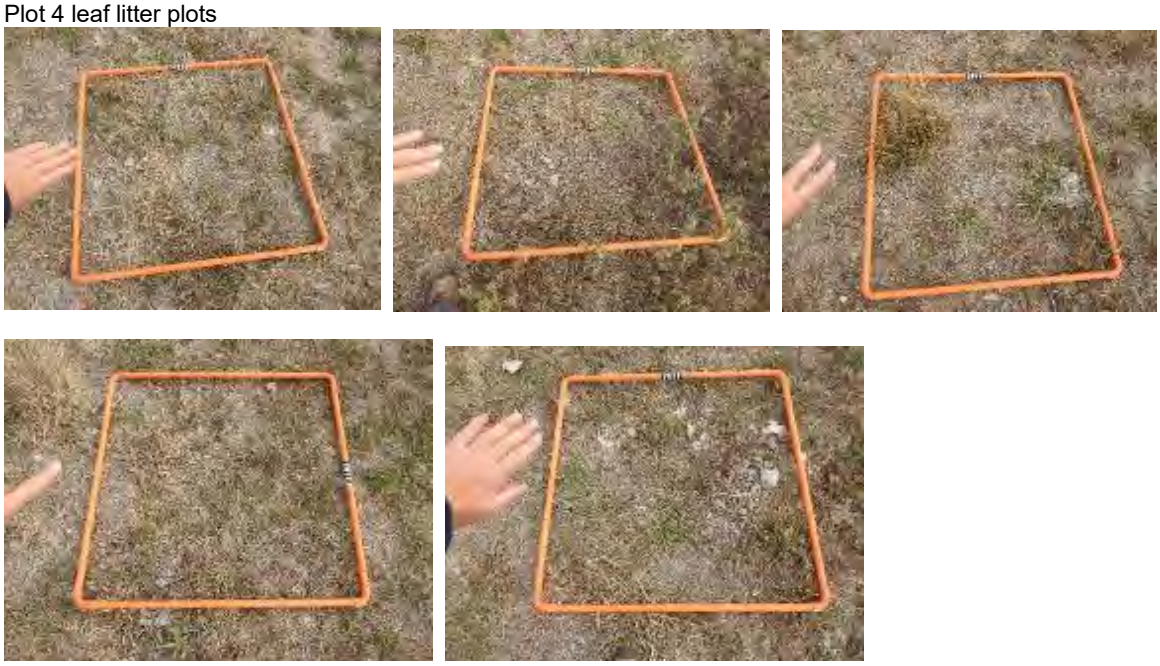
Plot 3 leaf litter plots

Plot 3 end of midline

Plot 4 midline



Plot 4 leaf litter plots



Plot 4 end of midline

Plot 5 midline

Plot 5 leaf litter plots

Plot 5 end of midline

Plot 6 midline

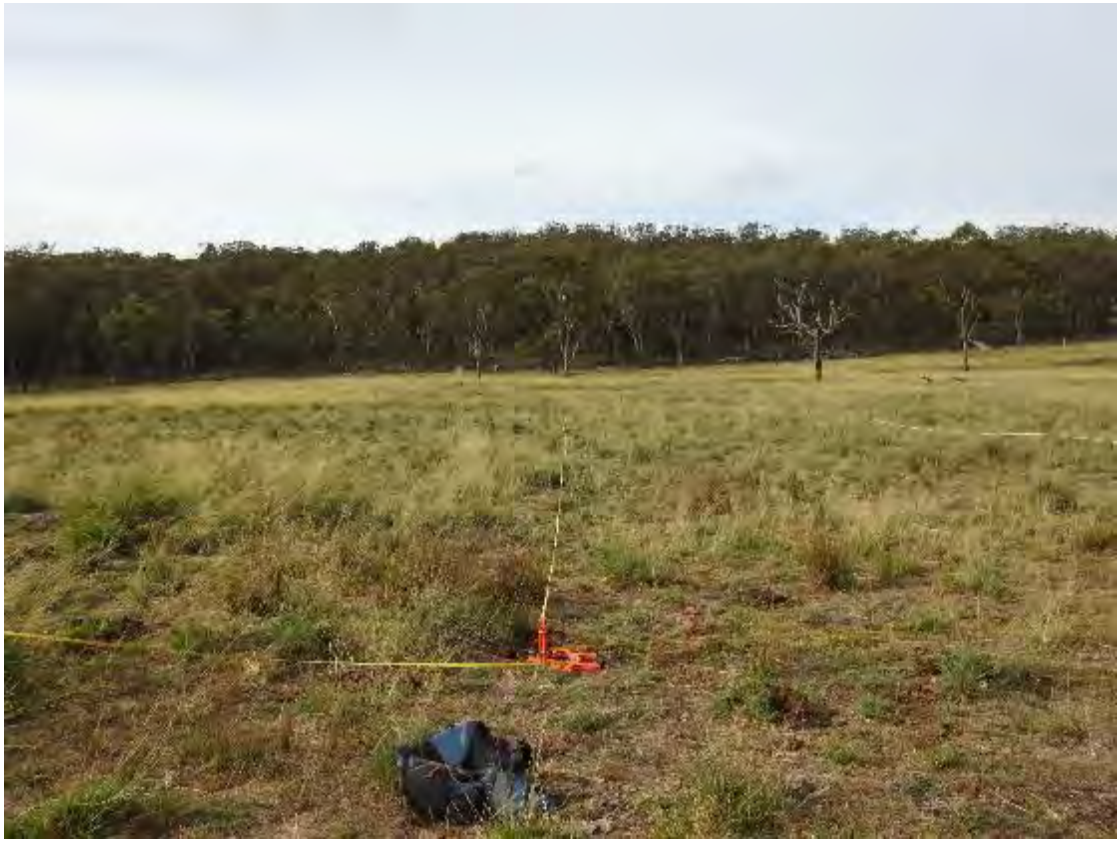
Plot 6 leaf litter plots





Plot 6 end of midline

Plot 7 midline



Plot 7 leaf litter plots

Plot 7 end of midline

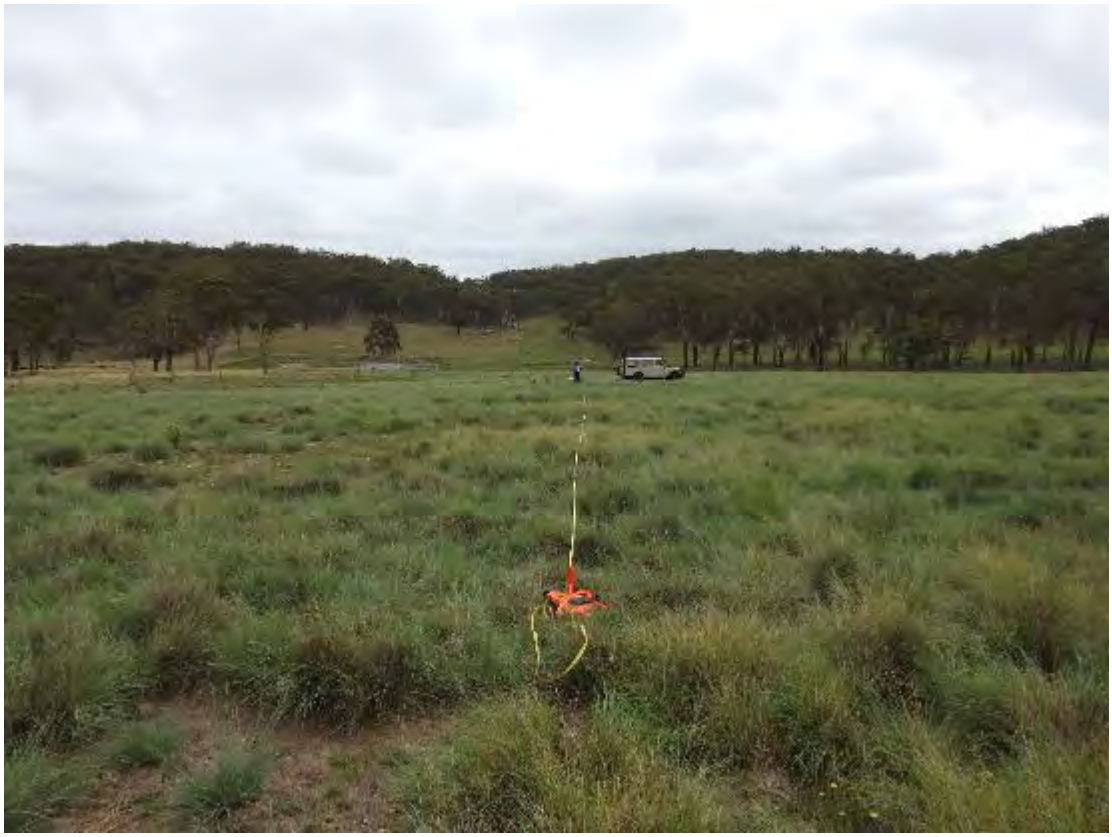
Plot 8 midline

Plot 8 leaf litter plots





Plot 8 end of midline

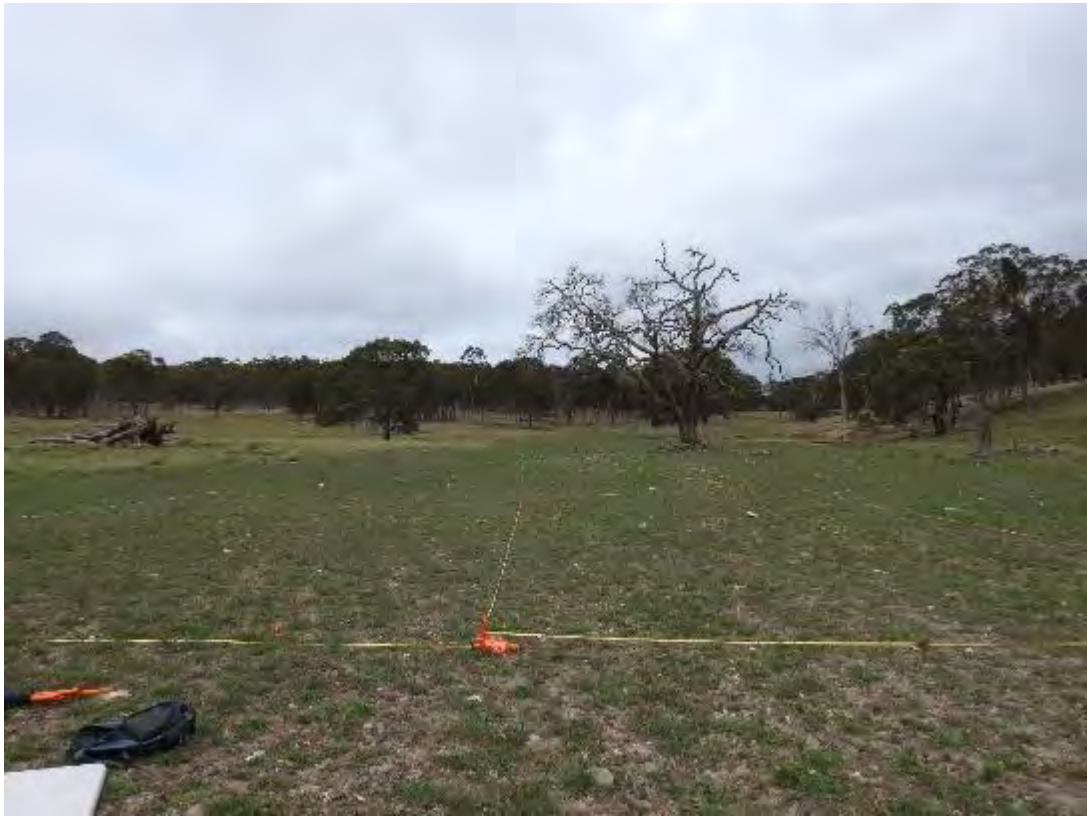


Plot 9 midline

Plot 9 leaf litter plots

Plot 9 end of midline

Plot 10 midline



Plot 10 leaf litter plots

Plot 10 end of midline

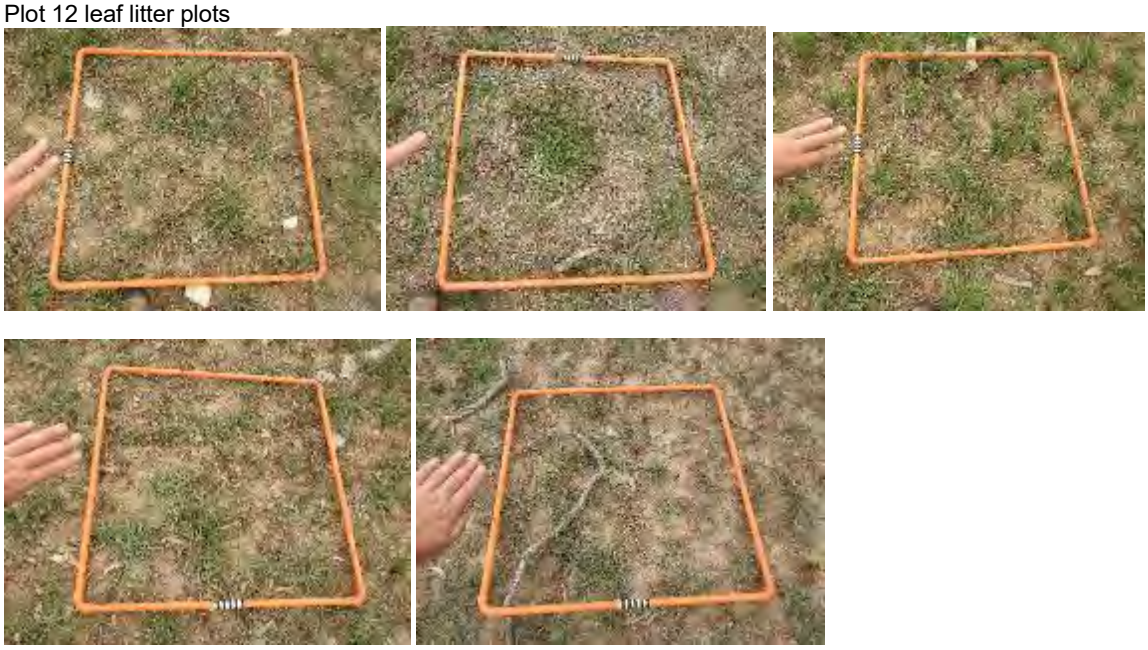
Plot 11 midline

Plot 11 leaf litter plots

Plot 11 end of midline

Plot 12 midline

Plot 12 leaf litter plots



Plot 12 end of midline

Plot 13 midline

Plot 13 leaf litter plots

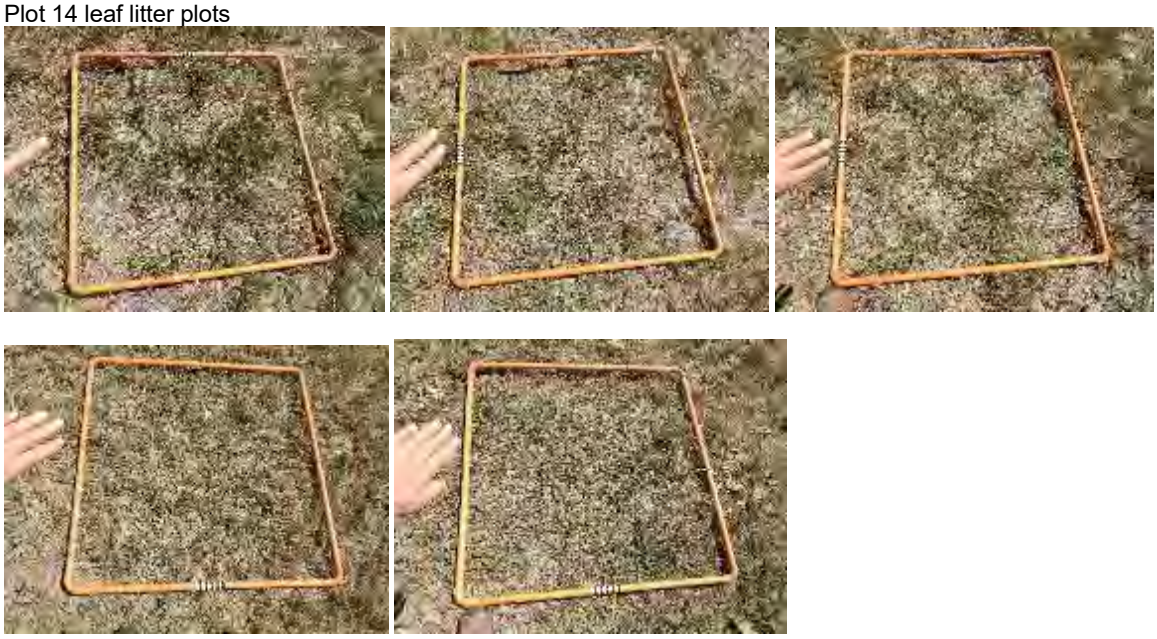




Plot 3 end of midline

Plot 14 midline

Plot 14 leaf litter plots



Plot 14 end of midline

Plot 15 midline

Plot 15 leaf litter plots

Plot 15 end of midline

Description (VIS BioNet Profile):
PCT510 is a tall open forest or woodland that occurs on undulating areas at intermediate to high altitudes, with local stands in the Horton area east of Mount Kaputar. Similar to ID599 Yellow Box - Blakely's Red Gum grassy woodland of Brigalow Belt South and Nandewar Bioregions, it occupies deep, relatively fertile soils on a number of different geologies, but mainly sedimentary rocks and basalt. Dominated by Rough-barked Apple (Angophora floribunda), Yellow Box (Eucalyptus melliodora) and/or Blakely's Red Gum (Eucalyptus blakelyi). Ribbon Gum (Eucalyptus viminalis), Apple Box (Eucalyptus bridgesiana) and Broad-leaved Stringybark (Eucalyptus caliginosa) are sometimes present, and the vulnerable Eucalyptus rubida subsp. barbigerorum can occur within this unit east of Inverell. The shrub layer is either sparse or absent, with typical species including Acacia implexa, Acacia fimbriata, Cassinia quinquefaria or Olearia elliptica subsp. elliptica. The ground layer is well developed with dominant species including Kangaroo Grass (Themeda australis), Snow Grass (Poa sieberiana), Cymbopogon refractus and Lespedeza juncea subsp. sericea. Less frequent groundcover species include Aristida ramosa, Sorghum leiocladum, Dianella revoluta var. revoluta, Microlaena stipoides var. stipoides, Desmodium brachypodum, Viola betonicifolia, Chrysocephalum apiculatum, Glycine tabacina, Lomandra longifolia, Bothriochloa macra and Carex breviculmis. This association represents part of the TSC Act and EPBC Act listed Box-Gum Woodland EEC/TEC.
Landscape features: Occurs on undulating areas at intermediate to high altitudes, with local stands in the Horton area east of Mount Kaputar. It occupies deep, relatively fertile soils on a number of different geologies, but mainly sedimentary rocks and basalt. May occur on footslopes, valley flats, hillslopes or drainage depressions.
Site and Regional Distribution: An estimated 79 percent of this PCT has been cleared. Clearing for grazing agriculture in the New England Tablelands Bioregion has occurred.
Diagnostic features: No more information available.
Threatened ecological community: White Box Yellow Box Blakely's Red Gum Woodland (part) listed as an Endangered Ecological Community (BC Act) and Critically Endngered Ecological Community (EPBC Act).
Fauna habitat features: Woodlands provide important habitat for a diverse range of native fauna. The upper stratum provides nectar for many types of animal's including insects as well as tree hollows. The shrub layer provides essential resources such as nesting/breeding sites, protection from predators and sources of food (nuts, seeds, nectar from flowers and invertebrate prey). Many animals are only likely to be part of the Woodland at certain times. For example, seasonal transients through the community, such as honeyeaters, are most likely to visit during the local flowering season. Some bird species, such as the nationally vulnerable *Grantiella picta* (painted honeyeater) travel to these when resources are available. The grassy ground stratum layers provide protection for fauna such as Dunnarts and listed reptiles. Many bat species (insectivores, frugivores and nectivores) commonly use woodlands (Pennay and Freeman, 2005).

Condition (on site observation): The proposal area is a mix of improved pasture, cropped land and grazed and currently un-grazed native vegetation. The areas surrounding the proposal are rocky areas of grassy woodland.

Zone 1 has a native tree upper stratum, a virtually absent shrub layer and ground cover which is greater than 50% native.
Zone 2 has a native tree upper stratum, a virtually absent shrub layer and ground cover which is less than 50% native.
Zone 3 has a ground cover which is a cropped paddock with no native vegetation. Some paddock trees occur.
Zone 4 has a ground cover which is a cropped paddock with no native vegetation. Native trees occur as a PCT.

The assessment focussed on areas where the application of manure and effluent is proposed. This area did not contain trees or shrubs despite tress being scattered across the proposal area, and woodlands being present immediately outside the proposal areas in many cases.

Areas where Zone 2 exists have been subject of pasture improvement or are generally in a weedy state.

The ten paddock trees to be removed by this proposal are remnant of PCT510 (and not included in the vegetation integrity score) will also be removed by this proposal. Five of these are dead trees containing hollows and five are alive trees containing hollows which have been assessed in the BAMCC paddock trees assessment. These ten trees occur in Old 3 (six), Show (three) and Crouches (one).

4.2 Vegetation integrity assessment of the development area

4.2.1 Mapping vegetation zones (Subsection 5.3.1 of the BAM)

Vegetation zones are defined as a 'relatively homogeneous area of native vegetation within a proposal that is the same PCT and broad condition state' (OEH 2014a). In this report we use two reference points stating:

1. how many hectares of each PCT zone are in the proposal area?
2. how many hectares are within the 1500m buffer (The local populations / the patch size)?

Vegetation zones within the 253.16 hectare proposal area were identified and mapped as four zones, three of which consist of PCT510 and the other zone is not native vegetation with paddock trees. Table 4-2 shows the native vegetation, including PCT510, as mapped in the Namoi VIS 4467 vegetation map and the areas of vegetation in each zone.

Table 4-2: Identification of vegetation zones in the proposal

Zone	PCT ID	Plant Community Type (PCT) Name	Hectares in 1500 metre buffer	Hectares in proposal area
1	510	Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	2332.06	86.99
2	510	Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion		95.75
3	N/A	Cropped paddocks with paddock trees	N/A	69.82
4	510	Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	2332.06	0.59
		Native veg Not Native	59.22 (%) 40.78 (%)	Total 183.33 Total 69.83

Ten paddock trees also occur in the proposal area and are not included in the figures for native vegetation above. Vegetation zones area mapped in Figure 4-1, Native vegetation within 1500 metres of the property is shown in Figure 4-2 and paddock trees are mapped in Figure 4-3.

Figure 4-1: Vegetation map showing vegetation zones and the proposal

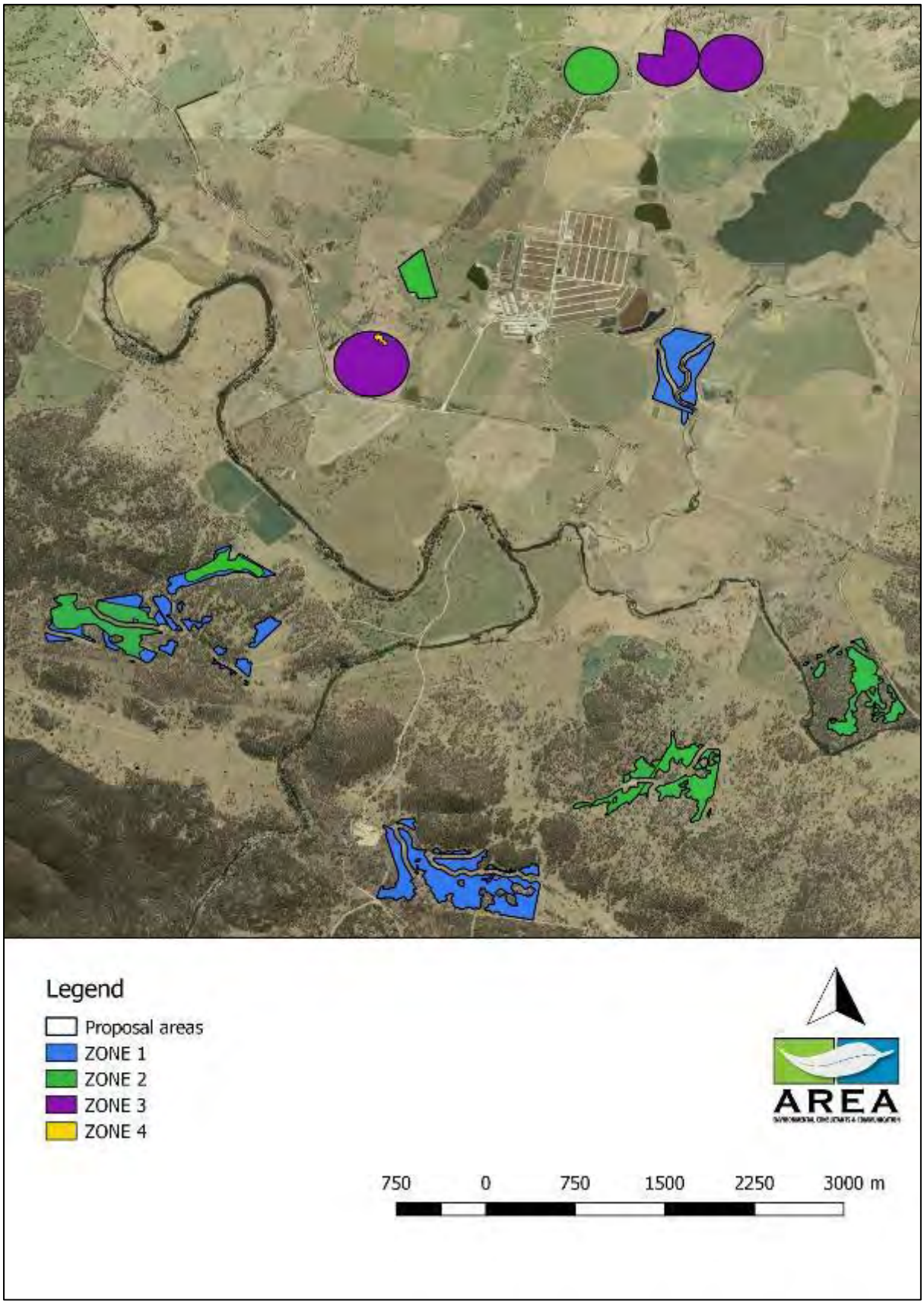


Figure 4-2: Vegetation map within 1500m (VIS) of proposal areas

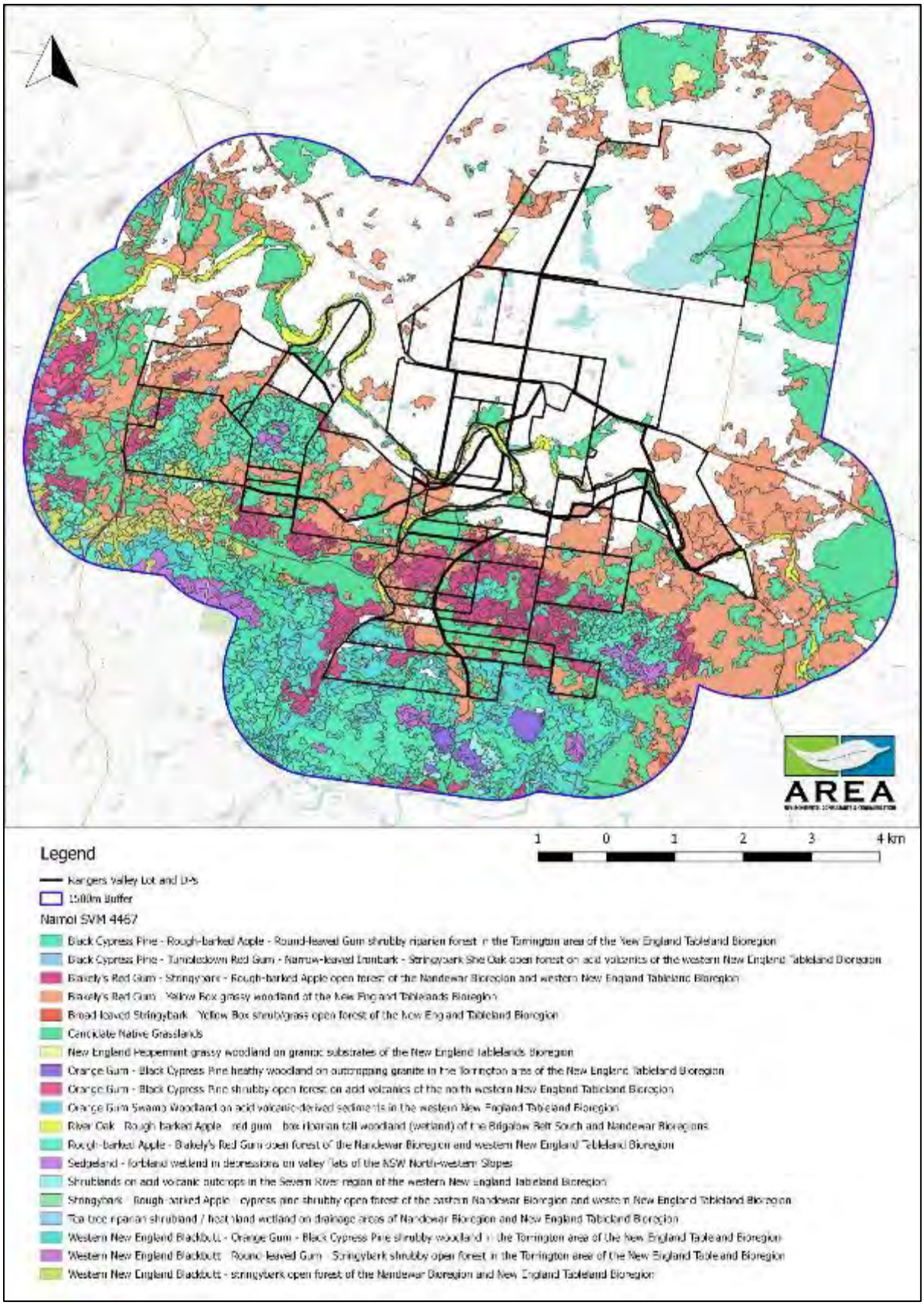
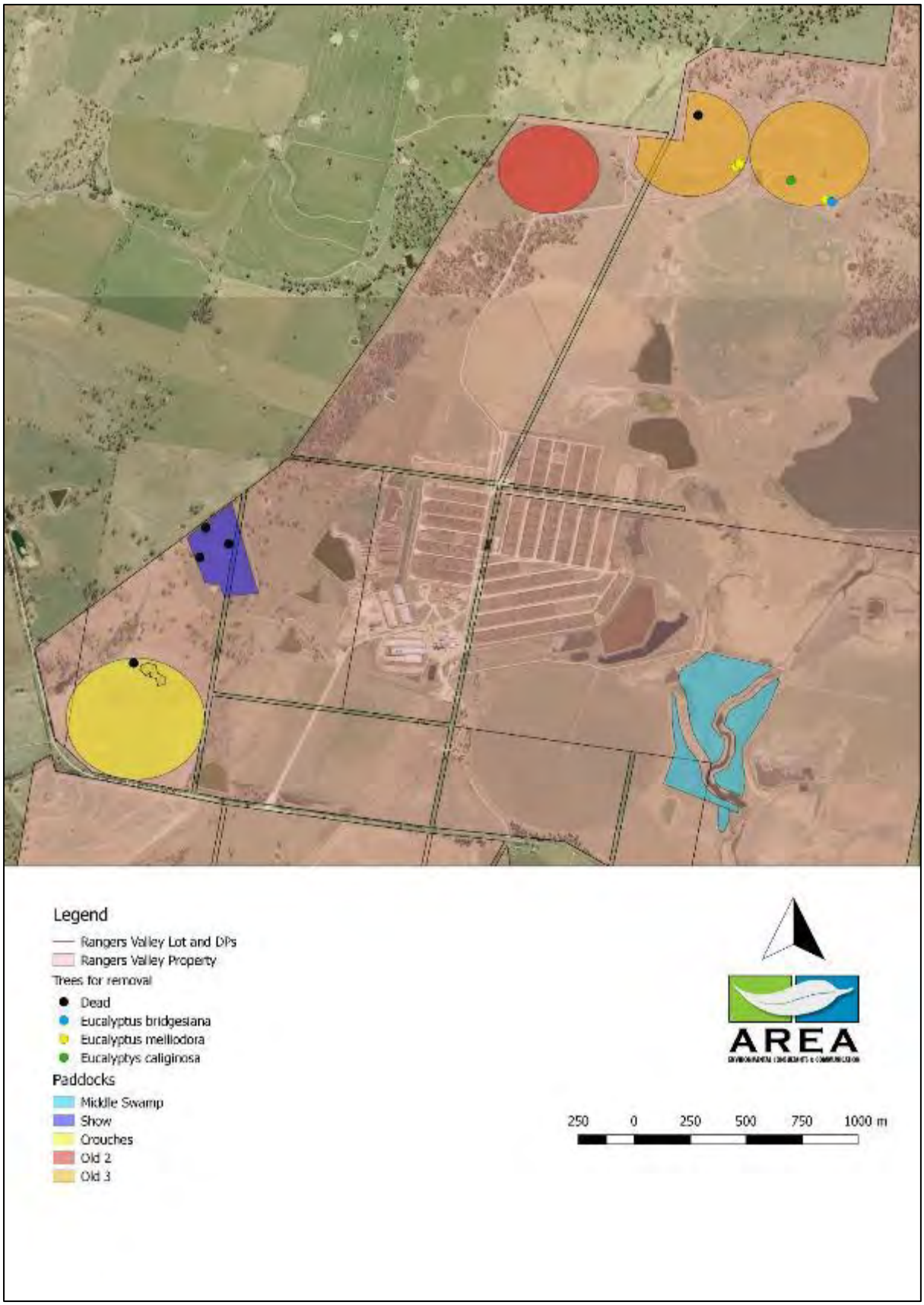


Figure 4-3: Paddock trees in the proposal areas



4.2.2 Patch size (Proposal)

The proposal possesses 183.33 hectares of PCT510 Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion.

There is approximately 2332.06 hectares of PCT510 within 1500m of the property.

The proposal is on the edge of a large patch of wooded vegetation which is approximately 65 square kilometres.

4.2.3 Assessing vegetation integrity using benchmark data

Data collected from each plot was measured against the benchmark values for the PCT. Each parameter was further considered by whether it achieved more than 25% of the benchmark values.

Table 4-3: Plot data against PCT benchmark data

PCT510 benchmark				Zones															
Vegetation Class	New England Grassy Woodlands			1	1	2	2	1	1	1	N/A	N/A	2	2	2	1	1	2	
IBRA	New England Tablelands			Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8	Plot 9	Plot 10	Plot 11	Plot 12	Plot 13	Plot 14	Plot 15	
Benchmark Calculation Level	Class/IBRA	25% of benchmark value																	
Tree Richness	4	1		0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
Shrub Richness	6	1.5		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Grass and Grass Like Richness	10	2.5		3	3	5	4	5	4	4	3	4	2	1	0	5	3	0	
Forb Richness	15	3.75		1	1	1	1	0	2	6	8	8	3	3	3	3	3	2	
Fern Richness	1	0.25		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Other Richness	3	0.75		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Tree Cover	47	11.75		0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	
Shrub Cover	6	1.5		0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	
Grass and Grass Like Cover	82	20.5		75.1	90.1	20	17.1	68.2	55	57.1	80.4	90.1	0.2	0.1	0	58.3	85.5	0	
Forb Cover	13	3.25		0.2	0.1	0.3	5	0	7	7.1	1.3	8.1	20.1	0.3	6.1	1.3	0.8	7	
Fern Cover	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Other Cover	1	0.25		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total length of fallen logs	26	6.5		0	0	0	0	0	0	1.6	0	0.4	1.1	0	0	0	0	33	
Litter Cover	30	7.5		36	52	62	59	72	53	46	49	34	27	2	27	24	50	37	
Number of Large Trees	3	0.75		0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
Large Tree Threshold Size	50																		
Less than 25% of the benchmark																			
More than 25% of the benchmark																			

4.2.4 Survey effort as described in Subsection 5.3.4 (number of plots)

The field data collected using 15 BAM (2017) plots is presented Appendix A.

The following site attributes were assessed in the plots to obtain a quantitative measure of vegetation condition.

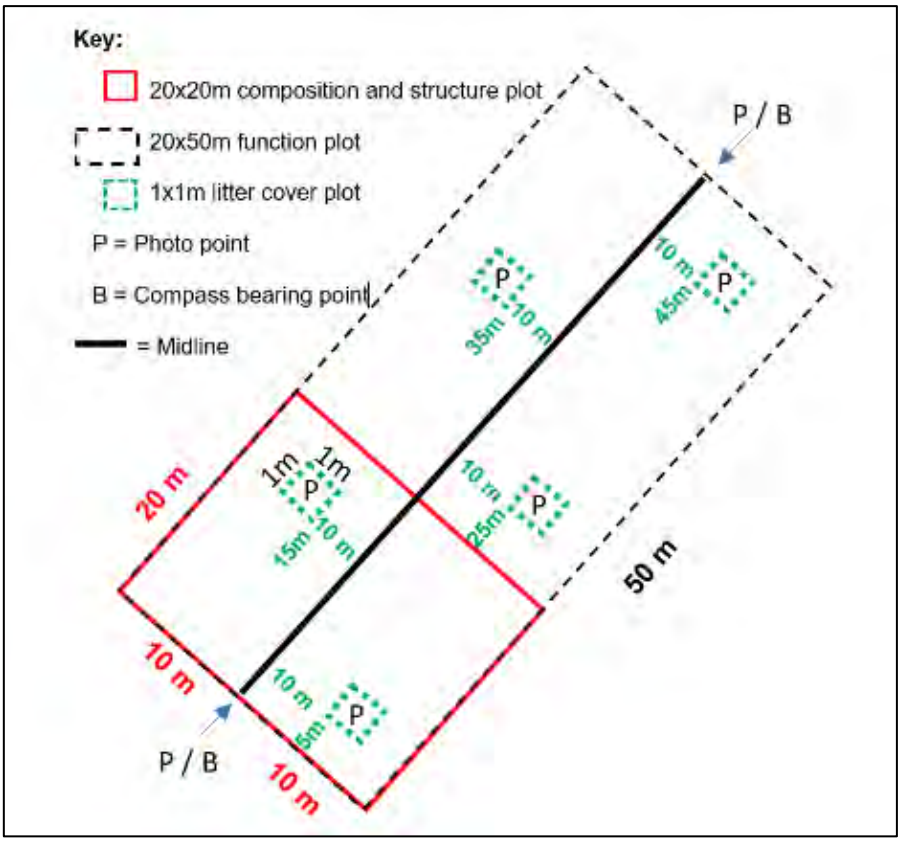
- **Composition score** based on the number of native plant species (richness) recorded by the assessor within the 20 metre x 20 metre plot boundary for each growth form group (Figure 4-3)
- **Structure score** based on the assessment of foliage cover for each growth form group within the 20m x 20m plot boundary
    - Foliage cover for a growth form group is the percentage of cover of all living plant material of all individuals of the species (Figure 4-3).
- **Function score** based on the number of large trees, tree stem size class, tree regeneration, tree hollows and length of fallen logs is recorded within a 20 metre x 50 metre plot boundary (Figure 4-3)
- Additionally, a High Threat Exotic weed assessment was undertaken.

Plot-based floristic survey

Vegetation in each plot was assessed with 20 by 20 metre quadrats nested inside 20 by 50 metre transects. The following information was collected:

- Stratum and layer – in which each species occurs.
- Growth form – for each recorded species.
- Species name – above ground vascular plant species were identified to the lowest taxonomic order possible using nomenclature consistent with PlantNet NSW.
- Cover – a measure or estimate of the appropriate cover measure for each recorded species; recorded from one to five per cent and then to the nearest five per cent. If the cover of a species is less than one per cent and the species is considered important, then the estimated cover should be entered (e.g. 0.4).
- Abundance rating – a relative measure of the cover abundance of individuals or shoots of each species within the plot was estimated and assigned a cover abundance score using the BAM.

Figure 4-4: BAM plot layout (not to scale)



The vegetation survey was completed using field survey methods in line with Chapters 5 and 6 of the BAM and by implementing the guidelines for *Threatened Biodiversity Survey and Assessment* (DEC, 2004) and *NSW Guide to Surveying for Threatened Plants* (2016). AREAs Principal Consultant and Principal Environment and Community Consultant completed surveys for this proposal:

- Four and a half days of strategic vegetation survey and targeted threatened species searches from 4 February to 8 February 2019 following the Biodiversity Assessment Method 2017 and relevant threatened species search protocols.
- One night of nocturnal species and frog searches.

Table 4-4: Minimum number of transects / plots required per vegetation zone area

Vegetation zone area (hectares)	Minimum number of transects/plots (Table 4: BAM)
<2	1 plot/transect
>2–5	2 plots/transects
>5–20	3 plots /transects
>20–50	4 plots/transects
>50–100	5 plots/transects
>100–250	6 plots/transects
>250–1000	7 plots/transects; more plots may be needed if the condition of the vegetation is variable across the zone
>1000	8 plots/transects; more plots may be needed if the condition of the vegetation is variable across the zone

Zone 1 required five plots and seven were completed, all of which were used for the BAM credit calculator analysis and all are provided in Appendix B.

Zone 2 required five plots and six were completed, all of which were used for the BAM credit calculator analysis and all are provided in Appendix B.

Zone 3 consists of cropped paddocks of corn and soybean. No plots were completed in this zone as the ground cover contained no native vegetation and the paddock trees were assessed under the streamline assessment.

Zone 4 required one plot. No plots were collected in this zone as the ground cover is a cropped corn paddock and consisted of no native vegetation. Estimated modelled data was used in the BAMCC for this zone. Modelled data represents no native vegetation apart from the trees, other parameters were estimated and informed by operations during inspection of the trees.

Two plots were completed outside the proposal area where native vegetation had received applications of inorganic fertiliser previously. Both these plots indicated the area was continuing as native vegetation.

The survey effort for all threatened flora was consistent with the document published by OEH: *NSW Guide to Surveying Threatened Plants 2016.* Two surveyors walked or slowly drove 10 to 20m spaced transects across proposal areas. The exception to this was Crouches (a cropped corn paddock), Old 2 (a grassed and agriculturally managed paddock) and Old 3 (a paddock grazed and cropped with soybean). Show paddock was the subject of threatened species searches on foot, however personnel tracking devices were not used at this time.

Preliminary understanding of the vegetation was by inspection of the Namoi VIS 4467 GIS map layer. This mapping was then ground-truthed using a mobile GPS unit and GIS and was converted into polygons. The polygons were then mapped as PCTs and any identified Threatened Ecological Communities (TECs).

Surveys were used to identify variation within vegetation zones in the proposal area. The structure, function and composition condition of PCTs were then assessed in accordance with Chapter 5 of the BAM. Vegetation zones were assigned by comparing the dominant canopy species, general description of location and landscape position, soil type and other attributes described in the TSPD (OEH 2016b) and OEH online VIS classification database (OEH 2016c).

4.2.5 Determining the vegetation integrity score (Appendix 6 of the BAM):

The vegetation integrity scores according to the BAMCC are:

- Zone 1 (86.99 hectares) is 20.4
- Zone 2 (95.76 hectares) is 7.5
- Zone 4 (0.59 hectares) is 6.1

Impact to zone will trigger offsetting as the vegetation integrity score is greater than 15 (as per section 10.3.1 of BAM).

Figure 4-5: vegetation integrity score

Zone	BAM item number	Area (ha)	Composition condition score	Structure condition score	Function condition score	Current vegetation integrity score
1	1	86.99	10.5	54.2	15	20.4
2	2	95.75	5	5.7	15	7.5
4	3	0.59	10.3	0.6	38.2	6.1

4.3 Local data

Local benchmark data of BAM plots collected on the property have not been used for this assessment.

An understanding of the implications of applying organic fertiliser on the local native vegetation was gained by completing two BAM plots in areas adjacent to the proposal area and which had previously had inorganic fertiliser applied.

5 Threatened species

The following section addresses the potential presence of threatened flora and fauna species to be considered in the assessment of impacts and targeted surveys:

- Ecosystem credit species (predicted species) are predicted to occur based on their known presence or predicted presence in the IBRA subregion, the known association with PCTs and the size and condition of the vegetation patches on the site.
- Species credit species (candidate species) are those that cannot be reliably predicted from the habitat surrogates and their presence is to be assessed through habitat assessment and targeted surveys. When species credit species have habitat constraints within the proposal area, they require further consideration.

A default list of threatened species with potential to occur in the proposal was firstly identified using the assessment filtering tool in the BAMCC. A background review was also conducted to confirm these and possible additional threatened species using the resources shown in Table 5-1.

Table 5-1: Wildlife databases used to identify potentially occurring threatened species

Database / resource	Search area	Date accessed
BAM credit calculator (BAMCC)	New England Tablelands – Deepwater Downs IBRA > Inverell Plateau Granites > PCT510	28 March 2019
OEH NSW Atlas of Wildlife	Approximately 10 X10 kilometres centred on the proposal area	Approx. 30 Jan 2019
Protected Matters Search Tool (DEE)	10 kilometre radius around point in centre of Rangers Valley property.	30 March 2019
OEH Threatened Species Profile Database (TSPD)	Potential presence of vegetation class	Approx. 30 Jan 2019

Threatened species known to occur based on recorded sightings recorded on the OEH BioNet Species Sightings Database (Table 5-2 and Figure 5-1).

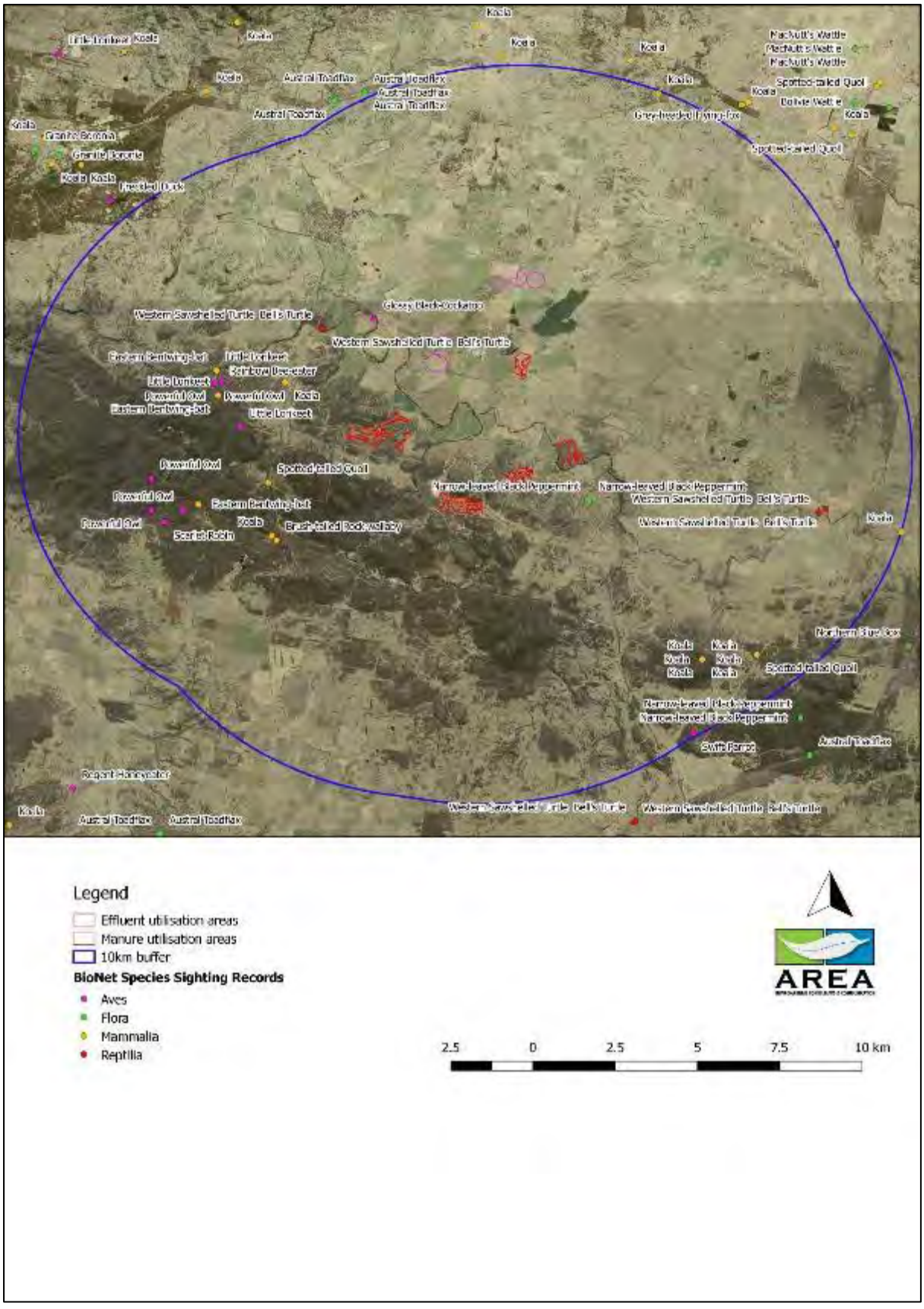
Table 5-2: Threatened species known within 10 kilometres of the proposal area (BioNet)

Kingdom Name	Class Name	Scientific Name	Common Name	NSW Status	Comm Status	Source	No of records
Fauna	Mammalia	*Petrogale penicillata*	Brush-tailed Rock-wallaby	E1 P	V	BioNet	1
Fauna	Mammalia	*Miniopterus schreibersii oceanensis*	Eastern Bentwing-bat	V P		BioNet	3
Fauna	Aves	*Calyptorhynchus lathami*	Glossy Black-Cockatoo	V P 2		BioNet	1
Fauna	Mammalia	*Phascolarctos cinereus*	Koala	V P	V	BioNet	13
Fauna	Aves	*Glossopsitta pusilla*	Little Lorikeet	V P		BioNet	3
Fauna	Flora	*Eucalyptus nicholii*	Narrow-leaved Black Peppermint	V	V	BioNet	2
Fauna	Aves	*Ninox strenua*	Powerful Owl	V P 3		BioNet	5
Fauna	Aves	*Merops ornatus*	Rainbow Bee-eater	P	J	BioNet	2
Fauna	Aves	*Petroica boodang*	Scarlet Robin	V P		BioNet	3
Fauna	Mammalia	*Dasyurus maculatus*	Spotted-tailed Quoll	V P	E	BioNet	2
Fauna	Aves	*Lathamus discolor*	Swift Parrot	E1 P 3	CE	BioNet	1
Fauna	Reptilia	*Myuchelys bellii*	Western Sawshelled Turtle Bell's Turtle	E1 P	V	BioNet	4

E = Endangered
V = Vulnerable
P = Protected

J = Japan bilateral agreement

Figure 5-1: BioNet results within 10 kilometres of the proposal

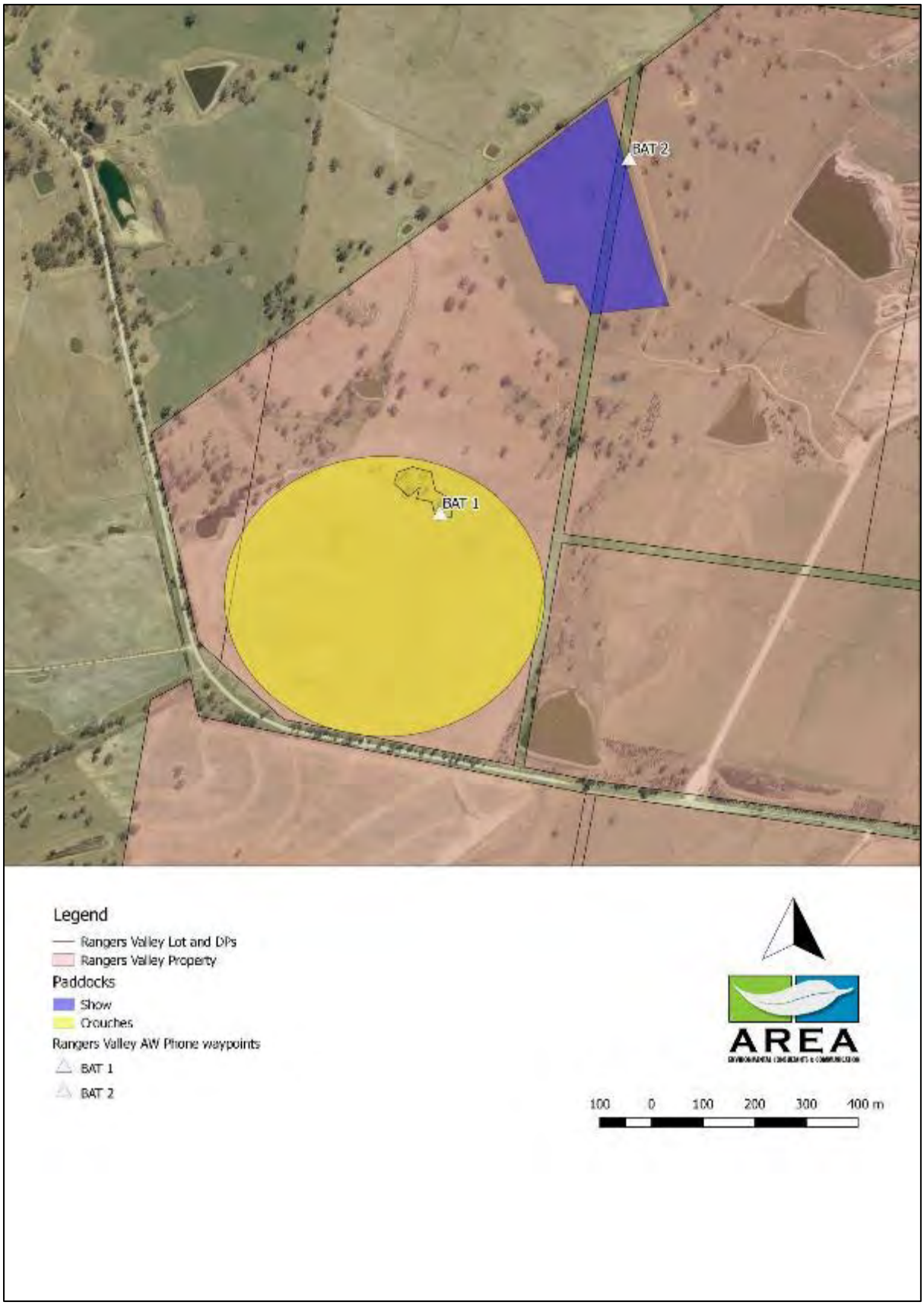


Bat recording was conducted at two locations over three nights to further seek to confirm the presence of threatened species in the proposal area (Table 5-3 and Figure 5-2).

Table 5-3: Bat recording data. # indicates threatened species.

		Machine: Bat 1			Machine: Bat 2		
Scientific name	Common name	Night 1	Night 2	Night 3	Night 1	Night 2	Night 3
Austronomus australis	White-striped Freetail Bat	x	x	x		x	
Chalinolobus gouldii	Gould's Wattled Bat	x	x	x	x	x	x
Chalinolobus morio	Chocolate Wattled Bat				x	x	x
Miniopterus orianae oceanensis #	Eastern Bent-winged Bat	x			x	x	x
Mormopterus planiceps	Southern Free-tailed Bat	x		x			x
Saccolaimus flaviventris #	Yellow-bellied sheath-tailed bat	x	x	x			
Scotorepens balstoni	Inland broad-nosed Bat					x	x
Vespadelus vulturnus	Little Forest Bat	x		x	x	x	x
Vespadelus darlingtoni	Large Forest Bat		x	x	x	x	
Vespadelus troughtoni #	Eastern Cave Bat		x	x	x		x
Vespadelus regulus	Southern Forest Bat	x	x		x		
Nyctophilus gouldi / geofroyii	Long-eared Bats					x	x
	Total calls	**158**	**164**	**108**	**88**	**102**	**612**

Figure 5-2: Bat monitoring device locations



5.1 Ecosystem credit species associated with PCTs on the proposal area as outlined in Section 6.2 of BAM

The BAMCC assessment tool identified 23 threatened species reliably predicted to use the proposal area (Table 5-4). No surveys are required to confirm presence of these species. Ecosystem credits apply to these species as none of these have associated habitat constraints or geographical limitations provided by the BAMCC.

5.1.1 List of ecosystem credit species derived

The derived ecosystem credit species as generated by the BAMCC is provided in Table 5-4. This table also indicates which threatened species were identified in the BAMCC paddock tree assessment – no additional species were identified. These species are subsequently assessed in conjunction with biodiversity values reported in Chapter 6 and potential impacts in Chapter 7.

Table 5-4: Threatened species reliably predicted to utilise PCT510 Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion (Ecosystem species). Species highlighted in green are species also identified in the paddock tree BAM assessment. No additional species were identified in the paddock tree BAM assessment.

Scientific name	Common name	Habitat constraints	Sensitivity to gain class	NSW listing status	National listing status.
Anthochaera phrygia	Regent Honeyeater (Foraging)	N/A	High Sensitivity to Potential Gain	Critically Endangered	Critically Endangered
Calyptorhynchus lathami	Glossy Black-Cockatoo (Foraging)	N/A	High Sensitivity to Potential Gain	Vulnerable	Not Listed
Chthonicola sagittata	Speckled Warbler	N/A	High Sensitivity to Potential Gain	Vulnerable	Not Listed
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	N/A	High Sensitivity to Potential Gain	Vulnerable	Not Listed
Daphoenositta chrysoptera	Varied Sittella	N/A	Moderate Sensitivity to Potential Gain	Vulnerable	Not Listed
Dasyurus maculatus	Spotted-tailed Quoll	N/A	High Sensitivity to Potential Gain	Vulnerable	Endangered
Falsistrellus tasmaniensis	Eastern False Pipistrelle	N/A	High Sensitivity to Potential Gain	Vulnerable	Not Listed
Glossopsitta pusilla	Little Lorikeet	N/A	High Sensitivity to Potential Gain	Vulnerable	Not Listed
Haliaeetus leucogaster	White-bellied Sea-Eagle (Foraging)	N/A	High Sensitivity to Potential Gain	Vulnerable	Not Listed
Hieraaetus morphnoides	Little Eagle (Foraging)	N/A	Moderate Sensitivity to Potential Gain	Vulnerable	Not Listed
Lathamus discolor	Swift Parrot (Foraging)	N/A	Moderate Sensitivity to Potential Gain	Endangered	Critically Endangered
Lophoictinia isura	Square-tailed Kite (Foraging)	N/A	Moderate Sensitivity to Potential Gain	Vulnerable	Not Listed
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	N/A	Moderate Sensitivity to Potential Gain	Vulnerable	Not Listed
Melithreptus	Black-chinned Honeyeater	N/A	Moderate Sensitivity to Potential Gain	Vulnerable	Not Listed

Scientific name	Common name	Habitat constraints	Sensitivity to gain class	NSW listing status	National listing status.
gularis gularis	(eastern subspecies)				
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat (Foraging)	N/A	High Sensitivity to Potential Gain	Vulnerable	Not Listed
Neophema pulchella	Turquoise Parrot	N/A	High Sensitivity to Potential Gain	Vulnerable	Not Listed
Ninox connivens	Barking Owl (Foraging)	N/A	High Sensitivity to Potential Gain	Vulnerable	Not Listed
Petroica boodang	Scarlet Robin	N/A	Moderate Sensitivity to Potential Gain	Vulnerable	Not Listed
Petroica phoenicea	Flame Robin	N/A	Moderate Sensitivity to Potential Gain	Vulnerable	Not Listed
Phascolarctos cinereus	Koala (Foraging)	N/A	High Sensitivity to Potential Gain	Vulnerable	Vulnerable
Pteropus poliocephalus	Grey-headed Flying-fox (Foraging)	N/A	High Sensitivity to Potential Gain	Vulnerable	Vulnerable
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	N/A	High Sensitivity to Potential Gain	Vulnerable	Not Listed
Stagonopleura guttata	Diamond Firetail	N/A	Moderate Sensitivity to Potential Gain	Vulnerable	Not Listed

5.1.2 Justification for exclusion of any ecosystem credit species predicted

No ecosystem credit species were excluded from this assessment.

5.2 Identify species credit species in the proposal area

This section has BAMCC outputs showing which species credit species are predicted by the BAMCC in the proposal area. The full list of 18 candidate species is provided in Table 5-6. This list includes one species in addition to those listed by the BAMCC. This species is the Eastern Cave Bat, *Vespadeuls troughtoni,* which was recorded by the bat monitors used for this assessment.

After the field assessment this list of species credit species was reviewed and exclusions from the BAMCC candidate species list were made as appropriate.

5.2.1 Justification for exclusion of any species credit species predicted

Species credit species listed in Table 5-5 were excluded because survey confirmed the species was:

- Not present or
- Unlikely to be present or
- Unlikely to use the suitable habitat in the proposal area

Nine species have been excluded from further assessment. This is justified in Table 5-5.

Table 5-5: species credit species excluded from further survey

Species credit species excluded		Reason			Explanation
Scientific name	Common name	Species not present	Species unlikely to be present	Unlikely to use the suitable habitat	
Adelotus brevis - endangered population	Tusked Frog population in the Nandewar and New England Tableland Bioregions		X		No suitable wet habitat un the proposal area. This proposal avoids waterways. Further, areas within the proposal are not moist or cryptic areas and are cropped or grazed.
Diuris pedunculata	Small Snake Orchid		X		No suitable habitat as the area. This species requires moist areas which are often peaty soils and amongst boulders. Areas within the proposal area are in flat open country which is grazed or cropped.
Eucalyptus magnificata	Northern Blue Box		X		Not recorded in proposal areas and unlikely to have been missed during the assessment.
Eucalyptus nicholii	Narrow-leaved Black Peppermint		X		Not recorded in proposal areas and unlikely to have been missed during the assessment.
Lathamus discolor	Swift Parrot (Breeding)		X	X	Breeds in Tasmania.
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat (Breeding)		X		Roosting habitat for this species is primarily caves, as well as derelict mines, storm-water tunnels, buildings or other man-made structures.
Ninox connivens	Barking Owl (Breeding)		X		Breeding is commonly in areas of dense shady foliage/ dense tall midstratum vegetation, which is not present in the proposal area. Sometimes in heavily cleared landscapes, the species can breed along timbered waterways – also not within the proposal area..
Pteropus poliocephalus	Grey-headed Flying-fox (Breeding)		X		Breeding areas for this species are commonly in vegetation with a dense canopy which is not present within the proposal area.
Thesium australe	Austral toadflax		X		Recorded during the assessment, outside the proposal area. No suitable habitat in the proposal area. Areas within the proposal are outside buffers around waterways and are either grazed or cropped or managed for improved pasture.

5.2.2 List of candidate species

17 species credit species were identified by the BAMCC as having potential to use habitat in the proposal area. One other species, Eastern Cave Bat, *Vespadeuls troughtoni,* was added to this list as it was recorded at the site during the assessment. The highlighted species have been included in the species credit calculations.

Table 5-6: Candidate species credit species (BAMCC)

Scientific name	Common name	Sensitivity to gain class	NSW listing status	National listing status.
Adelotus brevis - endangered population	Tusked Frog population in the Nandewar and New England Tableland Bioregions	Very High Sensitivity to Potential Gain	Endangered Population	Not Listed
Anthochaera phrygia	Regent Honeyeater (Breeding)	High Sensitivity to Potential Gain	Critically Endangered	Critically Endangered
Calyptorhynchus lathami	Glossy Black-Cockatoo (Breeding)	High Sensitivity to Potential Gain	Vulnerable	Not Listed
Dichanthium setosum	Bluegrass	High Sensitivity to Potential Gain	Vulnerable	Vulnerable
Diuris pedunculata	Small Snake Orchid	High Sensitivity to Potential Gain	Endangered	Endangered
Eucalyptus magnificata	Northern Blue Box	High Sensitivity to Potential Gain	Endangered	Not Listed
Eucalyptus nicholii	Narrow-leaved Black Peppermint	High Sensitivity to Potential Gain	Vulnerable	Vulnerable
Haliaeetus leucogaster	White-bellied Sea-Eagle (Breeding)	High Sensitivity to Potential Gain	Vulnerable	Not Listed
Hieraaetus morphnoides	Little Eagle (Breeding)	Moderate Sensitivity to Potential Gain	Vulnerable	Not Listed
Hoplocephalus bitorquatus	Pale-headed Snake	High Sensitivity to Potential Gain	Vulnerable	Not Listed
Lathamus discolor	Swift Parrot (Breeding)	Moderate Sensitivity to Potential Gain	Endangered	Critically Endangered
Lophoictinia isura	Square-tailed Kite (Breeding)	Moderate Sensitivity to Potential Gain	Vulnerable	Not Listed
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat (Breeding)	Very High Sensitivity to Potential Gain	Vulnerable	Not Listed
Ninox connivens	Barking Owl (Breeding)	High Sensitivity to Potential Gain	Vulnerable	Not Listed
Phascolarctos cinereus	Koala (Breeding)	High Sensitivity to Potential Gain	Vulnerable	Vulnerable
Pteropus poliocephalus	Grey-headed Flying-fox	High Sensitivity to Potential Gain	Vulnerable	Vulnerable
Thesium australe	Austral Toadflax	Moderate Sensitivity to Potential Gain	Vulnerable	Vulnerable
Vespadelus troughtoni	Eastern Cave Bat	Very High Sensitivity to Potential Gain	Vulnerable	Not Listed

5.2.3 Indication of listed flora or fauna presence based on targeted survey or expert report

Bat recording devices confirmed the presence of three threatened microbat species:

- *Miniopterus orianae oceanensis* – Eastern Bent-winged Bat
- *Saccolaimus flaviventris* - Yellow-bellied sheath-tailed Bat
- *Vespadelus troughtoni* – Eastern Cave Bat

5.2.4 Details of targeted survey technique, effort, timing and weather

Terrestrial flora surveys

Targeted flora surveys occurred during 4 to 8 February at the Rangers Valley property During this time BAM vegetation plots were completed, and threatened species search transects were conducted.

Targeted flora surveys in the proposal area were undertaken for all identified candidate flora species following the methods described in *Threatened Biodiversity Survey and Assessment Guidelines for Developments and Activities – Working Draft* (DEC 2004) and the *NSW Guide to Surveying for Threatened Plants* (OEH 2016). A combination of 10m to 20m transects in impact footprints, floristic plot surveys (per BAM 2017) and random meander surveys (Cropper 1993) further afield were undertaken to identify, search and record any candidate species.

Threatened species transects were less systematic in the effluent utilisation areas which were more isolated from patches of vegetation, consisted of a homogeneous cropped ground cover or were the subject of intensive grazing or other agricultural management.

While tracks cannot be seen in Figure 5.4 in Show, this area was the subject of threatened species transects.

Figure 5-3 to Figure 5-6 show survey transects as tracks, BAM plot locations and bat recording device locations.

Figure 5-3: Proposal survey effort – Figure 1 of 3. Plot location and search tracks

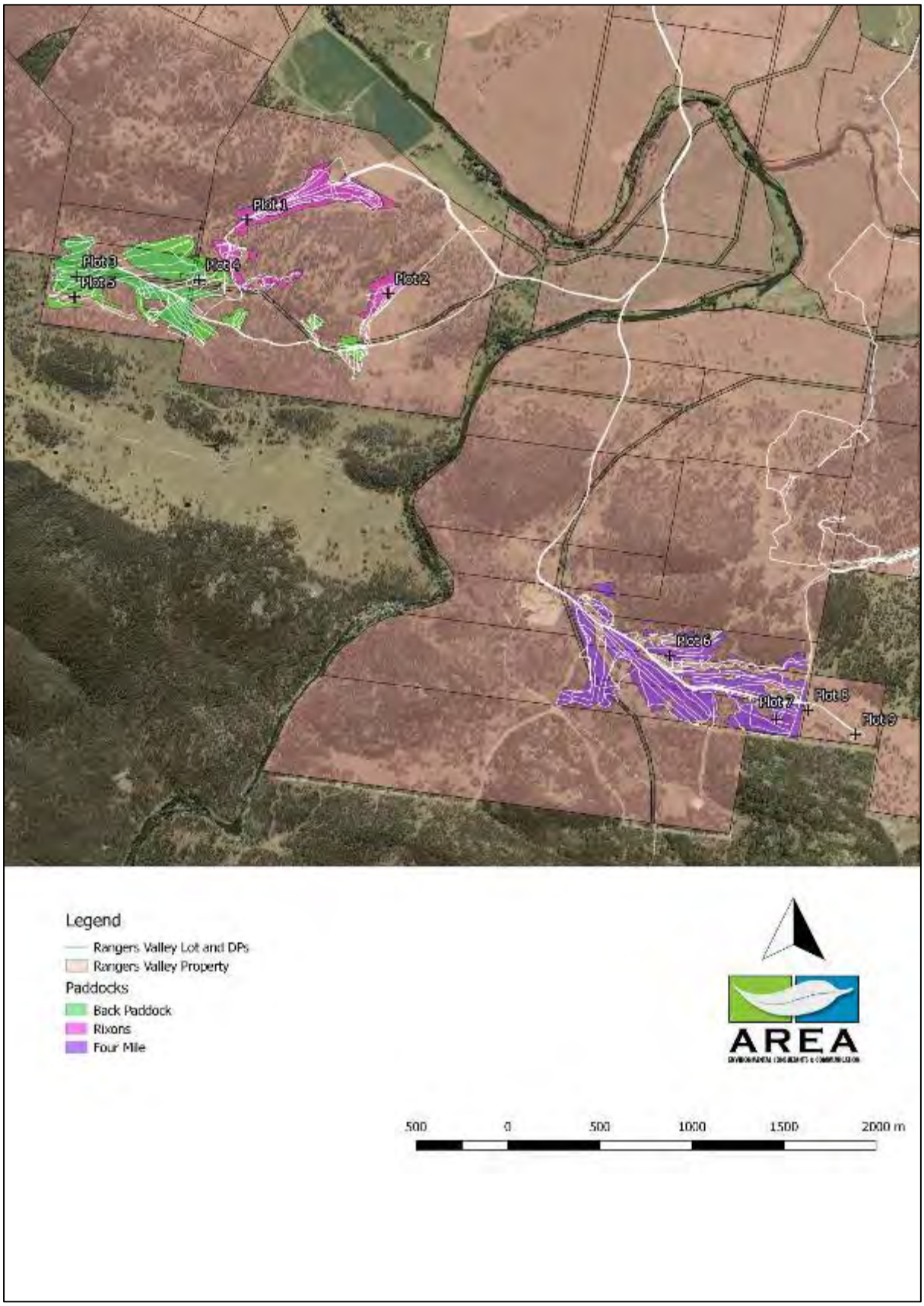


Figure 5-4: Proposal survey effort – Figure 2 of 3. Plot location and search tracks

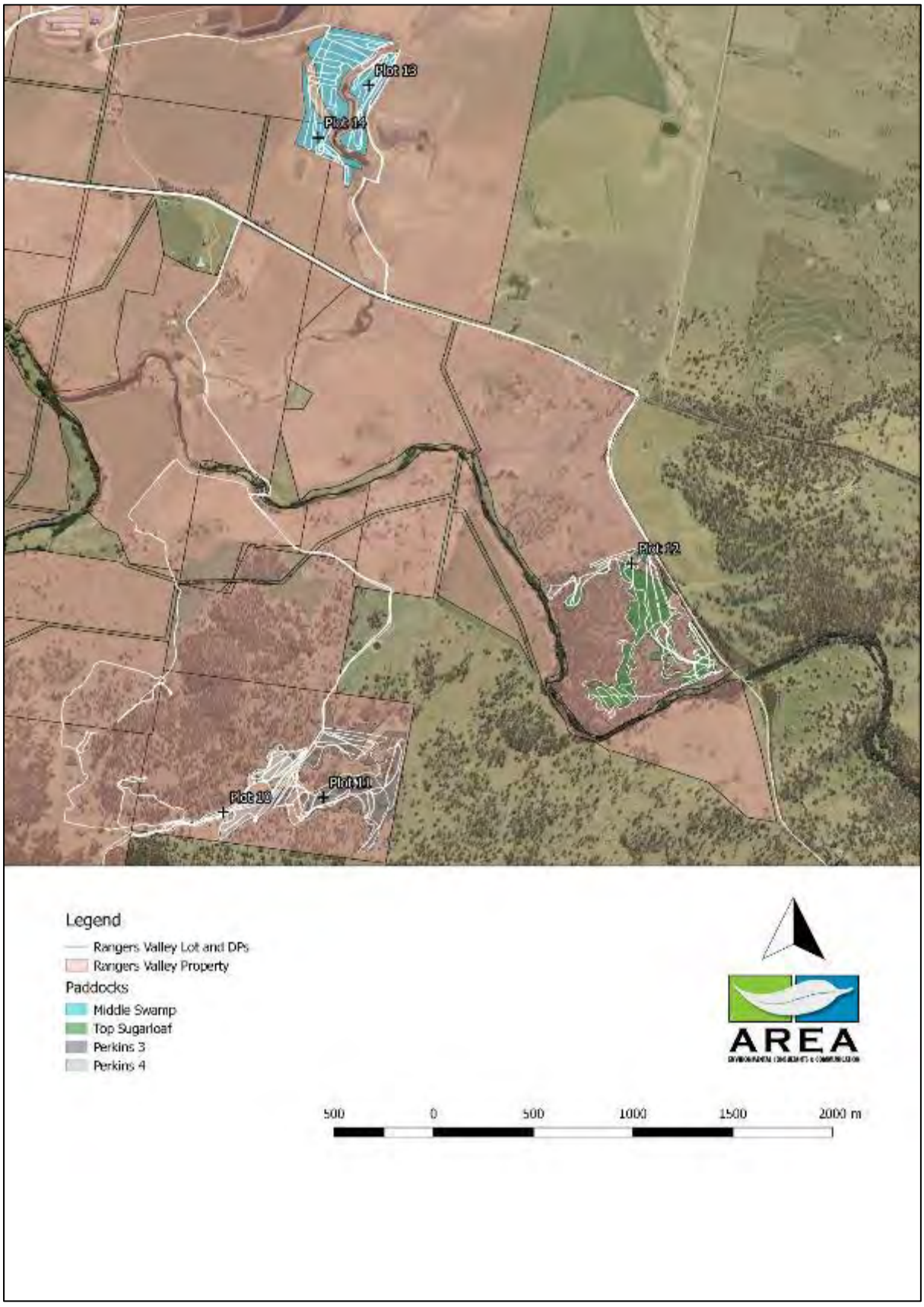


Figure 5-5: Proposal survey effort – Figure 3 of 3. Plot location and search tracks

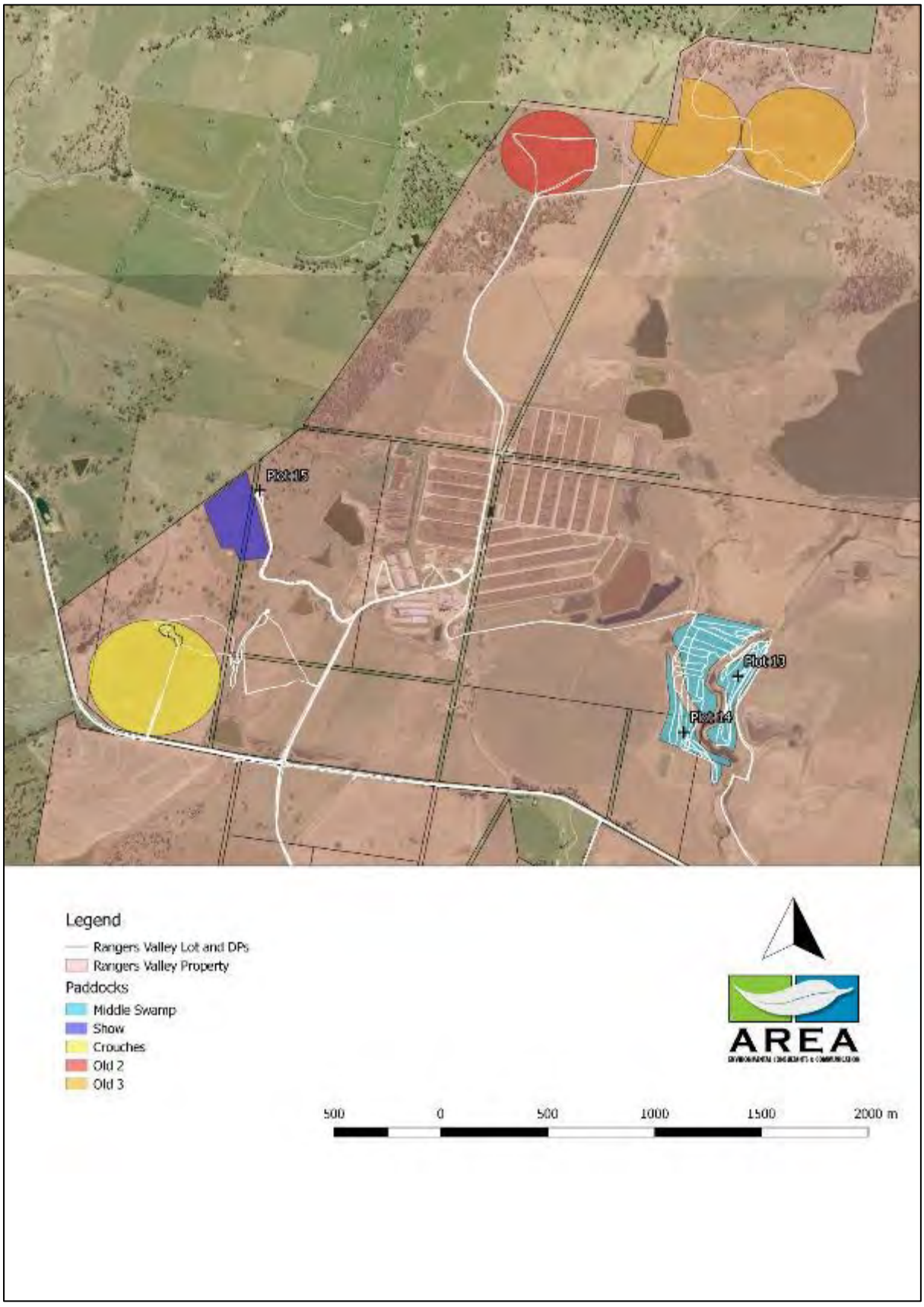
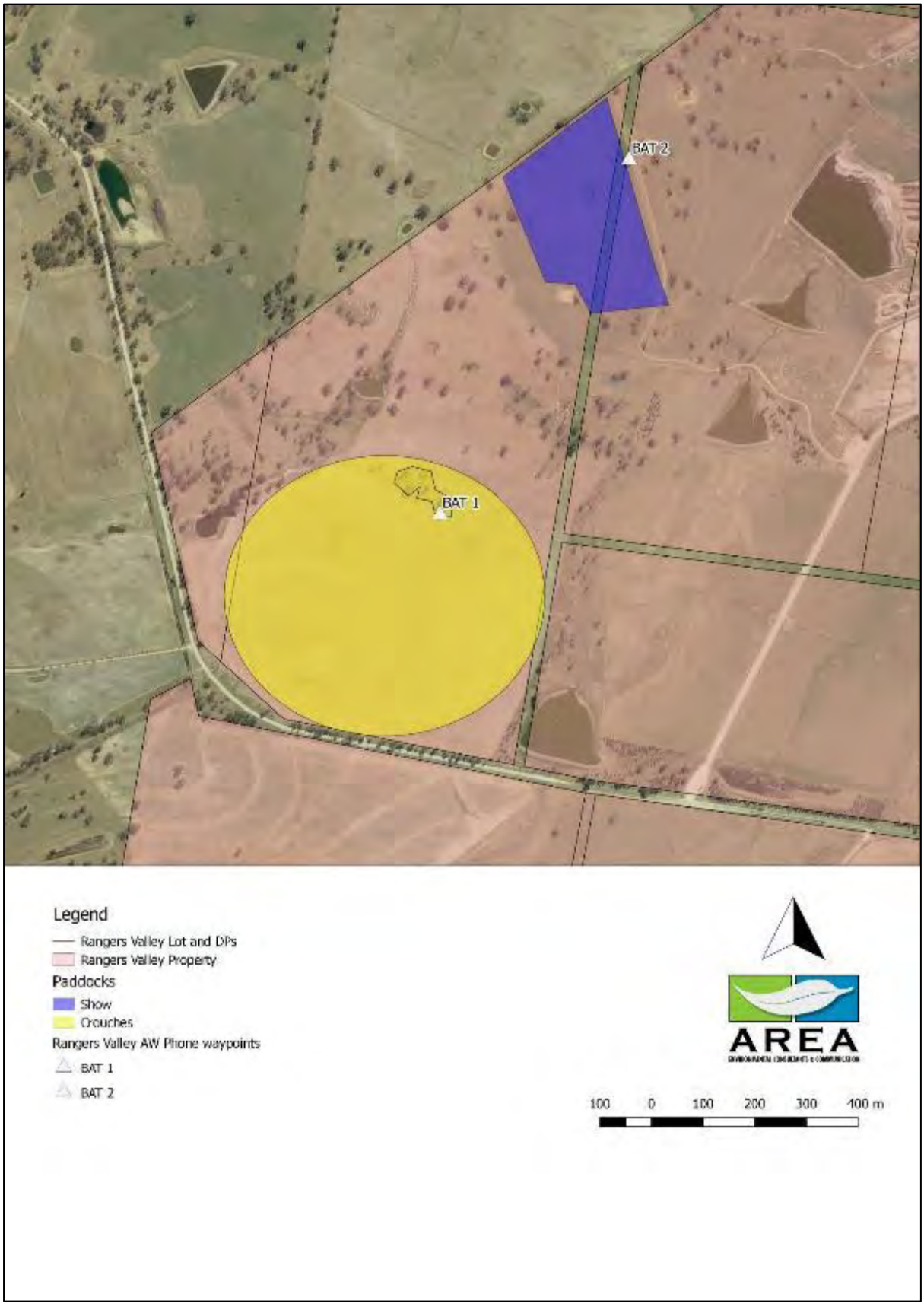


Figure 5-6:Proposal survey effort – Microbat monitoring. Survey nights of 5, 6 and 7 February 2019



5.2.5 Species polygons

The species in Table 5-7 have been identified in the BAMCC and have potential to occur in the proposal area.

Table 5-7: Threatened species requiring a species polygon

Scientific name	Common name	Sensitivity to gain class	NSW listing status	National listing status.
Anthochaera phrygia	Regent Honeyeater (Breeding)	High Sensitivity to Potential Gain	Critically Endangered	Critically Endangered
Calyptorhynchus lathami	Glossy Black-Cockatoo (Breeding)	High Sensitivity to Potential Gain	Vulnerable	Not Listed
Dichanthium setosum	Bluegrass	High Sensitivity to Potential Gain	Vulnerable	Vulnerable
Haliaeetus leucogaster	White-bellied Sea-Eagle (Breeding)	High Sensitivity to Potential Gain	Vulnerable	Not Listed
Hieraaetus morphnoides	Little Eagle (Breeding)	Moderate Sensitivity to Potential Gain	Vulnerable	Not Listed
Hoplocephalus bitorquatus	Pale-headed Snake	High Sensitivity to Potential Gain	Vulnerable	Not Listed
Lophoictinia isura	Square-tailed Kite (Breeding)	Moderate Sensitivity to Potential Gain	Vulnerable	Not Listed
Phascolarctos cinereus	Koala (Breeding)	High Sensitivity to Potential Gain	Vulnerable	Vulnerable
Vespadelus troughtoni	Eastern Cave Bat	Very High Sensitivity to Potential Gain	Vulnerable	Not Listed

Individual species habitat polygons requested by BAM have been provided in Figure 5-7, Figure 5-8 and Figure 5-9.

Figure 5-7: Species polygons for Regent Honeyeater (foraging) and Koala (breeding)

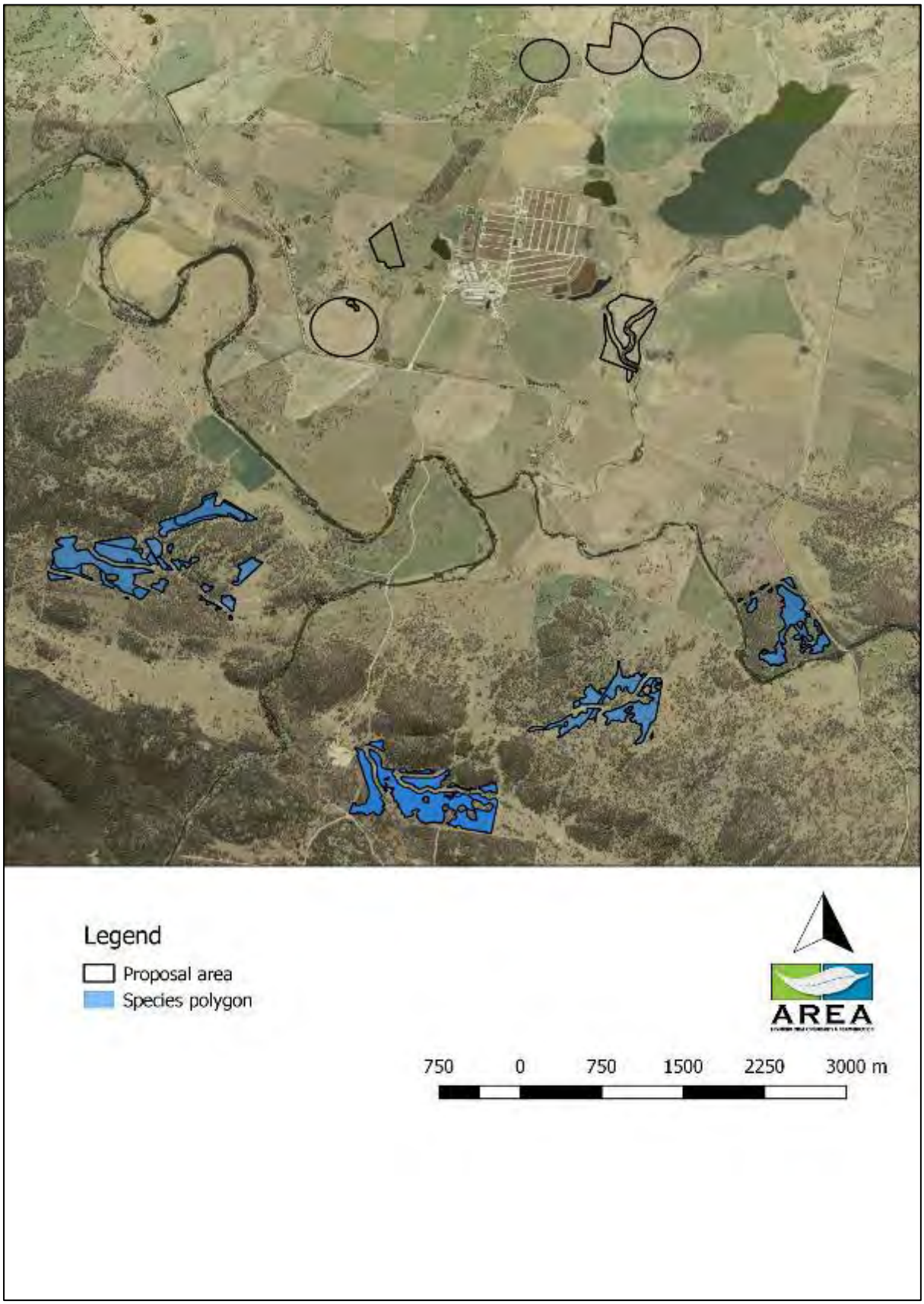


Figure 5-8: Species polygons for Glossy Black-Cockatoo (breeding), White-bellied Sea Eagle (breeding), Little Eagle (breeding), Pale-headed Snake, Square-tailed Kite (breeding) and Eastern Cave Bat.

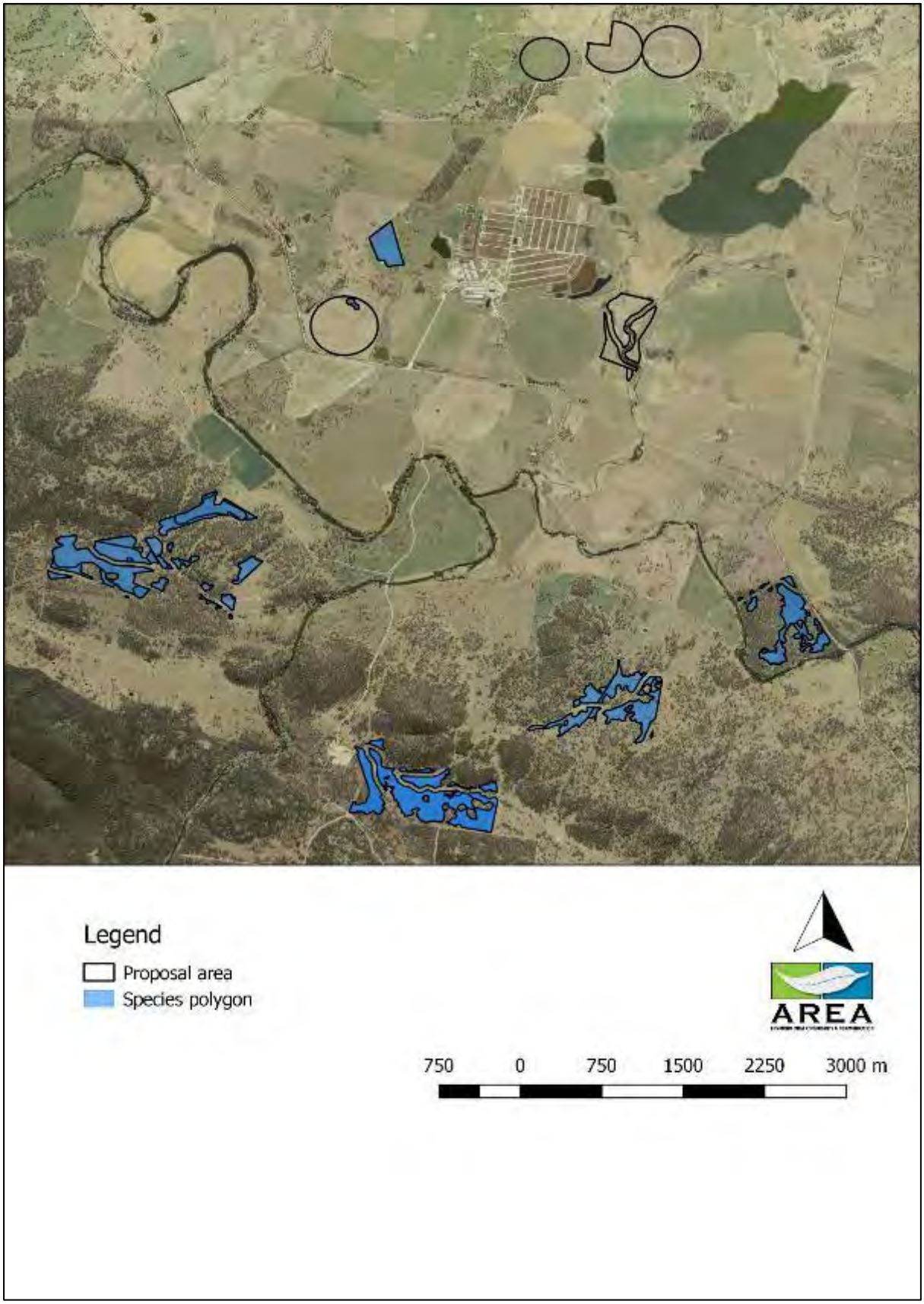
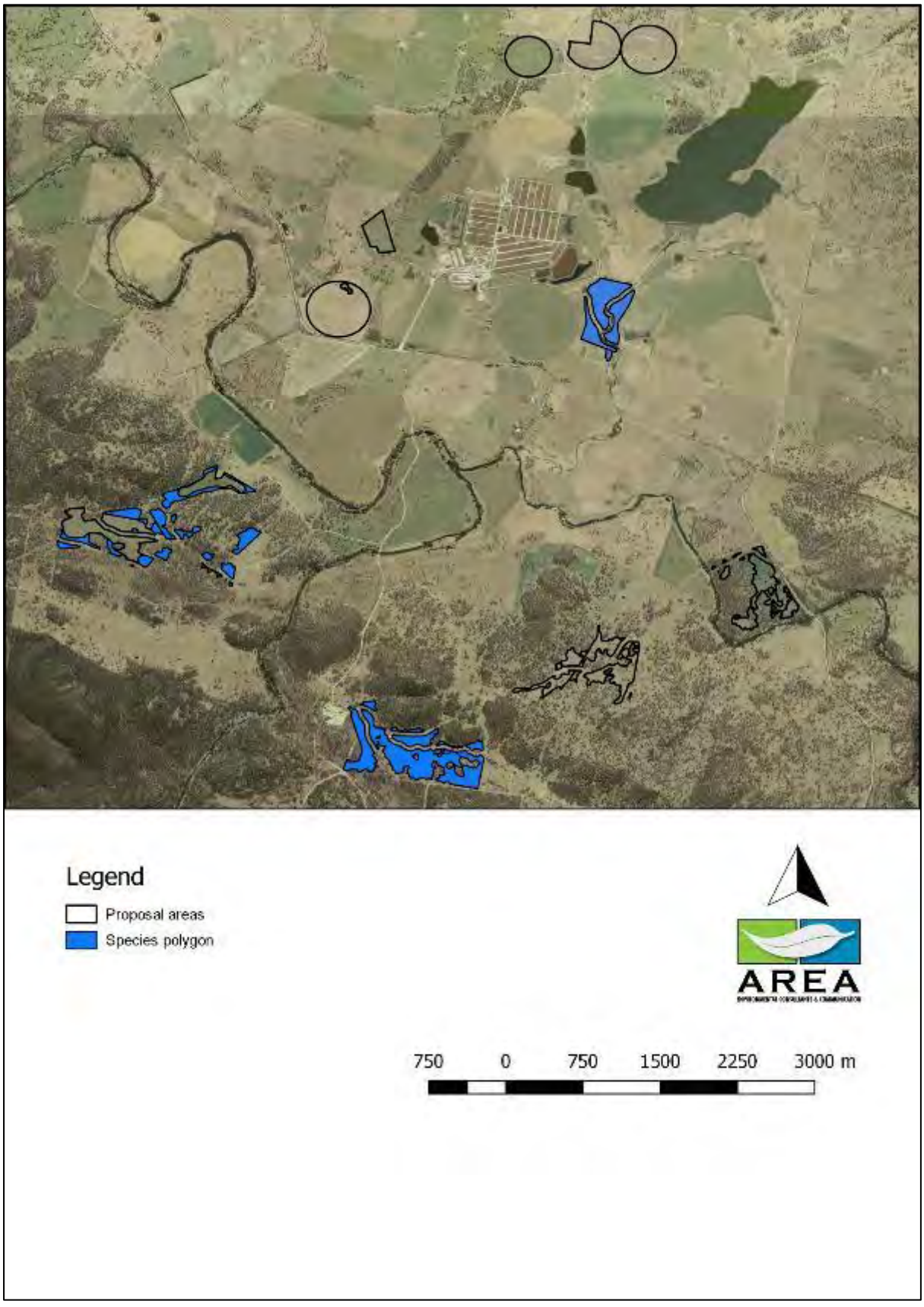


Figure 5-9: Species polygons for Bluegrass



5.2.6 Biodiversity risk weighting for the species

The biodiversity risk weighting is based on the combination of two components: sensitivity to loss score and sensitivity to potential gain score using the criteria listed in Appendix 7 of BAM (2017). Sensitivity to potential gain considers the ability of a species to respond to improvements in habitat condition at an offset site.

Risk weighting for each species listed as affected by the proposal has been provided in Table 5-8

Table 5-8: Sensitivity to Potential Gain for species that may be affected by the proposal (source BAM Calculator)

Scientific name	Common name	Biodiversity risk	Sensitivity to gain	Biodiversity risk weighting
Anthochaera phrygia	Regent Honeyeater (Breeding)	Very High	High Sensitivity to Potential Gain	3
Calyptorhynchus lathami	Glossy Black-Cockatoo (Breeding)	High	High Sensitivity to Potential Gain	2
Dichanthium setosum	Bluegrass	High	High Sensitivity to Potential Gain	2
Haliaeetus leucogaster	White-bellied Sea-Eagle (Breeding)	High	High Sensitivity to Potential Gain	2
Hieraaetus morphnoides	Little Eagle (Breeding)	Moderate	Moderate Sensitivity to Potential Gain	1.5
Hoplocephalus bitorquatus	Pale-headed Snake	High	High Sensitivity to Potential Gain	2
Lophoictinia isura	Square-tailed Kite (Breeding)	Moderate	Moderate Sensitivity to Potential Gain	1.5
Phascolarctos cinereus	Koala (Breeding)	High	High Sensitivity to Potential Gain	2
Vespadelus troughtoni	Eastern Cave Bat	Very High	Very High Sensitivity to Potential Gain	3

5.2.7 Threatened species survey

The targeted threatened species assessment focused on listed species precited to occur in PCT510 following all requisite guidelines to detect these species in the proposal. Local experience, previous survey of the region, preliminary reporting and information held on government databases and archives were also used to inform the assessment.

Assessment in the proposal area occurred over five days in February 2019.

Where assessment was not sufficient to confirm the absence of species, the species was assumed to be present.

5.3 Use of local data

No local data were used in this BDAR.

5.3.1 How is this local data relevant to the proposal area?

No local data were used in this

5.4 Were expert reports used in place of targeted survey?

No expert reports were used in this BDAR.

STAGE 2 BAM: IMPACT TO BIODIVERSITY VALUES

6 Matters of National Environmental Significance (MNES)

6.1 Threatened species

There are 33 MNES listed threatened species, 11 listed migratory and 18 listed marine species with potential to occur in the proposal area (Table 6-1, Appendix C).

Table 6-1: MNES summary

MNES	Result	Comment
World Heritage Properties	None	
National Heritage Places	None	
Wetlands of International Importance	3	All are located more than 1100 kilometres from the proposal area
Great Barrier Marine Park	None	
Commonwealth Marine Area	None	
Listed Threatened Ecological Communities	3	One occurs in the proposal area
Listed Threatened Species	33	22 are not identified by NSW searches
Listed Migratory Species	11	Birds that will not be affected by the proposal
Commonwealth Land	None	
Commonwealth Heritage Places	None	
Listed Marine Species	18	Birds that will not be affected by the proposal
Whales and other Cetaceans	None	
Critical Habitats	None	
Australian Marine Parks	None	
Commonwealth Reserves Terrestrial	None	
State and Territory Reserves	1	Fladbury Nature Reserve is located approximately 1 kilometre from the proposal area at the closest point
Forest Regional Agreements	1	North East NSW RFA
Invasive Species	23	
Nationally Important Wetlands	None	
Key Ecological Features (Marine)	None	

Twenty-two species are highlighted in the MNES report that are not listed under NSW legislation and the BAMCC generated list of threatened species. These include;

- Five birds
- One fish
- Four mammals
- Ten plants
- Two reptiles

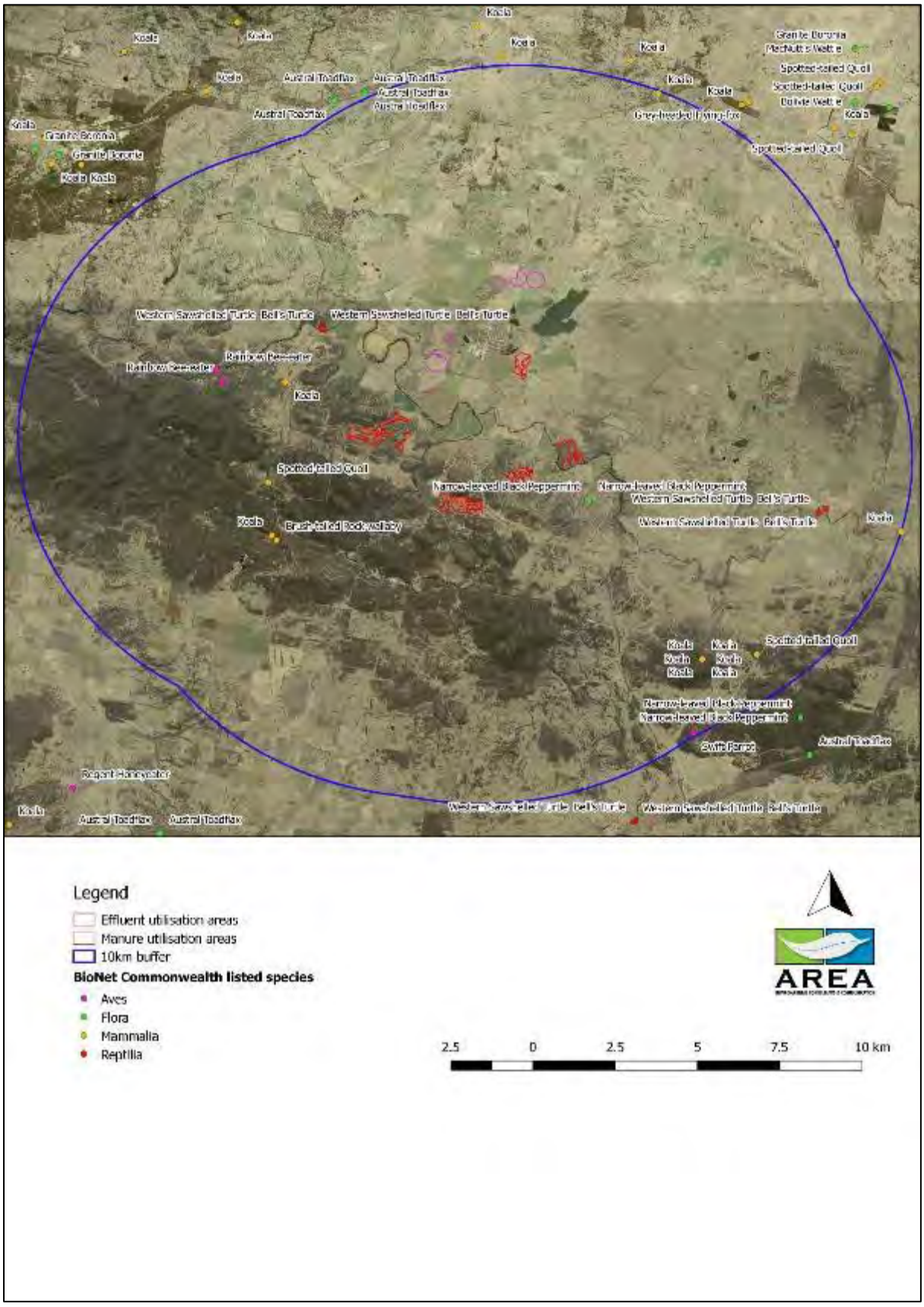
Seven species of Commonwealth listed fauna or flora are known to occur within 10 kilometres from the proposal area (Table 6-2 and Figure 6-1). Three Commonwealth listed threatened species have been recorded within 1500 metres of the proposal area.

Table 6-2: Commonwealth listed flora and fauna within 10 kilometres. Green highlight indicates species previously recorded within 1500m on BioNet.

Kingdom Name	Scientific Name	Common Name	NSW Status	Comm Status
Fauna	*Petrogale penicillata*	Brush-tailed Rock-wallaby	E	V
Fauna	*Phascolarctos cinereus*	Koala	V	V
Flora	*Eucalyptus nicholii*	Narrow-leaved Black Peppermint	V	V
Fauna	*Merops ornatus*	Rainbow Bee-eater	P	J
Fauna	*Dasyurus maculatus*	Spotted-tailed Quoll	V	E
Fauna	*Lathamus discolor*	Swift Parrot	E	CE
Fauna	*Myuchelys bellii*	Western Sawshelled Turtle/ Bell's Turtle	E	V

CE=Critically Endangered, E = Endangered, V= vulnerable, P = Protected, J = Japan bilateral agreement.

Figure 6-1: Commonwealth listed species within 10 kilometres of the proposal area



6.2 Migratory species

Eleven migratory species listed under the EPBC Act may potentially occur within the proposal area. (EPBC Act Protected Matters Report). None of these are known to occur within 10 kilometres of the proposal area.

7 Minimise impacts

7.1 Demonstration of efforts to avoid and minimise impact on biodiversity values

This section has been completed in accordance with Chapter 8 of BAM (2017).

- The proposal area is 253.16 hectares
- 183.33 hectares are mapped as native vegetation
- 69.83 hectares are mapped as Not Native vegetation (cropped paddocks)
- One described Plant Community Types (PCT) occurs in the proposal area:
    - PCT510 Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion This community is an endangered ecological community (White Box Yellow Box Blakely's Red Gum Woodland (Part)) under the BC At and a critically endangered ecological community (White Box Yellow Box Blakely's Red Gum Woodland (Part)) the EPBC Act.
- Vegetation Zones area allocated as:
    - Zone 1 – Areas with more than 50 percent native ground cover (no tree removal required, and all of this zone is manure utilisation areas)
    - Zone 2 – Areas with between zero and 50 percent native ground cover (removal of three dead trees in effluent utilisation areas and no tree removal in manure utilisation areas)
    - Zone 3 – Areas with zero percent native ground cover (current cropped paddock with removal of five living trees required as paddock tree assessment. Also, removal of two dead trees is required)
    - Zone 4 – Area with zero native ground cover (current cropped paddock with native tree removal required as PCT assessment)

The vegetation and threatened species assessment occurred in February 2019. Based on the results of this assessment the following changes were made to the impact footprint to avoid and minimise impact to biodiversity values.

Avoidance of impacts:

- Clearing of native vegetation was originally more extensive in Show paddock. One BAM 2017 vegetation plot in this site demonstrated the ground cover was not native as greater than 50 percent of the cover was not native species. This site also contained 21 trees within the impact footprint and 20 of these being large trees for this PCT. Further, six had large hollows (>20 centimetres diameter), and ten had hollows <20 centimetres diameter. Six were dead trees.

  This area of this impact was significantly reduced such that three trees remain within the impact footprint all of which are dead. All are in the large tree class for this PCT and two have hollows and one has a large hollow.

- An area of approximately 1.61 hectares was included as part of the Perkins 4 site for biodiversity assessment. No plots were completed in this area however AREA ecologists informed the proponent that this area contained a predominantly native ground cover, habitat values including hollows, fallen timber and rocks occurred in the area. In addition, access to this area would require removal of more native vegetation, which was likely to require offsetting.

  This site was removed from the proposal.

- The area identified for clearing associated with the Crouches paddock was initially considered as 38 hectares. Crouches paddock is a cropped paddock however the initial footprint included not only the trees in a group in the centre of the paddock which are part of the current proposal, but also a section of planted and regenerating native woodland to the east of the paddock. The vegetation was not assessed to confirm any additional information. Based on the advice from AREA ecologists, the proponent reduced the area to be cleared from the Crouches site to avoid all native vegetation outside the bounds of the paddock and reduce the number of trees to be removed within the paddock bounds.

Refer to the mitigation measures in Section 8.

7.2 Assessment of direct and indirect impacts unable to be avoided at the development site

This section has been completed in accordance with Sections 9.1 and 9.2 of BAM (2017). The assessment includes but is not limited to type, frequency, intensity, duration and consequence of impact.

7.2.1 Removal of native vegetation (residual impact)

Removal of vegetation impact will occur in the effluent utilisation areas only. This residual impact is summarised as:

- Impact to PCT510
  - 0.59 hectares – Zone 4
- Impact to alive paddock trees – five trees
- Impact to dead paddock trees – five trees

The loss of PCT510 in the effluent utilisation area equates to 0.33 percent of the PCT510 mapped within the proposal area.

Residual impact to the manure utilisation areas will not include removal of trees and it is expected native ground cover will persist in the areas where it currently exists. Some native ground cover species such as Poa species, which also occur in low abundance in areas mapped as Zone 2 (less than 50% native vegetation ground cover) are also expected to persist as a result of this proposal.

PCT510 on this site represents a threatened ecological community as listed as an endangered ecological community under the BC Act and as critically endangered under the EPBC Act.

Table 7-1: Residual impact to native vegetation

Zone	Formation	Class	Plant Community Type (PCT) Name	Type of impact	Hectares in proposal area
1	Grassy Woodlands	New England Grassy Woodlands	Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	No native vegetation removed	86.99
2				Three dead paddock trees removed	95.75
3	Cropped paddock	N/A	N/A Remnant paddock trees	Five living and two dead paddock trees removed	69.82
4	Grassy Woodlands	New England Grassy Woodlands	Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	Removal of native vegetation	0.59

7.2.2 Removal of habitat for threatened fauna species

The potential impact to threatened fauna and their habitat would occur during clearing of habitat in the short-term and over the long-term through reduction in availability of habitat for sedentary and transient local populations, and possibly movements of species through the landscape.

In the effluent utilisation areas, the proposal would reduce the number of tree hollows and reduce the availability of perching/ resting/ shelter resources.

7.2.3 Loss of food resources

The clearing of trees in the effluent utilisation areas would result in a loss of habitat by reducing the availability of nectar resources and has low potential to affect threatened nectar feeding birds, microbats and birds of prey mostly associate with PCT510.

Woodland possesses different bark types and canopy structures of which are a source of multiple food resources such as seeds, lerps and gum / resin and attract a diversity of invertebrates, again mostly associated with PCT510.

Impact to this habitat by removing trees in the effluent utilisation areas would reduce foraging habitat for birds, microchiropteran bats, and raptors by reducing prey (ground-dwelling, arboreal mammals, birds and reptiles).

7.2.4 Loss of tree hollows and woody debris (sheltering and breeding habitat)

Paddock trees will be removed in the effluent utilisation areas.

In the effluent utilisation areas (Crouches, Show and Old 3) a total of ten paddock trees and 12 trees in a patch of PCT510 will be removed:

- In Crouches, 12 trees have been recognised as part of PCT510 and included in the BAM calculations. One other tree to be removed from in this paddock is dead and has no hollows.
- Six are Class 3 trees (>50 centimetres diameter at breast height)
  - Four are dead
  - Two have large hollows (>20 centimetres diameter at breast height)
  - Four have hollows (<20 centimetres diameter at breast height)
- Three are Class 2 trees (>20 centimetres diameter at breast height)
  - All have hollows (<20 centimetres diameter at breast height)

Loss of tree hollows is Key Threatening Process listed under the BC Act.

Ground logs benchmark for PCT510 is 26m. Given the agricultural landscape within which the proposal is situated, the presence of logs greater than 10 centimetres diameter is minimal. Such logs were only identified in four of the 15 plots and mostly in low metre counts. Plot 15 had 33 metres of logs on the ground – this area was subsequently removed from the proposal area.

7.2.5 Loss of dams (breeding and foraging habitat for wetland dependent species)

No dams or other waterways will be removed by the proposal,

Farm dams on the property had recently been cleaned out at the time of the assessment and were virtually dry.

Dams / water retention areas can seasonally provide shelter and food resources for wide-ranging and transient wetland and migratory bird species, and for sedentary wetland

dependent fauna species as frogs. They may be used as important refuge or dispersal habitat for frogs or as a drought refuge for birds.

There is no 'critical habitat' as listed under the BC Act identified in the proposal area for threatened wetland dependent biota.

7.2.6 Removal of threatened plants

No threatened plants will be removed as part of this proposal.

7.3 Assessment of indirect impacts

7.3.1 Aquatic impacts

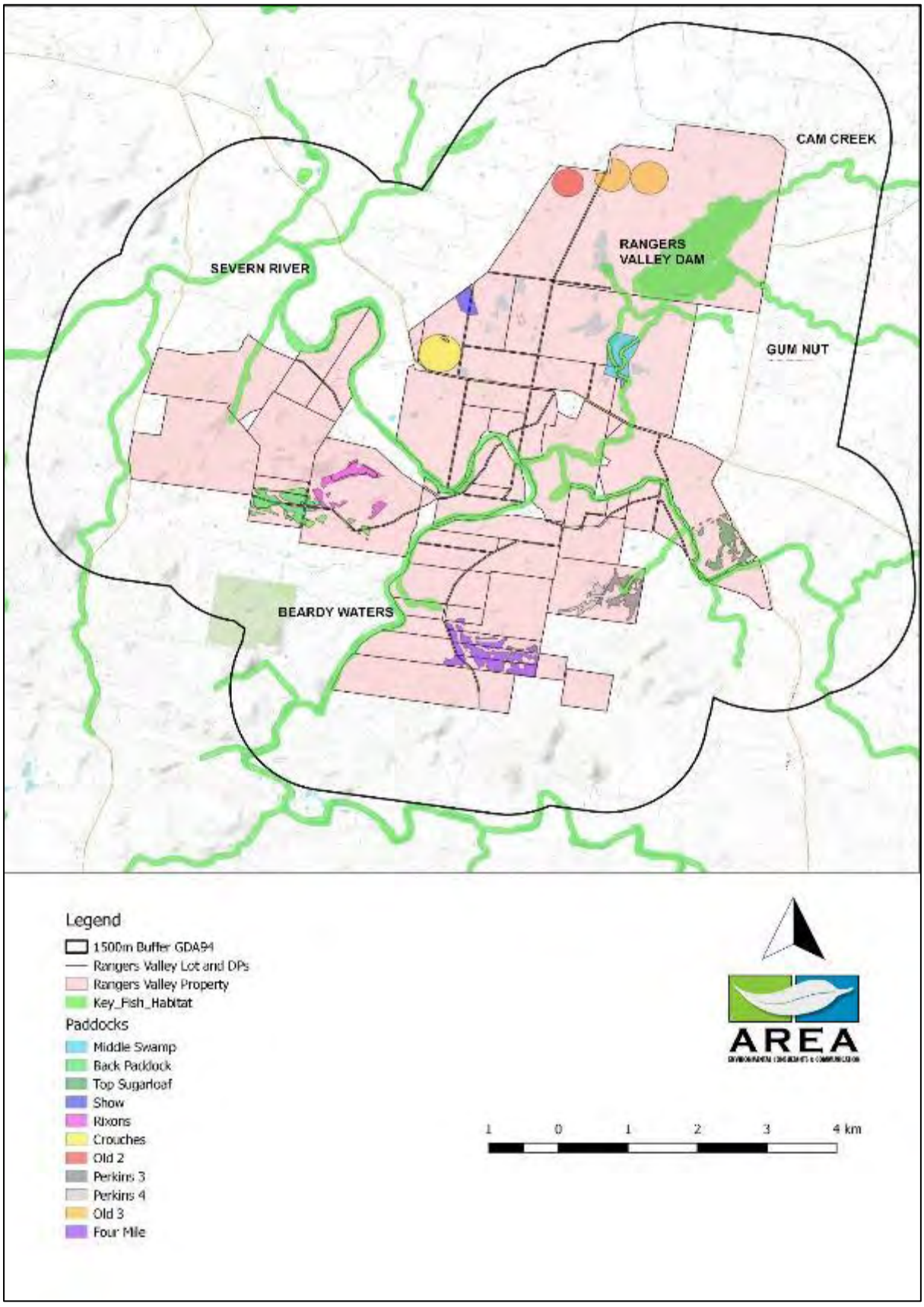
There are natural drainage lines in the proposal area, but operation of the proposal will not directly impact these.

The proposal traverses protected riparian buffers mapped as Key Fish Habitat (KFH). Buffers have been applied to all mapped drainage lines, including those area mapped as KFH to avoid contact with riparian zones. These buffers are the same as, or more than, is required based on the Strahler order buffers stipulated in Table 14 of the BAM.

This proposal will not involve the removal of vegetation or habitat features from waterways, dredging or otherwise obstructing fish passage, changes to surface water drainage lines or changes to the banks of waterways. The proposal does not require a permit for development with Key Fish Habitat. Manure utilisation areas within areas of Key Fish Habitat are currently grazed by cattle so processes associated with nutrients are existing in this environment.

With respect to water quality changing hydraulic chemistry, the NSW EPA is responsible for issuing an Environmental Protection Licence (EPL) to the proponent of the proposal. The proponent has an existing EPL which includes water monitoring requirements. Where monitoring triggers detects an exceedance of acceptable levels then a remediation order will be used to enact management measures to ensure water, quality is not affected. Standard safeguards within the EPL will protect all aquatic threatened species.

Figure 7-1: Key Fish Habitat



7.3.2 Groundwater dependent ecosystems

The desktop review identified groundwater dependent ecosystems on the proposal area. The proposal is not expected to impact or change groundwater flows.

7.3.3 Changes to hydrology

The proposal will result in negligible changes surface drainage. The proposal is unlikely to negatively impact on present surface or groundwater hydrology and surface topography is not being altered. Additional runoff as a result of tree removal is expected to be minimal and will not require any change of land management.

7.3.4 Fragmentation of identified biodiversity links and habitat corridors

Existing habitat will not be fragmented as connection through Rangers Valley will be maintained as residual native vegetation within PCT150. Habitat linkages surrounding the proposal area and some areas of habitat within the site will remain and may still be utilised by listed fauna.

7.3.5 Edge effects on adjacent native vegetation and habitat

Edge effects will occur within residual native vegetation on Rangers Valley, however the vegetation which will be removed is sparse and its removal will no increase the edge effects on adjacent native vegetation.

7.3.6 Injury and mortality of fauna

Clearing vegetation may result in fauna injury and /or mortality however operation of the proposed activity is unlikely to impact fauna species. The most at risk fauna of harm are those that have refuge habitat in hollow bearing trees e.g. microbats, reptiles and frogs and do not have a fine-tuned flight (fleeing / escaping) mechanism as seen in birds.

All other fauna would have a chance to evade vegetation clearing and would likely seek refuge in adjacent habitat.

7.3.7 Weeds of national significance

No weeds of national significance we identified in the proposal area.

7.3.8 Invasion and spread of pests

Animal pests, particularly deer, pigs, cats and foxes, already exist in the proposal area. Predation by feral cats and foxes has a high potential on site and is listed a Key Threatening Process under both the EPBC Act and the BC Act. Pests are managed through the existing Biodiversity Management Plan for the property.

7.3.9 Invasion and spread of pathogens and disease

In NSW, there are infectious pathogens with potential to impact on biodiversity. Any activities involving the movement of soil and equipment over large areas are a potential risk for spread and infection. Three pathogens are considered a negligible risk to the proposal area due to the low rainfall of the area. These are listed as key threatening processes under the EPBC Act and/or BC Act including:

- Dieback caused by Phytophthora (EPBC Act and BC Act).
- Infection of frogs by amphibian chytrid fungus causing the disease chytridiomycosis (EPBC Act and BC Act).
- Infection by Psittacine Circoviral (beak and feather) (EPBC Act and BC Act).

There is a low to negligible likelihood for the potential risk of pathogens on the proposal area during construction given its location and dry climate and they have not been detected on site. A Pathogen Management Plan is not needed.

Phytophthora (Phytophthora cinnamomi)
Phytophthora is soil-borne fungus causing tree death (dieback). It attacks the roots of a wide range of native plant species. Spores can be dispersed over relatively large distances by surface and sub-surface water flows. Infected soil/root material may be dispersed by vehicles (e.g. earth moving equipment).

Infection by Psittacine Circoviral (beak and feather)
Psittacine Circoviral (beak and feather) Disease (PCD) affects parrots and their allies (psittacines) and is often fatal. No other faunal species or groups are known to be susceptible to PCD (Murdoch University 1997). It is caused by a relatively simple virus that infects and kills the cells of the feather and beak, as well as cells of the immune system, leaving birds vulnerable to bacterial and other infections (Murdoch University 1997). The distribution of the disease and the factors involved in its spread are not well understood. The virus multiplies in the liver and can be transmitted orally or in faeces or feathers. Sulphur-crested Cockatoos affected by this disease were seen during the assessment.

Chytrid fungus (Batrachocytrium dendrobatidis)
Chytrid fungus is a fatal infectious disease affecting amphibians worldwide. It is a water-borne fungus that may be spread because of handling frogs or through cross contamination of water bodies by vehicles and workers.

7.3.10 Noise, light, dust and vibration

During the operation of the proposal, effects of increased noise, light, dust and vibration may result in indirect impact to biodiversity values.

Dust is likely to be the most obvious of these with the movement of farm machinery and the dust generated during the manure spreading process. The effects of machinery movement would be short lived and only occurring occasionally in association with this proposal. Dust generated by the manure or ground disturbed during the application of the manure will be short term until the ground cover has re-established in addition, the existing ground cover would not be removed during the operation of this proposal and all ground cover left in situ will reduce the dust production.

7.3.11 Cumulative impact

The Rangers Valley property is managed as a commercial cattle station. All areas within the proposal are currently, or may be at any time, grazed or cropped.

The manure utilisation areas are currently managed on a rotational basis such that the native and not native grass has opportunity to re-establish dense cover and replenish the soil seed bank.

This proposal aims to increase the potential and efficiency for this grass replenishment process to occur.

The effluent utilisation areas will require the removal of some native vegetation (trees). This will contribute to the level of clearing that has already occurred on the Rangers Valley property. The OEH Namoi VIS 4467 map identifies ‘not native’ as 54% of the property. Removal of trees in the effluent utilisation areas will not notable increase this value, in fact, the effluent utilisation areas are already mapped as not native in this map.

In summary, while the cumulative effect to areas of native vegetation and the associated habitat vales has worsened, the increase is small.

It is recommended the native vegetation is monitored to ensure the application rate of manure and effluent is consistent with the persistence of native species and cover to the current levels of above.

7.4 Areas not requiring assessment

Areas of not native vegetation (Zone 3) were not assessed using BAM plots and transects to the same extent as required for the native vegetation zones.

Most of the proposal area was assessed using requisite species credit species guidelines and BAM (2017). Areas of cropped or intensely managed agricultural land (Crouches, Old 2 and Old 3) were assessed for threatened species, however this was not in the form of 10 – 20 metre transects given the uniform and highly disturbed cropped nature of the vegetation.

7.5 Matters for further consideration (Species credit species)

No matters require further consideration.

7.6 Matters of National Environmental Significance (EPBC Act)

This chapter presents species identified by the Matters of National Environmental Significance.

7.6.1 Listed Threatened Species

Table 7-2: Threatened species identified in the MNES report

Common Name	Scientific Name	Commonwealth Status
Regent Honeyeater	*Anthochaera phrygia*	Critically Endangered
Curlew Sandpiper	*Calidris ferruginea*	Critically Endangered
Red Goshawk	*Erythrotriorchis radiatus*	Vulnerable
Squatter Pigeon (southern)	*Geophaps scripta scripta*	Vulnerable
Painted Honeyeater	*Grantiella picta*	Vulnerable
Swift Parrot	*Lathamus discolor*	Critically Endangered
Australian Painted-snipe	*Rostratula australis*	Endangered
Murray Cod	*Maccullochella peelii*	Vulnerable
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Community likely to occur within area	New England Peppermint (*Eucalyptus nova-anglica*) Grassy Woodlands	Critically Endangered
Large-eared Pied Bat, Large Pied Bat	*Chalinolobus dwyeri*	Vulnerable
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (south eastern mainland population)	*Dasyurus maculatus maculatus* (SE mainland population)	Endangered
Corben's Long-eared Bat, South-eastern Long-eared Bat	*Nyctophilus corbeni*	Vulnerable
Greater Glider	*Petauroides volans*	Vulnerable
Brush-tailed Rock-wallaby	*Petrogale penicillata*	Vulnerable
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)	*Phascolarctos cinereus* (combined populations of Qld, NSW and the ACT)	Vulnerable
New Holland Mouse, Pookila	*Pseudomys novaehollandiae*	Vulnerable
Grey-headed Flying-fox	*Pteropus poliocephalus*	Vulnerable
Velvet Wattle	*Acacia pubifolia*	Vulnerable
Rupp's Wattle	*Acacia ruppii*	Endangered
Granite Boronia	*Boronia granitica*	Endangered
Ooline	*Cadellia pentastylis*	Vulnerable
-	*Callistemon pungens*	Vulnerable
bluegrass	*Dichanthium setosum*	Vulnerable
Small Snake Orchid, Two-leaved Golden Moths, Golden Moths, Cowslip Orchid, Snake Orchid	*Diuris pedunculata*	Endangered
McKie's Stringybark	*Eucalyptus mckieana*	Vulnerable
Narrow-leaved Peppermint, Narrow-leaved Black Peppermint	*Eucalyptus nicholii*	Vulnerable
Blackbutt Candlebark	*Eucalyptus rubida subsp. barbigerorum*	Vulnerable
Tall Velvet Sea-berry	*Haloragis exalata subsp. velutina*	Vulnerable
Wandering Pepper-cress	*Lepidium peregrinum*	Endangered
Heath Wrinklewort	*Rutidosis heterogama*	Vulnerable
Austral Toadflax, Toadflax	*Thesium australe*	Vulnerable
Adorned Delma, Collared Delma	*Delma torquata*	Vulnerable
Border Thick-tailed Gecko, Granite Belt Thick-tailed Gecko	*Uvidicolus sphyrurus*	Vulnerable
Bell's Turtle, Western Sawshelled Turtle, Namoi River Turtle, Bell's Saw-shelled Turtle	*Wollumbinia belli*	Vulnerable

7.7 Serious and Irreversible Impacts (SAII)

The BAMCC Credit Summary Report (Appendix B) provides a column indicating Candidate SAIIs.

7.7.1 White Box Yellow Box Blakely's Red Gum Woodland

A review of this report demonstrated PCT510 is a candidate SAIIs (**Appendix B**). Zone 1, 2 and 4 and as remnant paddock trees in Zone 3 and dead trees to be removed in Zone 2 and 3 are components of White Box Yellow Box Blakely's Red Gum Woodland which is an Endangered Ecological Community under the BC Act and a Critically Endangered Community under the EBPC Act.

This EEC is nominated under Principle 1 – species or ecological community currently in a rapid rate of decline and Principle 2 – species or ecological communities with very small population size.

Principle 1 - Rapid rate of decline for an ecological community means the ecological community should have been observed, estimated, inferred, or reasonably suspected to have undergone, or be projected to undergo, a very large reduction in distribution, being:

- *≥ 90% reduction where the reduction is measured since 1750 (historical decline), or*
- *≥ 80% reduction where the reduction is over a 50-year period, either in the past, future, or any part of the past, present and future.*

The period of decline for an ecological community can be assessed as recent decline, current decline or projected future decline which is liable to continue unless remedial measures are taken, or alternatively, as historical decline.

Principle 2 – species or ecological communities with very small population size. Species that have a very small population size are species with a known population size that is either:
• fewer than 50 mature individuals independent of whether there are any threats, or
• fewer than 250 mature individuals and the species has an observed, estimated or projected continuing decline:
o of at least 25% in three years or one generation (whichever is longer) OR
o where the number of mature individuals in each subpopulation is <50 OR
o the percentage of mature individuals in one subpopulation is 90-100% OR
o the population is subject to extreme fluctuations4 in the number of individuals (IUCN 2017).

PCT510 occurs in Zone 1, 2 and 4 and as remnant paddock trees in Zone 3 or lone dead trees to be removed in Zone 2 and 3.

- No vegetation will be removed as part of this proposal in Zone 1
- Dead paddock trees will be removed in Zone 2 (three)
- Living paddock trees (five) and dead paddock trees (two) will be removed in Zone 3
- A 0.59 hectare patch of PCT510 with a not-native – corn crop ground cover will be removed in Zone 4,

Manure application is not expected to reduce from the continuation or quality of the native ground cover and not to impact the tree stratum. In Zone 4, 0.59 hectares of PCT510 will be removed as part of this proposal (Plate 2-3: Example of Zone 3 - proposed effluent utilisation area with paddock trees only (Soybean crop - Old 3)Plate 2-3). This area of Zone 4 has a not native ground cover which is currently a corn crop. No native ground cover species were observed.

Zone 1 and part of Zone 2 are manure utilisation areas, this means manure application is proposed after it has been stored for 12 months then screened (for rocks, woodchip etc.) and powdered for application will be spread using farm machinery on the site. This process will replace application of inorganic fertiliser (urea, superphosphate) on these paddocks. Section 2.3.3 provides a list of scientific papers discussing this topic which, as well as observations made during this assessment (Plot 8 and 9 – Appendix A) have informed the opinion that:

- those native and exotic species that respond to fertiliser such as Qld Bluegrass and Poa species will grow well and increase their biomass
- application of manure is also not expected to negatively reduce the richness or cover of forb species
- if the grazing regime is strategic, the native vegetation composition and structure can be maintained. Areas of native grasslands should be left fallow periodically, and when setting seed which will enable maintenance of the soil seedbank.

A SAII is not considered likely for PCT510 in this proposal however environmental safeguards are recommended in the report and monitoring is recommended which will inform future management actions to remediate effects on the quality of this EEC.

7.7.2 Regent Honeyeater

A potential Serious and Irreversible Impact was identified by the BAMCC for Regent Honeyeater. The Regent Honeyeater is nominated under Principle 1. Principle 1 – species or ecological community currently in a rapid rate of decline.

Principle 1 concerns *species and ecological communities that have undergone large reductions or are likely to undergo large reductions in the future are considered to be at greater risk of extinction than those that have undergone or are likely to undergo smaller reductions (NSW Scientific Committee 2014).*

Potential SAII entities listed under this principle have already undergone, currently are in, or are projected to undergo, a rapid rate of decline. Criteria used to identify these entities include the following:

- ***Entities listed as critically endangered under the BC Act*** *The principle would generally capture entities listed as critically endangered under the BC Act where the reason for that listing is a very large reduction in population size.*
- ***Rapid rate of decline for species*** *The species has an observed, estimated, inferred, suspected or projected population reduction of ≥80% in 10 years or three generations (whichever is longer).*

  'Generation' means the average age of parents of the current cohort (i.e. newborn individuals in the population). Generation therefore reflects the turnover rate of breeding individuals in a population (IUCN 2017).

  The period of decline can be assessed as recent decline, current decline or projected future decline which is liable to continue.

This proposed impact includes removal of a 0.59 a patch of vegetation with a corn crop ground cover, five living paddock trees and five dead paddock trees. Removal of vegetation is confined to areas which are already highly fragmented and amongst cropped paddocks.

Other impact to native vegetation cover and assemblage is not expected to reduce the vegetation integrity score. No trees will be removed in the manure utilisation areas.

Further, large areas of established forested vegetation is found surrounding the proposal area.

Potential impact to this species is small, and unlikely to increase the rate of decline for this species and as such, the author does not consider this proposal to be an SAII for this species.

7.7.3 Eastern Cave Bat

The Eastern Cave Bat is nominated under Principle 4. Principle 4 – species or ecological community that is unlikely to respond to management and is therefore irreplaceable

The consideration of whether an entity is unlikely to respond to management encompasses two key elements.
The first is based on the best current ecological knowledge of the life history traits and characteristics of a species. There are some threatened species that are known to display particular life history traits that severely limit the species' ability to increase in abundance.
The second element considers whether there are any key threatening processes affecting the species or ecological community that cannot be effectively managed.

Species or ecological community that cannot be offset because the entity is unlikely to respond to management
These are species or ecological communities with:

1. life history traits and/or ecology which is known, but the ability to control key threats at the site-scale is negligible. In general, these are species significantly threatened by uncontrollable disease (e.g. frogs highly threatened by chytrid fungus)

2. known reproductive characteristics that severely limit their ability to increase the existing population on, or occupy new habitat at, a stewardship site. In general, these are plants that are sterile or largely clonal with no or very limited capacity to increase in number through seed production and recruitment.

Irreplaceable
The consideration of whether an impact on an entity irreplaceable takes into account two factors. The first factor is the likely success in achieving gain in condition, abundance or habitat area. For potential species that are identified in criteria 1 and 2 above, the likelihood of achieving an offset gain is extremely low or highly uncertain.

The second factor takes into account consideration of impacts on habitat components that cannot readily be re-created. In general, these are impacts on essential habitat such as caves or cliff lines that are used by threatened species.

The Eastern Cave Bat was detected by the remote sensing bat monitoring equipment used for this assessment. This species is a cave-roosting species. While features such as rocky outcrops, cliffs or rocky overhangs are present in the vicinity of the proposal, the proposal will not disturb any of these features. The proposal will remove paddock trees which may constitute a link in the food web for this species. Forested areas and other small patches of treed vegetation exist in close proximity to the proposal which will continue to support the food web for this species. Further, the cropped land may also support food resources for this species.

It is recommended that the Eastern Cave Bat does not constitute an SAII in this case.

7.8 Impact summary

This section summarises all anticipated impacts requiring assessment under the BAM and other impacts not covered in BAM (refer **Table 7-10**). A summary of proposed mitigation is also included to demonstrate how impacts intend to be mitigated, with further details on mitigation provided in **Chapter 8**.

Table 7-3: Summary of impacts and proposed mitigation

Impact	Biodiversity values	Nature of impact Direct / indirect	Extent of impact Site based / local / regional / state / national	Duration Short or long term / pre, during or post construction	Relevant key threatening process	Proposed mitigation (refer detail in Chapter 8)	Requires offset?
Removal of native vegetation	Removal of 22 trees, 13 of which have at least one hollow.	Direct	Site based	Long term	• Loss of hollow-bearing trees (BC Act) • Clearing of native vegetation (BC Act) • Removal of dead wood and dead trees (BC Act)	• Retain in other areas around facility.	Yes, as paddock trees and 0.59ha of PCT510.
Removal of threatened fauna species habitat and habitat features	Hollow bearing trees and dead standing trees: • Microbats • Woodland birds	Direct	Site based	Long term	• Clearing of native vegetation (BC Act) • Land clearance (EPBC Act) • Loss of hollow-bearing trees (BC Act) • Removal of dead wood and dead trees (BC Act)	• No significant modification to landscaping is required for the remainder of the site. • Salvage and relocate trees hollows during removal	Yes, as paddock trees
Application of manure and effluent	Application rate will be maintained at a level such that biodiversity values will not be reduced.	Direct	Site based	Long term	• Loss of native vegetation	• Monitor native vegetation and maintain application rate and grazing management/ rest opportunity is also managed relative to manure application rates.	Yes – Future integrity scores have been adjusted to reflect the no loss in biodiversity. One credit is required.
Removal of threatened plants	None	N/A	N/A	N/A	• N/A	• N/A	No
Aquatic impacts	None	N/A	N/A	N/A	• N/A	• N/A	No
Groundwater dependent ecosystems	None	N/A	N/A	N/A	• N/A	• N/A	No
Changes to hydrology	None	N/A	N/A	N/A	• N/A	• N/A	No
Fragmentation of identified biodiversity links and habitat	Paddock trees within cropped paddocks will be removed.	Direct	Site based	Long term	• Clearing of native vegetation (BC Act) • Removal of dead wood and dead trees (BC Act)	• N/A	Yes, as paddock trees

Impact	Biodiversity values	Nature of impact Direct / indirect	Extent of impact Site based / local / regional / state / national	Duration Short or long term / pre, during or post construction	Relevant key threatening process	Proposed mitigation (refer detail in Chapter 8)	Requires offset?
corridors							
Edge effects on adjacent native vegetation and habitat	Plant Community Types	Indirect	Local	Short term	N/A	• Tree removal will not increase edge effects.	No
Injury and mortality of fauna	Birds, bats frogs, reptiles that can use tree hollows	Direct / Indirect	Local	Short term / pre, during or post construction	N/A	• Pre-clearing and clearing process to minimise impacts to fauna	No
Invasion and spread of weeds	Disturbed soils	Indirect	Site	Short term / pre, during or post construction	• Invasion of native plant communities by exotic perennial grasses (BC Act)	• Weed control ongoing as part of farm standard operation.	No
Invasion and spread of pests	PCTs and native fauna	Indirect	Site	Long term	• Competition and grazing by the feral European rabbit (Oryctolagus cuniculus) (BC Act) • Predation and hybridisation of feral dogs (Canis lupus familiaris) (BC Act) • Predation by the European red fox (Vulpes vulpes) (BC Act) • Predation by the feral cat (Felis catus) (BC Act) • Predation by Plague Minnow or Mosquito Fish (Gambusia holbrooki) (BC Act) • Predation, habitat • degradation, competition and disease transmission by feral pigs (Sus scrofa) (BC Act)	• Pest control during operation already implemented • Vegetation monitoring program	No
Invasion and spread of pathogens and disease	None	N/A	N/A	N/A	• N/A	• N/A	No

Impact	Biodiversity values	Nature of impact Direct / indirect	Extent of impact Site based / local / regional / state / national	Duration Short or long term / pre, during or post construction	Relevant key threatening process	Proposed mitigation (refer detail in Chapter 8)	Requires offset?
Noise, light and vibration	PCTs and native fauna	Direct/ indirect	Site	Short term / during spreading of manure from farm machinery	• N/A	• Operation during daylight hours only	No

8 Mitigation measures

Mitigation measures are required to further avoid and minimise impacts to biodiversity. These measures have been designed to address the potential negligible impacts identified in Chapter 7 being:

- Loss of vegetation and habitat for threatened species.
- Potential fauna mortality during construction.
- Edge effects and weed invasion.

A list of recommended mitigation measures is summarised in **Table 8-1**. These are designed to provide guidance on recommended measures to further avoid and mitigate impact to biodiversity.

Table 8-1: Recommended mitigation measures

Item	Timing	Recommended mitigation measures
Site personnel induction	Pre-construction	Ensure all construction staff working on the proposal are inducted on: • Site environmental procedures (i.e. vegetation management, sediment and erosion control, protective fencing, noxious weeds, hygiene protocols, ethical procedures for handling fauna displaced on the site). • What to do in case of environmental emergency (chemical spills, fire, injured fauna). • Key contacts in case of environmental emergency.
Site planning	Pre-construction	• Locate temporary infrastructure (set down areas, access tracks etc.) in cleared areas away from vegetation to minimise vegetation removal and indirect effects.
Identification of clearing limits	Pre-construction	• Accurately and clearly mark out the limits of clearing (where appropriate) and the vegetation to be retained outside of the construction footprint and / or used for post landscaping. • Regular inspections should be undertaken to ensure all retained vegetation/fauna habitat is clearly marked and that fencing is in place, where appropriate. • Only clear each stage of the proposal as required so that vegetation will be retained in the buffer area until future stages commence.
Protection of fauna during clearing of vegetation	Pre-construction and during clearing works	• Avoid clearing native vegetation in Spring. • Salvage and relocate tree hollows from trees cleared as part of the proposal. Salvaging and relocating hollows and large wooden debris can increase the biodiversity and habitat values. o Lengths of tree trunk or branches containing hollow, particularly large established hollows, should not be woodchipped and instead should be placed in an area of native vegetation outside the clearing area. o Depending on the equipment and budget available, tree trucks can be trimmed, transported and positioned in an alternate location. o The entire tree does not need to be relocated – just the section containing the hollow, and as much length as feasible. o Salvaged hollows can be placed on the ground or if equipment is available, longer tree trunk lengths can be rested against a tree so the salvaged hollow is off the ground. o Trees can be trimmed using large machinery or chainsaws. o Trees can be transported and positioned using trucks, excavators and cranes as available.
Management of erosion and sediment control	Pre-and during construction	• Provide sediment and erosion controls to manage exposed soil surfaces and stockpiles to prevent sediment discharge into waterways, vegetation and fauna habitat. • Clearly identify stockpile and storage locations and provide erosion and sediment controls around stockpiles.

Item	Timing	Recommended mitigation measures
Wetland areas including gilgais	Pre-and during construction	• Minimise the area of disturbance in and near drainage lines, gilgai or dams, clearly mark out work zones in these areas, where appropriate. • Ensure all work within proximity to aquatic habitats have adequate sediment and erosion control. • Do not infill or remove gilgai
Weed management	Pre-and during construction	• Ensure that any machinery arriving on site be inspected for any foreign soil or plant matter/weed material and be washed down before entering the site. • Weeds should be controlled within the work area according to the requirements of the *Biosecurity Act 2016* • Any noxious weeds which are identified as part of the proposal must be disposed of appropriately.
Impacts from introduction and spread of pathogen and diseases	Operation	• As parrots are attracted to the feedlot to consume spilt grain, control and spread of a disease is needed. Develop a process where effective detection and management (Legal culling) of parrot's effected by psittacine circoviral (beak and feather) disease occurs. A Permit from NSW OEH will be required as part of this plan.
Revegetation and landscaping	Operation	• Minor landscaping around drains, embankments and ponds may be required. Where this occurs, all species planted for any purpose should be consistent with those Plant Community Types described in this report.
Loss of hollow bearing trees	Pre-and during construction	• The pre-clearing work is recommended to salvage and relocate tree hollows affected by the proposal. This process will also address other threatened species mitigation requirements for listed microbats.
Monitor and review	All stages	• A review of mitigation measures (including a checklist) should be developed to ensure that all measures proposed have been undertaken. • Review of the impact of this proposal to the native vegetation would be useful to justify continuation of the activity, and to inform future applications of this nature.

9 Biodiversity offsets

9.1 BAMCC offsetting requirement

As the proposal seeks approval under Part 4 of the NSW EPA Act the need for offsetting has been considered.

The BAMCC has been used to determine the offsetting requirements for the proposal. BAMCC outputs area provided in Appendix B.

The BAMCC has been used in four components:

- Full BAM assessment
  - Zone 1 – No trees to be removed
  - Zone 2 – No PCTs to be removed (three dead paddock trees only)
  - Zone 4 – 0.59 hectares of PCT to be removed (#3 in the BAMCC output)
- Streamlined assessment for removal of paddock trees (remnants of PCT510)
  - Zone 3 – Living paddock trees (five) to be removed (and two dead trees)

Removal of the dead paddock trees in Zone 2 and Zone 3 has been considered in the assessment for candidate species.

Based on the comparison provided in section 9.1.1, the maximum scores were entered into the BAMCC for future vegetation integrity score for zones 1 and 2 where there will be no vegetation removal and virtually no net loss anticipated from the proposal.

A future vegetation integrity score of zero has been used for Zone 3 where PCT510 will be removed.

Table 9-1: Current vegetation integrity scores

Zone	BAM item number	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score
1	1	86.99	10.5	54.2	15	20.4
2	2	95.75	5	5.7	15	7.5
4	3	0.59	10.3	0.6	38.2	6.1

Table 9-2:Future vegetation integrity score

Zone	BAM item number	Area (ha)	Composition condition score	Structure condition score	Function condition score	Vegetation integrity (VI) score	Change in VI score	Total Change in VI score
1	1	86.99	10.5	54.3	15	20.5	0	0
2	2	95.76	5	5.7	15	7.5	0	0
4	3	0.59	0	0	0	0	-6.1	-6.1

Offset requirements are summarised in Table 9-3 and Table 9-4.

Table 9-3: Ecosystem credit summary from BAMCC

Zone	BAM item number	Matter requiring offsetting	Number of credits
1	1	Blakely's Red Gum – Yellow Box grassy woodland of the New England Tableland Bioregion	1
2	2	Blakely's Red Gum – Yellow Box grassy woodland of the New England Tableland Bioregion	0
4	3	Blakely's Red Gum – Yellow Box grassy woodland of the New England Tableland Bioregion	0
		Total	1

Table 9-4: Species credit summary from BAMCC

Scientific name	Common name	Number of credits
Anthochaera phrygia	Regent Honeyeater (Breeding)	1
Calyptorhynchus lathami	Glossy Black-Cockatoo (Breeding)	3
Dichanthium setosum	Bluegrass	TBC
Haliaeetus leucogaster	White-bellied Sea-Eagle (Breeding)	3
Hieraaetus morphnoides	Little Eagle (Breeding)	2
Hoplocephalus bitorquatus	Pale-headed Snake	3
Lophoictinia isura	Square-tailed Kite (Breeding)	2
Phascolarctos cinereus	Koala (Breeding)	1
Vespadelus troughtoni	Eastern Cave Bat	4
	Total	19 (plus TBC)

Table 9-5: Paddock tree credit summary from BAMCC

Number of trees	Species	DBHOB category	Contains hollows	Tree class	Number of credits
1	*Eucalyptus caliginosa*	>=20 and <50	Yes	2	1
2	*Eucalyptus melliodora*	>=20 and <50	Yes	2	2
1	*Eucalyptus melliodora*	>50	Yes	3	1
1	*Eucalyptus bridgesiana*	>50	Yes	3	1
				Total	5

9.1.1 Justification for high mean future scores for manure application areas

In the case of Zone 1 and Zone 2, the BAMCC was adjusted to reflect the expected change to the vegetation as a result of the proposal. Given there will be no clearing occurring in the manure utilisation areas, and there is an expectation a similar number of native species will persist in a fertilised environment, a high future vegetation integrity score has been generated.

A comparison between Plot 6 and Plot 7 (in the proposed manure utilisation area – Four Mile) and Plot 8 and Plot 9 (in adjacent paddock and having previously be fertilised with inorganic fertiliser) was conducted using the BAM calculator (Table 9-6). The paddock containing plots 8 and 9 had not been grazed for approximately six months prior to the assessment and Four Mile contained cattle at the time of the assessment.

Table 9-6: Comparison between proposed manure utilisation area and previously fertilised adjacent paddock.

Plots	Paddock	Composition condition score	Structure condition score	Function condition score	Current vegetation integrity score
6 and 7	Four Mile Manure utilisation area	16.7	53.2	15	23.7
8 and 9	Paddock adjacent to Four Mile	30.7	56.5	30	37.4

A comparison of the BAM assessment parameters is provided in Table 9-7.Note that the assessment focused on open areas where the manure application can occur unimpeded by trees, as such the tree count is low. Scattered trees did occur through the area and more forested areas occur around the manure utilisation areas. Bold numbers in Table 9-7 indicate where a paddock has achieved a more desirable score than the other. From this analysis, it is apparent the adjacent paddock, which has been previously fertilised with inorganic fertiliser, has better native vegetation and not native vegetation parameter scores. Given the adjacent paddock has not been grazed by cattle for approximately six months, the higher values may, at least in part, reflect this. Importantly, despite the use of inorganic fertiliser on this paddock, native species are able to persist to similar or better levels. Effective grazing management which enables native vegetation to periodically recover is recommended to maintain native vegetation.

Table 9-7: BAM assessment parameter comparison

	Four Mile **Plots 6 and 7**	Adjacent paddock **Plots 8 and 9**	PCT510 Benchmark
Native species			
Average native species count **Trees**	0	0	4
Average native species count **Shrubs**	0	**0.5**	6
Average native species count **Grasses etc**	**4**	3.5	10
Average native species count **Forbs**	4	**7.5**	15
Average native species count **Ferns**	0	0	1
Average native species count **Other**	0	0	3
Number of native species only in this paddock	3	**10**	
Number of native species in at least one plot from each paddock	9		
Average native species cover (percent) **Trees**	0	0	47
Average native species cover (percent) **Shrubs**	0	**0.05**	6
Average native species cover (percent) **Grasses**	56.05	**85.25**	82
Average native species cover (percent) **Forbs**	**7.05**	3.5	13
Average native species cover (percent) **Ferns**	0	0	0
Average native species cover (percent) **Other**	0	0	1
Not native species			
Average not native species count	9	**7**	
Number of not native species only in this paddock	6	**3**	
Number of not native species in both paddocks	7		
Average not native species cover (percent)	31.5	**11.05**	
Average high Threat Weed cover (percent)	12.5	**6**	
Other			
Average leaf litter cover (percent)	**49.5**	41.5	30

9.2 Biodiversity Stewardship Site

No Biodiversity Stewardship Site has been identified to supply the required credits for this proposal

10 Conclusions and recommendations

10.1 Conclusions

The Biodiversity Assessment Report (BDAR) has been prepared to meet the requirements of the Biodiversity Assessment Method (OEH 2017) and the *NSW Biodiversity Conservation Act 2017.* This has involved an assessment of the landscape values on the site and surrounding assessment area, the vegetation communities present and their condition relative to benchmark scores, and the known or potential presence of threatened flora or fauna species.

The proposal area was selected to avoid impacts to remnant vegetation as much as possible. Despite this, the proposal would result in some loss of remnant vegetation and impacts are described in the BDAR along with measures to further avoid and mitigate potential impacts to biodiversity.

The proposal area is generally within grassed, grazed or cropped land with some remnant trees.

The native vegetation was mapped as PCT510 in all areas of native vegetation. Manure utilisation areas do not require vegetation removal and the effluent utilisation areas require removal of a 0.59 hectare patch of PCT510 and the removal of five living and five dead remnant paddock trees.

Impact to native vegetation communities mapped as PCT510 requires offsetting of one ecosystem credit.

Removal of the five living paddock trees requires offsetting with five ecosystem credits.

PCT510 is an example of the Endangered Ecological Community -White Box Yellow Box Blakely's Red Gum Woodland. The BAMCC highlighted this community as a potential Serious and Irreversible Impact (SAII). This report asserts given the size and type of impact proposed, it is not an SAII in this case.

Nine threatened species were determined to have habitat within the proposal area and have a potential to be present in the proposal area. A species credit requirement has been generated for these species totalling 19 (plus that for one species which is to be confirmed by OEH).

Two threatened species were identified by the BAMCC as potential SAII species. These are the Regent Honeyeater and the Eastern Cave Bat. This report asserts given the size and type of impact proposed it is not an SAII for these species.

10.2 Recommendations

In summary, the following recommendations are made regarding the proposal:

- Implement mitigation measures recommended on Table 8-1.
- Salvage tree hollows, as discussed in Table 8-1. It is recommended any salvaged timber with hollows are placed in vegetated areas around the feedlot. For example, the patch of vegetation to the south of Old 2 – Effluent utilisation area.
- Impact of the proposal in manure utilisation areas will not remove native vegetation. It is anticipated however that there will be some change in the vegetation assemblage as native ground cover which is more tolerant to changes in nutrient levels will thrive in preference to those that are more sensitive.

As this is an uncertain impact it is recommended to implement vegetation, especially ground cover, monitoring to strategically map the vegetation change as a result of this proposal as part of an adaptive management strategy.

- Monitoring will be conducted to alert the proponent if the proposal is altering the vegetation in the manure utilisation areas such that there is a risk it will cease to represent the Threatened Ecological Community or the PCT.
- It is recommended this monitoring occurs every two years for six years (three monitoring events) and then evidence based thereafter.

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Appendix A: **BAM FIELDWORK DATA SHEETS**

BAM (2017) Sheets

BAM Plot – Field Survey Form

Site Sheet no:

		Survey Name	Plot Identifier	Recorders	
Date	05 02 19	Rangers Valley	1	Phil Cameron, Addy Watson	
Zone 56	Datum	IBRA region		Photo #	Zone ID: 1
Easting 3[illegible]	Northing 67[illegible]	Plot Dimensions		Orientation of midline from the 0 m point	310
Likely Vegetation Class					Confidence: H M L
Plant Community Type	PCT 510			EEC:	Confidence: H M L

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	3
	Forbs	1
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	75.1
	Forbs	0.2
	Ferns	0
	Other	0
High Threat Weed cover %		10

BAM Attribute (20 x 50 m plot) dbh	Euc*	Non Euc	Hollows†
80 + cm	–	–	0
50 – 79 cm	–	–	
30 – 49 cm	–	–	Hollows 20cm+
20 – 29 cm	–	–	0
10 – 19 cm	–	–	
5 – 9 cm	–	–	
< 5 cm	–	–	This size class records tree regeneration
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		total 0

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	50, 40, 50, 30, 10	0, 0, 0, 1, 1	0, 0, 0, 0, 0	0, 0, 0, 0, 0
Average of the 5 subplots	36 %			

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code
Clearing (inc. logging)	3	O
Cultivation (inc. pasture)	2	R
Soil erosion	1	R
Firewood / CWD removal	–	–
Grazing (identify native/stock)	2	R
Fire damage	–	–
Storm damage	–	–
Weediness	2	R
Other	–	–

Free Text Section for brief site description

Paddock is mostly not native. Boundary drawn c GPS using vehicle along native/not native boundary. Historically cleared, pasture improved, super phosphate, rotational ploughing 3-5yrs. Grasses have seed heads (mostly) Thick leaf litter (dead grass thatch)

Leaf Litter and end point GPS ID	Easting	Northing
5m		
15m		
25m		
35m		
45m		
End point		

Form version designed 15 September 2017 — Printed 19 March 2018

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date: 5 Feb 19	Rangers Valley	1	Phil Cameron, Nick Austin

BAM Code	GF Code	ID	Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers.		N, E or HTE	Cover	Abund	stratum	voucher	Height (m)
GG	g		Eragrostis crebra	Tall Cupgrass	N	70	1000	L	–	0.4
			Paspalum dilatatum	Paspalum	HTE	70	100	L	–	0.3
GG	g		Poa labillardieri.	Tussock Poa	N	5	20	L	–	0.4
			Plantago lanceolata	Ribwort	E	1	20	L	–	0.1
FG	f		Rumex brownii	slender dock	N	0.2	10	L	–	0.2
—			Cirsium capillare	Small Thistle	E	0.1	20	L	–	0.1
GG	v		Juncus flexuosus		N	0.1	20	L	–	0.2

	n	abund
GG	3	75.1
FG	1	0.2

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. **N:** native, **E:** exotic, **HTE:** high threat exotic.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ... 100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ... 1000, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.

Form version designed 15 September 2017 Printed 19 March 2018

BAM Plot – Field Survey Form				Site Sheet no:	
		Survey Name	Plot Identifier	Recorders	
Date	05 02 19	Rangers Valley	2	P Cameron, A Watson	
Zone 56	Datum	IBRA region	Photo #		Zone ID
Easting 375065	Northing 6731829	Plot Dimensions		Orientation of midline from the 0 m point	10
Likely Vegetation Class					Confidence H M L
Plant Community Type	PCT 510			EEC:	Confidence H M L

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	3
	Forbs	1
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	90.1
	Forbs	0.1
	Ferns	0
	Other	0
High Threat Weed cover %		0.2

BAM Attribute (20 x 50 m plot) dbh	Stem Classes and Hollows: Euc*	Non Euc	Hollows¹
80 + cm	0	0	0
50 – 79 cm	0	0	
30 – 49 cm	0	0	Hollows 20cm+
20 – 29 cm	0	0	0
10 – 19 cm	0	0	
5 – 9 cm	0	0	
< 5 cm	0	0	This size class records tree regeneration
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		total 0

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	35, 55, 55, 70, 50	0, 0, 0, 0, 0	0, 0, 0, 0, 0	0, 0, 0, 0, 0
Average of the 5 subplots	53%	0	0	0

Plot Disturbance	Severity code	Age code
Clearing (inc. logging)	3	0
Cultivation (inc. pasture)	2	0
Soil erosion	0	0
Firewood / CWD removal	0	0
Grazing (identify native/stock)	2	0 (S)
Fire damage	–	–
Storm damage	–	–
Weediness	–	–
Other	–	–

Free Text Section for brief site description

Paddock historically cleared of mid + upper stratum, not ploughed. Pasture improved. Super phosphate applied historically. Very dense Tussock Poa + leaf litter (thatch).

Leaf Litter and end point GPS: ID	Easting	Northing
5m		
15m		
25m		
35m		
45m		
End point	375086	6731272

Form version designed 15 September 2017   28.4 °C   Printed 19 March 2018

46% humidity   wind 6-7 km/hr

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date: 5 Feb 2019	Rangers Valley	2	Paul Cameron / A. Wilson

BAM Code	GF Code	ID	Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers.	N, E or HTE	Cover	Abund.	stratum	voucher	Height (m)
EG	9		Poa labillardieri — Tussock Poa	N	70	1000	L		0.5
EG	9		Poa sieberiana var. hirtella — Grass Poa	N	20	200	L		0.2
			Persicaria decipiens	E	5	50	L		0.3
FG	8		Rumex brownii — Slender Dock	N	0.1	20	L		0.3
EG	9		Echinopogon ovatus — Tall Cup Grass	N	0.3	20	L		0.3
			Cirsium vulgare — Spear Thistle	E	0.1	10	L		0.2
			Persicaria dichotoma	HTE	0.2	5	L		0.2
			Conyza bonariensis — Tall Fleabane	E	0.1	1	L		0.4

V	n	t
EG	3	90.1
FG	1	0.1

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. N: native, E: exotic, HTE: high threat exotic.

Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ... 10, 15, 20, 25, ... 100% (foliage cover); *Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ... 10, 20, 30, ... 100, 200, ... 1000, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.

Form version designed 15 September 2017 — Printed 19 March 2018

BAM Plot – Field Survey Form

Site Sheet no:

Survey Name	Plot Identifier	Recorders
Rangers Valley	3	A.J Cameron, H.D, W.H, [illegible]

Date	Zone	Datum	IBRA region	Photo #	Zone ID
5 Feb 19	56				

Easting	Northing	Plot Dimensions	Orientation of midline from the 0 m point
373268	6731916		10

		Confidence
Likely Vegetation Class		H M L
Plant Community Type	NON NATIVE	EEC: Confidence H M L

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	5
	Forbs	1
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	20
	Forbs	02
	Ferns	0
	Other	0
High Threat Weed cover %		2-2

BAM Attribute (20 x 50 m plot) dbh	Stem Classes and Hollows Euc*	Non Euc	Hollows†
80 + cm	0	0	0
50 – 79 cm	0	0	
30 – 49 cm	0	0	Hollows 20cm+
20 – 29 cm	0	0	0
10 – 19 cm	0	0	
5 – 9 cm	—	—	
< 5 cm	—	—	This size class records tree regeneration
Length of logs (m) (≥10 cm diameter, ≥50 cm in length)	0		total 0

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	15	50	65	65	55	5	25	10	20	5	0	0	0	0	0	0	0	0	0	50
Average of the 5 subplots	62%																			

Plot Disturbance	Severity code	Age code
Clearing (inc. logging)	3	0
Cultivation (inc. pasture)	3	0
Soil erosion	1	0
Firewood / CWD removal	—	—
Grazing (identify native/exotic)	2	R
Fire damage	—	—
Storm damage	—	—
Weeds/rubbish	—	—
Other	—	—

Free Text Section for brief site description

Historically cleared + ploughed
Pasture improved. Location of
Plot selected to be representative
ie some areas are better +
some for worse.

Leaf Litter and end point GPS

ID	Easting	Northing
5m		
15m		
25m		
35m		
45m		
End point	373261	6731961

Form version designed 15 September 2017

28.8°C
27.4% humidity
wind 19.5km/h

Printed 19 March 2018

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date: 5 Feb 19	Rangers Valley	3	Phil Catherine Addie Nathan

BAM Code	GF Code	ID	Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers		N, E or HTE	Cover	Abund	strata m	voucher	Height (m)
66	g		Eriochloa crebra	Tall Cupgrass	N	5	60	L		0.45
GG	g		Dra labillardieri	Tussock Poa	N	10	150	L		0.4
			Paspalum dilatatum	Paspalum	HTE	2	20	L		0.5
			Bromus hordeaceus	Soft Brome	E	2	40	L		0.7
			Phalaris aquatica	Phalaris	E	2	30	L		0.5
GG	g		Poa sieberiana var.	Snow Grass	N	3	50	L		0.3
			Digitaria sanguinalis	Summer Grass	E	5	60	L		0.1
GG	g		Dactyloctenium radulans	Button Grass	N	1	20	L		0.1
			Polygonum aviculare	Wireweed	E	1	20	L		0.1
			Conyza bonariensis	Tall Fleabane	E	1	20	L		0.3
			Xanthium spinosum	Bathurst Burr	HTE	0.2	8	L		0.2
			Phalaris Grass	Bromus catharticus	E	5	100	L		0.2
			Modiola caroliniana	Red flowered Mallow	E	2	15	L		0.1
GG	v		Juncus spp	flavidus	N	1	15	L		0.3
			Cirsus capillaris	Smooth Hawksbeard	E	0.2	10	L		0.2
			Petrorhagia dubia	Proliferous pink	E	0.2	15	L		0.1
			Cirsium vulgare	Black Spear Thistle	E	0.2	10	L		0.1
FG	f		Portulaca oleracea	Pigweed	N	0.1	10	L		0.1

Native cover : 17.3
Exotic cover : 23.6
40.9

(17.3 ÷ 40.9) x 100 = 42.3% native

	S	L
GG	5	20
FG	1	0.3

GG NOT A PCT

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. **N:** native, **E:** exotic, **HTE:** high threat exotic.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ..., 100% (foliage cover). ***Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*
Abundance: 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.

Form version designed 15 September 2017 Printed 19 March 2018

BAM Plot – Field Survey Form

Site Sheet no:

		Survey Name	Plot Identifier	Recorders	
Date	06/02/19	Rangers Valley	4	Phil Cameron / Matthew Lindsay	
Zone 56	Datum	IBRA region	Photo #		Zone ID
Easting 374036	Northing 6731902	Plot Dimensions		Orientation of midline from the 0 m point	
Likely Vegetation Class					Confidence: H M L
Plant Community Type		NOT NATIVE		EEC:	Confidence: H M L

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	Ø
	Shrubs	Ø
	Grasses etc.	4
	Forbs	1
	Ferns	Ø
	Other	Ø
Sum of Cover of native vascular plants by growth form group	Trees	Ø
	Shrubs	Ø
	Grasses etc.	17.1
	Forbs	5
	Ferns	Ø
	Other	Ø
High Threat Weed cover %		50.1

BAM Attribute (20 x 50 m plot) dbh	Stem Classes and Hollows: Euc*	Non Euc	Hollows†
80 + cm	Ø	Ø	Ø
50 – 79 cm	Ø	0	
30 – 49 cm	0	Ø	Hollows 20cm+
20 – 29 cm	0	0	Ø
10 – 19 cm	—	—	
5 – 9 cm	—	—	
< 5 cm	—	—	This size class records tree regeneration
Length of logs (m) (≥10 cm diameter, >50 cm in length)	Ø		total Ø

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	60, 25, 75, 70, 65	5, 55, 10, 10, 10	0, 0, 0, 0, 0	0, 0, 0, 0, 0
Average of the 5 subplots	59%	18	0	0

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code
Clearing (inc. logging)	3	0
Cultivation (inc. pasture)	3	0
Soil erosion	1	0
Firewood / CWD removal	—	—
Grazing (identify native/stock)	2	R
Fire damage	—	—
Storm damage	—	—
Weediness	—	—
Other	—	—

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe. Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Free Text Section for brief site description

Plot selected to demonstrate / prove the area mapped as not is not native vegetation. Initially thought to be native but plot data elsewhere showed otherwise. This plot randomly selected and will be used as evidence for mapping.

Leaf Litter and end point GPS: ID	Easting	Northing
5m		
15m		
25m		
35m		
45m		
End point	374030	6731755

Form version designed 15 September 2017 — Wind: 11.2km/h, 32°C temp, 62.5% humidity — Printed 19 March 2018

400 m² plot: Sheet _ of	Survey Name	Plot Identifier	Recorders
Date 06/02/19	Rangers Valley	Plot 4	Phil Cameron / Alex Watson

BAM Code	GF Code	ID	Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers	N, E or HTE	Cover	Abund	stratum	voucher	Height (m)
CG	g		Eragrostis curvula Tall Cup Grass	N	10	60	1		0.8
CG	g		Poa labillardieri Tussock Poa	N	5	15	1		0.3
			Cirsium vulgare Black Spear Grass	E	1	10	1		0.1
			Paspalum dilatatum Paspalum	HTE	50	21000	1		0.1
			Medicago sp	E	1	10	1		0.1
CG	g		Poa sieberiana	N	2	40	1		0.2
			Petrorhagia dubia Prolifera pink	E	0.1	20	1		0.2
			Bromus hordeaceus Soft Brome	E	5	100	1		0.2
CG			Lomandra sp	N	0.1	1	1		0.1
			Xanthium spinosum Bathurst Burr	HTE	0.1	20	1		0.7
			Cynodon nlemfuensis Premium Grass	E	5	200	1		0.1
FG	F		Melia azedarach Australian Hill Flock	N	1	10	1		0.1
			Digitaria sanguinalis Summer Grass	E	5	90	1		0.1
			Phalaris aquatica Phalaris Grass	E	10	250	1		0.1
			Modiola rotundifolia Round-leaf Mallow	E	1	5	1		0.1
			Plantago coronopus Plaw Grass	E	5	200	1		0.2
			Crepis capillaris Smooth Hawksbeard	E	1	10	1		0.1

Native cover: 19.1
Exotic cover: 83.2
101.3

19.1 ÷ 101.3 x 100 = 17.86% native cover
& 82% exotic

N 350 Grasses of SB
N 3/4 Grasses of NEW.

CG	4	17.1
FG	1	5

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. N: native, E: exotic, HTE: high threat exotic.
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ... 10, 15, 20, 25, ... 100% (foliage cover). *Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across. 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*
Abundance: 1, 2, 3, ... 10, 20, 30, ... 100, 200, ... 1000, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.

Form version designed 15 September 2017 Printed 19 March 2018

BAM Plot – Field Survey Form

Site Sheet no:

Survey Name	Plot Identifier	Recorders
Rangers Valley	5	Phil Lambert, Addy Watson

Date: 6 2 19	Zone: 56	Datum:	IBRA region:	Photo #:	Zone ID:
Easting: 323360	Northing: 6731788	Plot Dimensions:		Orientation of midline from the 0 m point:	350°

Likely Vegetation Class			Confidence: H M L
Plant Community Type	PCT 510	EEC: Y	Confidence: H M L

Record starting and marking from the plot marker if applicable, orient pole so that northward (0) points along direction of midline. Dimensions (Shapes of 0.04 ha (plot radius 11.3 m) FA plot would be identified, magenta) leaving taken along midline.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	—
	Shrubs	—
	Grasses etc.	5
	Forbs	0
	Ferns	—
	Other	—
Sum of Cover of native vascular plants by growth form group	Trees	—
	Shrubs	—
	Grasses etc.	64.2
	Forbs	0
	Ferns	—
	Other	—
High Threat Weed cover %		20

BAM Attribute (20 x 50 m plot) dbh	Euc*	Non Euc	Stem Classes and Hollows Hollows†
80 + cm	0	0	0
50 – 79 cm	0	0	
30 – 49 cm	0	0	Hollows 20cm+
20 – 29 cm	0	0	0
10 – 19 cm	—	—	
5 – 9 cm	—	—	
< 5 cm	—	—	This size class records tree regeneration
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		total 0

Record living woody* (EuC) and living native non-eucalypt (Non Euc) stems separately.

Data needed to provide only (plus) unless a single tree for that only class.

* Includes all species of Eucalyptus, Corymbia, Angophora, Lophostemon and Syncarpia.

† For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where that is multi-stemmed. This hollow bearing stem may be a dead stem.

Each site count is noted as present by the living tree stems only. Depending on the Vegetation Class, other values and counts may be needed for a size class. For a multi-stemmed tree only the largest living stem is included in the count/measure. If it is measured by the large tree category for that vegetation class.

Hollows at least 10cm across are recorded for the purposes of habitat of some threatened species.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	75 85 60 70 70	5 5 10 0 0	0 0 0 0 0	5 10 0 5 0
Average of the 5 subplots	72%	4%	0	

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on either side and 1 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, sticks, twigs, branchlets and branches less than 10 cm in diameter. Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional. The data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT descriptions.

Physiography + site features that may help in determining PCT and Management Zone (optional):

Morphological Type		Landform Element		Landform Pattern	Microrelief
Lithology		Soil Surface Texture		Soil Colour	Soil Depth
Slope		Aspect		Site Drainage	Distance to nearest water and type

Prior Disturbance	Severity code	Age code
Clearing (inc. logging)	3	0
Cultivation (inc. pasture)	3	R
Soil erosion	1	NR
Firewood / CWD removal	-	-
Grazing intensity native/exotic	2	R
Fire damage	—	—
Storm damage	—	—
Weeds	—	—
Other	—	—

Severity: 3=high, 2=moderate, 1=severe. Age: R=recent (5-10yrs), I=intermediate (10-20yrs), O=old (>20yrs).

Free Text Section for brief site description

Poplar cleared, ploughed, pasture improved + superphosphate added. This plot selected as an example of high quality native grassland that can survive under previous disturbance. This area is dominated by Tall Eucalyptus but most other similar areas have Tussock Poa.

Leaf Litter end point GPS

ID	Easting	Northing
5m		
15m		
25m		
35m		
45m		
End point		

Form version designed 15 September 2017

Printed 19 March 2018

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 06/02/19	Rangers Valley	5	PLJ Cameron / Holly Walker

BAM Code	GF Code	ID	Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers.	N, E or HTE	Cover	Abund	strata m	voucher	Height (m)
GG	g		Eragrostis eriopoda Tall Cupgrass	N	65	>1000	c		0.4
			Paspalum plicatulum Paspalum	HTE	20	400	c		0.1
GG	g		Poa labillardieri Tussock Poa	N	2	15	c		0.4
GG	g		Poa sieberiana Snow Grass	N	1	15	c		0.1
GG	g		Dichelachne rudis/gns Bottlen Grass	N	0.1	10	c		0.1
			Briza subaristata Soft Brome	E	1	100	c		0.7
GG	g		Juncus flavidus	N	0.1	1	c		0.2
			Cirsium vulgare Black Spear Thistle	E	0.1	5	c		0.7
			Conyza bonariensis Tall Fleabane	E	0.1	5	c		0.2
			Crepis capillaris Smooth Hawks Beard	E	0.1	10	c		0.2

n	%
GG 5	68.2
Not native	21.3
	89.5 % cover

(68.2 ÷ 89.5) x 100 = 76.2 %

i.e. Native community / PCT

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. N: native, E: exotic, HTE: high threat exotic.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover). *Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.

Form version designed 15 September 2017 Printed 19 March 2018

BAM Plot – Field Survey Form						Site Sheet no:
		Survey Name	Plot Identifier		Recorders	
Date	07 02 19	Rangers Valley	6		M. Cameron Addy Watson	
Zone 56	Datum	IBRA region		Photo #		Zone ID
Easting 376621	Northing 6729596	Plot Dimensions		Orientation of midline from the 0 m point	0° N	
Likely Vegetation Class						Confidence H M L
Plant Community Type	PCT 510			EEC:		Confidence H M L

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	4
	Forbs	3
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	55
	Forbs	7
	Ferns	0
	Other	0
High Threat Weed cover %		10

BAM Attribute (20 x 50 m plot) dbh	Euc*	Non Euc	Hollows†
80 + cm	0	0	0
50 – 79 cm	0	0	
30 – 49 cm	0	0	Hollows 20cm+
20 – 29 cm	0	0	0
10 – 19 cm	—	—	
5 – 9 cm	—	—	
< 5 cm	—	—	This size class records tree regeneration
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		total 0

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	70 55 55 25 60	20 10 5 35 10	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	53%	16%	—	—

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code
Clearing (inc. logging)	3	0
Cultivation (inc. pasture)	3	NR
Soil erosion	1	NR
Firewood / CWD removal	—	—
Grazing (identify native/stock)	1	R
Fire damage	—	—
Storm damage	—	—
Weediness	—	—
Other	—	—

Free Text Section for brief site description

Polygon cleared, ploughed + super phosphate added in rotation. Possibly pasture improved but at a glance seems less likely than other areas assessed. Plot randomly selected as representative of broader Polygon.

Leaf Litter and end point GPS ID	Easting	Northing
5m		
15m		
25m		
35m		
45m		
End point	376628	6729633

Form version designed 15 September 2017 Printed 19 March 2018

400 m² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	07/02/18	Rangers Valley	6	[illegible] / [illegible]

BAM Code	GF Code	ID	Full species name mandatory or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers.	N, E or HTE	Cover	Abund	stratum	vouc her	Heig ht (m)
GG	g		Eriochloa crebra Tall Cupgrass	N	15	500	[illegible]		[illegible]
TG	T		Rumex brownii Slender Dock	N	2	20	[illegible]		[illegible]
			Conyza bonariensis Tall Fleabane	E	0.1	10	[illegible]		[illegible]
GG	g		Poa sieberiana var. sieberiana Snow Grass	N	15	170	[illegible]		[illegible]
GG	g		Poa labillardierei Tussock Poa	N	15	50	[illegible]		[illegible]
			Plantago varia Variable Plantain	N	0.2	70	[illegible]		[illegible]
—			Bromus hordeaceus Soft Brome	E	4	100	[illegible]		[illegible]
—			Phalaris aquatica Phalaris	E	5	50	[illegible]		[illegible]
			Cynodon dactylon Bermuda Grass	E	10	50	[illegible]		[illegible]
GG	g		Juncus flavidus	N	10	150	[illegible]		[illegible]
—			Trifolium sp. Clover	E	5	50	[illegible]		[illegible]
—			Lepidium bonariense Pepperweed	E	2	20	[illegible]		[illegible]
—			Modiola caroliniana Red Flowered Mallow	E	2	15	[illegible]		[illegible]
FG	c		Dysphania melanocarpa Black Crumbweed	N	5	200	[illegible]		[illegible]
—			Paspalum dilatatum Paspalum	HTE	10	80	[illegible]		[illegible]

Native ground cover = 62.1
exotic ground cover = 37.2
99.3

(62 ÷ 99.3) × 100 = 62.1

= PCT ✓

	n	%
GG	4	55
FG	2	7

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. **N:** native, **E:** exotic, **HTE:** high threat exotic.
Cover: 0.1, 0.2, 0.3, …, 1, 2, 3, …, 10, 15, 20, 25, …100% (foliage cover). **Note:** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*
Abundance: 1, 2, 3, …, 10, 20, 30, …, 100, 200, …, 1000, …

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.
Form version designed 15 September 2017 Printed 19 March 2018

BAM Plot – Field Survey Form

Site Sheet no:

Survey Name	Plot Identifier	Recorders
Rangers Valley	7	Phil CAMERON, Addy WATSON

Date: 07 02 19	Zone: 56	Datum	IBRA region	Photo #	Zone ID
Easting: 377404	Northing: 6729267	Plot Dimensions		Orientation of midline from the 0 m point:	180° (S)
Likely Vegetation Class					Confidence: H M L
Plant Community Type	PCT 510			EEC:	Confidence: H M L

Record easting and northing from the plot marker. If accurate, wind picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha (also circle 0.1 ha / 1/4 part around an identified, magnetic bearing taken along midline)

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	4
	Forbs	6
	Ferns	
	Other	
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	57.1
	Forbs	7.1
	Ferns	0
	Other	0
High Threat Weed cover %		15

BAM Attribute (20 x 50 m plot) dbh	Stem Classes and Hollows Euc*	Non Euc	Hollows†
80 + cm	0	0	0
50 – 79 cm	0	0	
30 – 49 cm	0	0	Hollows 20cm+
20 – 29 cm	0	0	0
10 – 19 cm	–	–	
5 – 9 cm	–	–	
< 5 cm	–	–	This size class records tree regeneration
Length of logs (m) (≥10 cm diameter, >50 cm in length)	1.6		total 1.6

Record living eucalypt (Euc*) and living native non-eucalypt (Non Euc) stems separately.
Data recorded as presence only (tick) unless a 'large tree' for that veg class.
* includes all species of Eucalyptus, Corymbia, Angophora, Lophostemon and Syncarpia.
† For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

Each size class is based on stems by the living tree stems only. Depending on the Vegetation Class, other values and counts may be recorded for a size class. For a multi-stemmed tree, only the largest living stem is included in the count. Hollows are recorded by the large tree category for that vegetation class.
Hollows at least 20cm across are recorded for the purposes of habitat or some vegetation classes.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	50 50 45 40 45	5 20 5 40 5	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	46%	11%	–	–

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midpoint at the locations 5, 15, 25, 35 and 45 m along the midline. Litter cover includes leaves, twigs, bark, branches (less than 10 cm in diameter) within these 1 m x 1 m plots (assessors may also record the cover of rock, bare ground and cryptogam and moss). Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future regional / reporting assessment attributes and benchmarks, and for enhancing PCT descriptions.

Physiography + soil features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Microrelief	
Lithology		Site Surface Texture		Soil Depth	
Slope		Aspect		Site Drainage	Distance to nearest water and type

Plot Disturbance	Severity code	Age code
Clearing (inc. logging)	3	0
Cultivation (inc. pasture)	2	NR
Soil erosion	1	NR
Firewood / CWD removal	–	–
Grazing (density, intensity)	1	R
Fire damage	–	–
Storm damage	–	–
Weediness	–	–
Other	–	–

Severity: 1=slight, 2=moderate, 3=severe. Age: R=recent (<10yrs), NR=not recent (>10yrs), O=old (>50yrs)

Free Text Section for brief site description

Cleared, Pastured, Superphosphate added, possibly pasture improved (Relatively in many few years) More Poa tussock than other ones – some polygon associated. Representative of this mid of the polygon.

Leaf Litter and end point GPS

ID	Easting	Northing
0m		
15m		
25m		
35m		
45m		
End point	377194	6729151

Form version designed 15 September 2017 — Printed 19 March 2018

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date: 7/02/19	Rangers Valley	7	Phil Cameron, Maddy Watson

BAM Code	GF Code	ID	Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers.	N, E or HTE	Cover	Abund	stratum	voucher	Height (m)
GG	g		Poa sieberiana var. sieberiana Snow Grass	N	35				
GG	g		Poa labillardierei Tussock Poa	N	20				
—			Cirsium vulgare Black Spear Thistle	E	2				
—			Paspalum dilatatum Paspalum	HTE	15				
—			Crepis capillaris Smooth Hawksbeard	E	1				
FG	f		Plantago varia Variable Plantain	N	1				
FG	f		Oxalis chnoodes Oxalis	N	1				
—			Medicago sp	E	0.5				
—			Lepidium bonariense Pepperweed	E	0.5				
—			Petrorhagia dubia Hairy Pink	E	0.5				
—			Sisymbrium sp (mustard weed)	E	0.1				
GG	g		Lomandra filiformis multiflora Lomandra	N	0.1				
FG	f		Alternanthera denticulata Lesser Joyweed	N	0.1				
—			Conyza bonariensis Tall Fleabane	E	0.1				
—			Bromus hordeaceus Soft Brome	E	5				
GG	g		Juncus flavidus	N	1				
—			Salvia verbenaca Wild Sage	E	1				
FG	f		Portulaca oleracea Pigweed	N	2				
FG	f		Dysphania melanocarpa Black Crumbweed	N	2				
FG	f		Einadia nutans subsp. nutans Climbing Saltbush	N	1				

	%
Native cover	64.2
exotic cover	25.7
Total	89.9

(64.2 ÷ 89.9) ×100 = 71.4 %

PCT (1)

	n	%
GG	4	57.1
FG	6	7.1

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. **N:** native, **E:** exotic, **HTE:** high threat exotic.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.

Form version designed 15 September 2017 Printed 19 March 2018

BAM Plot – Field Survey Form	Site Sheet no:

		Survey Name	Plot Identifier	Recorders	
Date	7/02/19	Rangers Valley	Plot 8 (control)	Paul Cameron / Ashley Watson	
Zone	Datum	IBRA region		Photo #	Zone ID
Easting 377375	Northing 6729267	Plot Dimensions		Orientation of midline from the 0 m point	180° (S)
Likely Vegetation Class					Confidence H M L
Plant Community Type	PCT 510			EEC:	Confidence H M L

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	6
	Shrubs	1
	Grasses etc.	3
	Forbs	8
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0.1
	Grasses etc.	80.4
	Forbs	1.3
	Ferns	0
	Other	0
High Threat Weed cover %		10

BAM Attribute (20 x 50 m plot) dbh	Stem Classes and Hollows Euc*	Non Euc	Hollows†
80 + cm	0	0	0
50 – 79 cm	0	0	
30 – 49 cm	0	0	Hollows 20cm+
20 – 29 cm	0	0	0
10 – 19 cm	–	–	
5 – 9 cm	–	–	
< 5 cm	✓	–	This size class records tree regeneration
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		total 0

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	30	45	70	45	55	0	5	1	0	0	0	0	0	0	0	0	0	1	1	0
Average of the 5 subplots	49%					1.2					0					0.4				

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code
Clearing (inc. logging)	3	O
Cultivation (inc. pasture)	2	R
Soil erosion	–	–
Firewood / CWD removal	–	–
Grazing (identify native/stock)	1	NR
Fire damage	–	–
Storm damage	–	–
Weediness	–	–
Other	–	–

Free Text Section for brief site description

This polygon is an existing manure application area. Plot randomly placed in polygon to measure effect of manure to biodiversity.

Leaf Litter and end point GPS ID	Easting	Northing
5m		
15m		
25m		
35m		
45m		
End point	377371	6729215

Form version designed 15 September 2017 Printed 19 March 2018

400 m² plot: Sheet _ of _ | Survey Name | Plot Identifier | Recorders

Date 7/02/19 | Rangers Valley | Plot 8 Control | [illegible]

BAM Code	GF Code	ID	Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers	N, E or HTE	Cover	Abund	stratum	voucher	Height (m)
[illegible]	g		Poa Sieberiana var. [illegible] Grass Cane	N	50	500	L		0.3
—	2		Paspalum dilatatum Paspalum	HTE	10	100	L		0.1
—	—		Cirsium vulgare Black Espear Thistle	E	0.1	50	L		0.4
—	—		Crepis capillaris Smooth Hawksbeard	E	0.1	50	L		0.1
—	—		Conyza bonariensis Tall Fleabane	E	0.1	20	L		0.2
FG	f		Parthenica olevacea Prickfoot	N	0.1	20	L		0.1
—	—		Lepidium bonariense Shepherds Purse	E	0.1	50	L		0.2
FG	f		Plantago varia Variable plantain	N	0.2	50	L		0.2
FG	f		Lomandra [illegible]	N	0.2	10	L		0.3
FG	f		Calotis scabiosifolia Rough Burr-daisy	N	0.1	10	L		0.1
FG	f		Juncus flavidus	N	0.2	50	L		0.2
FG	f		Rumex brownii Slender Dock	N	0.2	20	L		0.2
FG	f		Euphorbia [illegible] Caustic Weed	N	0.1	50	L		0.1
FG	f		Malva preissiana Australian hollyhock	N	0.2	20	L		0.1
—	—		Setaria pumila Yellow Pigeon Grass	E	0.2	10	L		0.2
FG	f		Oxalis chnoodes Oxalis	N	0.2	50	L		0.1
FG	f		Dysphania [illegible] Black Crumbweed	N	0.2	50	L		0.1
SG	s		Aristida [illegible]	N	0.1	1	M		0.1
—	—		Rumex hulletensis Soft Brome	E	1	10	L		0.1

	%
Native cover	91.4
Exotic cover	11.6
Total	112.0

(91.4 ÷ 112) × 100 = 81.6%

PCT 1

	n	I_n
FG	3	93.4
FG	8	1.3
SG	1	0.1

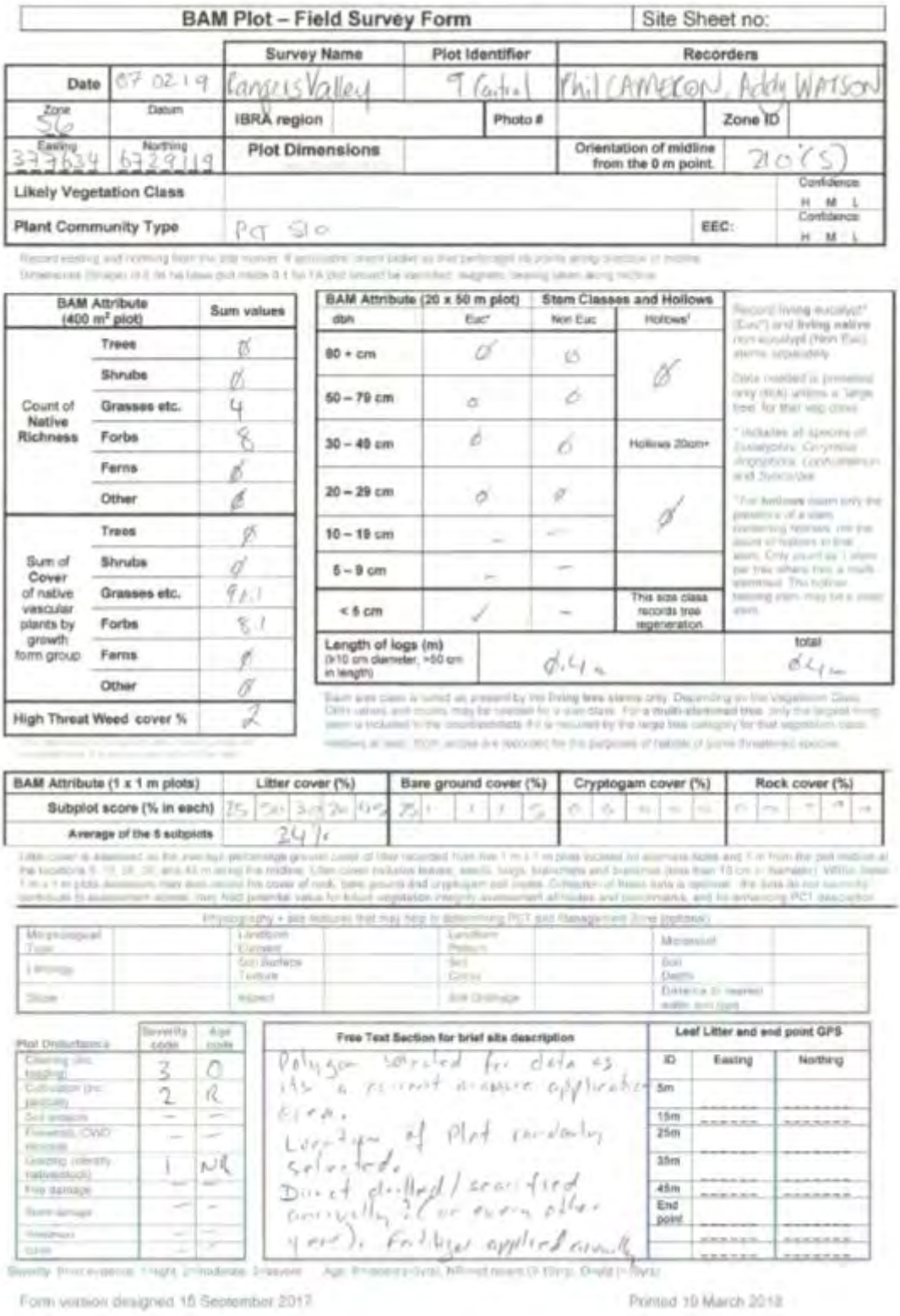
GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. **N:** native, **E:** exotic, **HTE:** high threat exotic.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover). ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.

Form version designed 15 September 2017 Printed 10 March 2018



BAM Plot – Field Survey Form | Site Sheet no:

Survey Name	Plot Identifier	Recorders
Rangers Valley	9 Central	Phil CAMERON, Addy WATSON

Date: 07 02 19		IBRA region:	Photo #:	Zone ID:	
Zone: 56	Datum:				
Easting: 377634	Northing: 6729119	Plot Dimensions:		Orientation of midline from the 0 m point:	210°(S)

		Confidence
Likely Vegetation Class		H M L
Plant Community Type: PCT 510	EEC:	Confidence: H M L

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	4
	Forbs	8
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	9.1
	Forbs	8.1
	Ferns	0
	Other	0
High Threat Weed cover %		2

BAM Attribute (20 x 50 m plot) dbh	Stem Classes and Hollows: Euc*	Non Euc	Hollows†
80 + cm	0	0	0
50 – 79 cm	0	0	
30 – 49 cm	0	0	Hollows 20cm+
20 – 29 cm	0	0	0
10 – 19 cm	–	–	
5 – 9 cm	–	–	
< 5 cm	✓	–	This size class records tree regeneration
Length of logs (m) (>10 cm diameter, >50 cm in length)	0.4 m		total 0.4 m

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	25, 20, 30, 20, 15	30, 1, 1, 1, 5	0, 0, 0, 0, 0	0, 0, 0, 0, 0
Average of the 5 subplots	24 %			

Plot Disturbance	Severity code	Age code
Clearing (inc. logging)	3	0
Cultivation (inc. pasture)	2	R
Soil erosion	–	–
Fire/wild, CWD removal	–	–
Grazing (identify native/stock)	1	NR
Fire damage		
Storm damage	–	–
Weediness	–	–
Other	–	–

Free Text Section for brief site description: Polygon selected for data as it is a remnant adjacent cultivated area. Location of plot randomly selected. Direct drilled / scarified annually 2 or even other year). Fertiliser applied annually

Leaf Litter end point GPS		
ID	Easting	Northing
5m		
15m		
25m		
35m		
45m		
End point		

Form version designed 15 September 2017 — Printed 19 March 2018

400 m² plot: Sheet _ of _		Survey Name	Plot Identifier	Recorders
Date	7/02/18	Rangers Valley	9 Control	Md Cameron / D.W. Watson

BAM Code	GF Code	ID	Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers.	N, E or HTE	Cover	Abund	stratum	vouc her	Height (m)
GG	g		Poa labillardierei Tussock Poa	N	10	20	L		0.4
GG	g		Poa sieberiana v sieberiana Snowgrass	N	75	500	L		0.3
GG	v		Juncus flavidus	N	5	50	L		0.3
—			Cirsium vulgare Black Spear thistle	E	2	30	L		0.3
—			Paspalum dilatatum Paspalum	HTE	2	20	L		0.1
FG	f		Dysphania melanocarpa Black Crumbweed	N	2	20	L		0.1
—			Crepis capillaris Smooth Hawksbeard	E	1	50	L		0.2
—			Plantago lanceolata Ribwort	E	1	50	L		0.2
FG	f		Plantago varia Variable Plantain	N	1	50	L		0.1
FG	f		Tricoryne elatior Yellow Rush-lily	N	0.1	5	L		0.1
FG	f		Dysphania melanocarpa Black Crumbweed	E	2	20	L		0.1
—			Bromus hordeaceus Soft Brome	E	1	75	L		0.2
GG	v		Juncus sp 2	N	0.1	30	L		0.1
~~GG v~~			~~Juncus flavidus~~ (Double)	[illegible]	—	—			
FG	f		Daucus glochidiatus Native carrot	N	1	15	L		0.2
—			Medicago sp	E	1	30	L		0.1
FG	f		Alternanthera denticulata Lesser Joyweed	N	0.5	10	L		0.1
—			Polygonum aviculare Wireweed	E	0.5	20	L		0.1
FG	f		Hypericum gramineum St Johns Wort	N	1	10	L		0.2
FG	f		Petrorhagia sp (glabra?)	N	0.1	5	L		0.2

Native cover 98.1
exotic cover 10.5
108.6

(98.1 ÷ 108.6) × 100 = 90.3

PCT ✓

	#	%
GC	4	98.1
FC	8	8.1

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. **N:** native, **E:** exotic, **HTE:** high threat exotic.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.
Form version designed 18 September 2017 Printed 19 March 2018

BAM Plot – Field Survey Form

Site Sheet no:

		Survey Name	Plot Identifier	Recorders
Date	7/02/19	Rangers Valley	Plot 10	Neil Cameron + Abby Watson
Zone 56	Datum	IBRA region	Photo #	Zone ID
Easting 377952	Northing 6730263	Plot Dimensions		Orientation of midline from the 0 m point: 230°

Likely Vegetation Class			Confidence H M L
Plant Community Type	Not native	EEC:	Confidence H M L

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	2
	Forbs	3
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	0.2
	Forbs	20.1
	Ferns	0
	Other	0
High Threat Weed cover %		0

BAM Attribute (20 x 50 m plot) Stem Classes and Hollows: dbh	Euc*	Non Euc	Hollows†
80 + cm	0	0	0
50 – 79 cm	0	0	
30 – 49 cm	0	0	Hollows 20cm+
20 – 29 cm	0	0	0
10 – 19 cm	–	–	
5 – 9 cm	–	–	
< 5 cm	–	–	This size class records tree regeneration
Length of logs (m) (≥10 cm diameter, >50 cm in length)	1.1		total 1.1

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	10	40 30	20	35		50	40	50	50	35	0	0	0	0	0	1	2	2	1	15
Average of the 5 subplots	27																			

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Plot Disturbance	Severity code	Age code
Clearing (inc. logging)	3	O
Cultivation (inc. pasture)	3	R
Soil erosion	1	NR
Firewood / CWD removal	–	–
Grazing (identify native/stock)	1	NR
Fire damage	–	–
Storm damage	–	–
Weediness	–	–
Other	–	–

Free Text Section for brief site description

This polygon was ID'd during reconnaissance as not native. The plot collects data to prove this. Fertilizer from bam applied to this paddock. Ploughed etc.

Leaf Litter and end point GPS: ID	Easting	Northing
5m		
15m		
25m		
35m		
45m		
End point	377915	6730238

Form version designed 15 September 2017 Printed 19 March 2018

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 7/2/19	Rangers Valley	10	Phil Christian

BAM Code	GF Code	ID	Full species name mandatory, or a unique means of identifying separate taxa within a survey. Data from here will be used to assign growth form counts and covers.	N, E or HTE	Cover	Abund	strata m	vouc her	Height m
			Digitaria eriantha Common Couch	E	70	500	L		0.1
FG	1		Dysphyma malacocephala Buck cranesbill	N	10	100	L		0.2
			Modiola caroliniana Red-weed	E	2	100	L		0.2
FG	1		Portulaca oleracea Pigweed	N	10	200	L		0.1
			Flaveria trinervia Clustered Flaveria	E	10	200	L		0.1
			Bidens pilosa Hairy Beggars	E	5	50	L		0.2
FG	1		Einadia nutans Climbing Saltbush	N	01	1	L		0.7
GG	2		Poa labillardieri Tussock Poa	N	01	2	L		0.1
GG	2		Poa sieberiana x sieberiana Snow Grass	N	01	5	L		0.1
			Lolium perenne Perennial Ryegrass	E	01	5	L		0.2
			Bromus hordaceus Soft Brome	E	01	5	L		0.2
			Cynodon dactylon* Bermuda Grass	E	1	15	L		0.2

* N 850 Grasses of NSW
H 36 Grasses of NSW

native cover = 20.3%
exotic cover = 88.2%
108.5%

(20.3% / 108.5) x 100 = 18.7%

NOT A PCT

	n	%
GG	2	8.2
FG	3	20.1

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. **N:** native, **E:** exotic, **HTE:** high threat exotic.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*
Abundance: 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.

Form version designed 15 September 2017 Printed 19 March 2019

BAM Plot – Field Survey Form

Site Sheet no:

Survey Name	Plot Identifier	Recorders
Rangers Valley	11	[illegible]

Date	7/2/19	Zone 56	Datum	IBRA region	Photo #	Zone ID
Easting	Northing	Plot Dimensions	20 x 20 m 20 x 50	Orientation of midline from the 0 m point	265° Magnetic °
Likely Vegetation Class					Confidence: H M L
Plant Community Type	Not Native			EEC:	Confidence: H M L

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	1
	Forbs	3
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	0.1
	Forbs	0.2
	Ferns	0
	Other	0
High Threat Weed cover %		0

BAM Attribute (20 x 50 m plot)	Stem Classes and Hollows		
dbh	Euc*	Non Euc	Hollows†
80 + cm	0	0	0
60 – 79 cm	0	0	
30 – 49 cm	0	0	Hollows 20cm+
20 – 29 cm	0	0	0
10 – 19 cm	—	—	
5 – 9 cm	—	—	
< 5 cm	—	—	Tick size class records tree regeneration
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		total 0

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	2	5	1	1	1	30	50	25	30	30	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots	2.0																			

Plot Disturbance	Severity code	Age code
Clearing (inc. logging)	3	O
Cultivation (inc. pasture)	2	R
Soil erosion	–	–
Firewood / CWD removal	–	–
Grazing (identify native/stock)	1	NR
Fire damage	–	–
Storm damage	–	–

Severity: 0=no evidence, 1=slight, 2=moderate, 3=severe

Free Text Section for brief site description

Polygon cleared and ploughed historically. Pasture improved + fertilizer spread. Location of plot randomly selected to be representative of wider area.

Leaf Litter and end point GPS

ID	Easting	Northing
5m		
15m		
25m		
35m		
45m		
End point		

Age: R=recent (<3yrs), NR=mid recent (3-10yrs), O=old (>10yrs)

Form version designed 15 September 2017 Updated 24 March 2018

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 7/2/19	Rangers Valley	11	[illegible]

1	—		Digitaria eriantha	Common Couch	E	90	>1000	L		0.1
2	RA	9	Poa labillardieri var. labillardieri	Common Tussock-grass	N	0.1	4	L		0.2
3	FG	7	Plantago varia	Variable Plantain	N	0.1	20	L		0.2
4	FG	8	Paspalum dilatatum	Paspalum	N	0.1	20	L		0.1
5	—		Eleusine tristachya	Goose Grass	E	2	40	L		0.1
6	—		Setaria pumila	Pitted Bristle-grass	E	2	10	L		0.2
7	—		Hypochaeris radicata	Flatweed	E	0.1	10	L		0.2
8	—		Lolium perenne	Perennial Ryegrass	E	0.1	10	L		0.2
9	FG	6	Hydrocotyle bonariensis	Australian Pennywort	N	0.1	1	L		0.1
10	—		Cynodon nlemfuensis	Bermuda Grass	E	0.1	15	L		0.1
11	—		Bromus catharticus	Prairie Grass	E	0.1	15	L		0.1
12	—		Eleusine indica	Crowsfoot Grass	E	0.1	10	L		0.1
13										
14										
15										
16			native cover: 0.4							
17			exotic cover: 94.9							
18			95.3							
19										
20										
21			(0.4 ÷ 95.3) ×100 = 0.4%							
22			∴ Not native							
23										
24				n	%					
25			RA	1	0.1					
26			FG	3	0.3					
27										
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
40										

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. **N:** native, **E:** exotic, **HTE:** high threat exotic.
Cover: 0.1, 0.2, 0.3, ... 1, 2, 3, ... 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ... 1000, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.

Form version designed 15 September 2017 Printed 24 March 2018

BAM Plot – Field Survey Form

Site Sheet no:

Survey Name	Plot Identifier	Recorders
Rangers Valley	12	Phil Emerson / Attributation

Date	07/02/19	Zone	Datum	IBRA region		Photo #		Zone ID	
		56							
Easting	Northing	Plot Dimensions	20 x 20 m 20 x 50	Orientation of midline from the 0 m point.	Magnetic °				
379924	6731615								

Likely Vegetation Class		Confidence: H M L
Plant Community Type	NOT NATIVE	EEC: Confidence: H M L

BAM Attributs (400 m² plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	0
	Forbs	3
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	0
	Forbs	6.1
	Ferns	0
	Other	0
High Threat Weed cover %		0

BAM Attribute (20 x 50 m plot)	Stem Classes and Hollows		
dbh	Euc*	Non Euc	Hollows†
80 + cm	0	0	0
50 – 79 cm	0	0	
30 – 49 cm	1	0	Hollows 20cm+
20 – 29 cm	0	0	0
10 – 19 cm	—	—	
5 – 9 cm	—	—	
< 5 cm	—	—	This size class records tree regeneration
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		total 0

BAM Attributs (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	55	70	70	70	70	5	65	50	60	60	0	0	0	0	0	0	0.5	1	0	0
Average of the 5 subplots	27%																			

Plot Disturbance	Severity code	Age code
Clearing (inc. logging)	2	O
Cultivation (inc. pasture)	3	R
Soil erosion	—	—
Firewood / CWD removal	—	—
Grazing (identify native/stock)	1	NR
Fire damage	1	O
Storm damage	—	—

Severity: 0=no evidence, 1=slight, 2=moderate, 3=severe Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Free Text Section for brief site description

Paddock has retained mature trees but all understory removed, ploughed regularly, sown to improved pasture species, treated eucalyptus & Super phosphate. Plot represents understory/ground stratum

Leaf Litter and end point GPS

ID	Easting	Northing
5m		
15m		
25m		
35m		
45m		
End point	379942	6731650

Form version designed 15 September 2017 Printed 24 March 2018

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 7/2/19	Rangers Valley	12 Sagittaf	Phil Cameron / Holly Watson

1	—		Digitaria eriantha	Summer Grass	E	40	2000	L		0.1
2	—		Bromus hordeaceus	Soft Brome	E	20	500	L		0.2
3	—		Bothriochloa decipiens	Pitted Grass	E	20	500	L		0.3
4	FG	f	Portulaca oleracea	Pigweed	N	5	100	L		0.1
5	FG	f	Malva preissiana	Aust. Hollyhock	N	1	5	L		0.1
6	—		Eleusine tristachya	Goose Grass	E	1	5	L		0.1
7	FG	f	Enchylaena tomentosa		N	0.1	1	L		0.1
8	—		Echinochloa colonum	Awnless Barnyard	E	0.1	1	L		0.1
9										
10										
11			native cover = 6.1							
12			exotic cover = 80.7							
13			86.2							
14										
15										
16			(6.1 ÷ 86.2) x 100 = 7.1%							
17			NOT NATIVE							
18										
19										
20			~~Exotic~~ n	%						
21			FG = 3	6.1						
22										
23										
24										
25										
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
40										

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. **N:** native, **E:** exotic, **HTE:** high threat exotic.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover). *Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.

Form version designed 15 September 2017 Printed 24 March 2019

BAM Plot – Field Survey Form

Site Sheet no:

Survey Name	Plot Identifier	Recorders
Rangers Valley	13	[illegible]

Date	28/02/19	IBRA region		Photo #	Zone ID
Zone 56	Datum				
Easting 376634	Northing 6734461	Plot Dimensions	20 x 20 m 20 x 50	Orientation of midline from the 0 m point.	180° Magnetic °
Likely Vegetation Class					Confidence H M L
Plant Community Type				EEC:	Confidence H M L

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	2
	Shrubs	0
	Grasses etc.	5
	Forbs	3
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	58.3
	Forbs	1.3
	Ferns	0
	Other	0
High Threat Weed cover %		2

BAM Attribute (20 x 50 m plot) dbh	Euc*	Non Euc	Stem Classes and Hollows Hollows†
80 + cm	0	0	0
50 – 79 cm	1	0	
30 – 49 cm	0	0	Hollows 20cm+
20 – 29 cm	0	0	0
10 – 19 cm	—	—	
5 – 9 cm	—	—	
< 5 cm	—	—	This size class records tree regeneration
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		total 0

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	15	15	20	50	20	0	25	0	5	1						0	0	0	0	0
Average of the 5 subplots	24																			

Plot Disturbance	Severity code	Age code
Clearing (inc. logging)	3	O
Cultivation (inc. pasture)	3	O
Soil erosion	1	N/A
Firewood / CWD removal	—	—
Grazing (identify native/stock)	1	R
Fire damage	—	—
Storm damage	—	—

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe Age: R=recent (<3yrs), M=not recent (3-10yrs), O=old (>10yrs)

Free Text Section for brief site description

Leaf Litter end point GPS

ID	Easting	Northing
5m		
15m		
25m		
35m		
45m		
End point	376611	6734461

Form version designed 15 September 2017 Printed 28 March 2018

400 m² plot: Sheet _ of _

Date	Survey Name	Plot Identifier	Recorders
05/02/19	Rangers Valley	13	Phil Cameron Addy Watson

ID	BAM Code	GF Code	[illegible]	N, E or HTE	Cover	Abund	[illegible]	[illegible]	[illegible]
1	GG	2	Eriochloa crebra Tall Cup Grass	N	50	>1000	[illegible]		[illegible]
2	GG	2	Chloris truncata [illegible] Grass	N	1	50	[illegible]		[illegible]
3	—		Cynodon [illegible] [illegible] Grass	E	40	>1000	[illegible]		[illegible]
4	GG	3	Enteropogon acicularis [illegible]	N	2	50	[illegible]		[illegible]
5	—		Phalaris aquatica Phalaris	E	5	50	[illegible]		[illegible]
6	—		[illegible] Black Spear Grass	E	1	70	[illegible]		[illegible]
7	FG	1	Einadia nutans subsp.	N	0.1	2	[illegible]		[illegible]
8	—		Cichorium intybus Chicory	E	1	[illegible]	[illegible]		[illegible]
9	—		Lactuca serriola Prickly Lettuce	E	0.1	10	[illegible]		[illegible]
10	—		Paspalum dilatatum Paspalum	HTE	2	[illegible]	[illegible]		[illegible]
11	—		Lolium perenne Perennial Ryegrass	E	1	10	[illegible]		[illegible]
12	—		Polygonum aviculare Wireweed	E	3	[illegible]	[illegible]		[illegible]
13	—		Lepidium bonariense [illegible]	E	0.1	[illegible]	[illegible]		[illegible]
14	—		Bromus catharticus Prairie Grass	E	0.1	[illegible]	[illegible]		[illegible]
15	—		Plantago lanceolata Plantain	E	1	50	[illegible]		[illegible]
16	—		[illegible] Tall Fescue	E	0.1	[illegible]	[illegible]		[illegible]
17	GG	[illegible]	[illegible] Grass	N	0.2	20	[illegible]		[illegible]
18	SG	1	[illegible]	N	0.2	50	[illegible]		[illegible]
19	—		Bromus hordeaceus Soft Brome	E	1	50	[illegible]		[illegible]
20	—		[illegible]	E	0.1	50	[illegible]		[illegible]
21	GG	[illegible]	Rytidosperma (caespitosum) Wallaby Grass	N	0.1	2	[illegible]		[illegible]
22	FG	[illegible]	Galium murale Small bedstraw	E	0.1	[illegible]	[illegible]		[illegible]
23									
24			native cover = 59.5						
25			exotic cover = 55.6						
26			115.1						
27									
28			(59.5 ÷ 115.1) × 100 = 51%						
29									
30			∴ Native PCT						
31									
32			NOTE: The dominance reflects						
33			cover of crop grass &						
34			more disturbed site = Bermuda						
35			Grass.						
36			n / %						
37			GG / 5 / 58.3						
38			FG / 3 / 1.3						
39									
40									

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. **N:** native, **E:** exotic, **HTE:** high threat exotic.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across. 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.

Form version designed 15 September 2017 Printed 28 March 2018

BAM Plot – Field Survey Form	Site Sheet no:

		Survey Name	Plot Identifier	Recorders	
Date	08/02/19	Rangers Valley	Plot 14	Phil Cameron, Addy Watson	
Zone 56	Datum	IBRA region	Photo #		Zone ID
Easting 378386	Northing 6734128	Plot Dimensions	20 x 20 m 20 x 50	Orientation of midline from the 0 m point.	350° Magnetic°
Likely Vegetation Class					Confidence H M L
Plant Community Type	PCT 510		EEC:		Confidence H M L

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	3
	Forbs	3
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	85.5
	Forbs	0.8
	Ferns	0
	Other	0
High Threat Weed cover %		2

BAM Attribute (20 x 50 m plot) dbh	Stem Classes and Hollows Euc*	Non Euc	Hollows†
80 + cm	0	0	0
50 – 79 cm	0	0	
30 – 49 cm	0	0	Hollows 20cm+
20 – 29 cm	0	0	0
10 – 19 cm	–	–	
5 – 9 cm			
< 5 cm	–	–	This size class records tree regeneration
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0		total 0

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	70, 50, 50, 30, 50	5, 5, 5, 5, 2		–
Average of the 5 subplots	50%			

Plot Disturbance	Severity code	Age code
Clearing (inc. logging)	3	O
Cultivation (inc. pasture)	2	O/NR
Soil erosion	1	NR
Firewood / CWD removal	–	–
Grazing (identify native/stock)	1	R
Fire damage	–	–
Storm damage	–	–

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe. Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Free Text Section for brief site description

Polygon [illegible] [illegible], when it was selected ([illegible]) [illegible] / semi permanent [illegible]) [illegible] [illegible] PCT 510 84, [illegible] [illegible] [illegible] Snow Grass Tall [illegible] [illegible] dominance [illegible] this part of the Polygon.

Leaf Litter and end point GPS ID	Easting	Northing
5m		
15m		
25m		
35m		
45m		
End point	378379	6734170

Form version designed 15 September 2017 — Printed 25 March 2018

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 08/02/19	Rangers Valley	14	[illegible]

ID										
1	EG	g	Eriochloa crebra	Tall Cup Grass	N	20	200	L		0.4
2	EG	g	Poa sieberiana x labillardieri	Snow Grass	N	65	3100+	L		0.3
3	—		Polygonum aviculare	Wireweed	E	2	50	L		0.1
4	—		Plantago debilis	Plantain	HTE	7	20	L		0.2
5	—		Leptorhynchos squamatus	Scaly Buttons	E	1	7m	L		0.1
6	FG	f	Plantago varia	Variable Plantain	N	0.5	30	L		0.1
7	EG	g	Juncus flavidus		N	0.5	20	L		0.2
8	FG	f	Rumex brownii	Slender Dock	N	0.1	10	L		0.2
9	FG	f	Dichondra eleocharoides	Pig Weed	N	0.2	15	L		0.1
10	—		Medicago sativa	Lucerne/Alfalfa	E	0.1	5	L		0.1
11	—		Heterothecra sp. or Hubbardia sp.?		E	0.1	5	L		0.2
12	—		Tagetes erecta	Yellow Bindweed	E	0.1	5	L		0.2
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
40										

% native cover = 86.3
% exotic cover = 5.3
91.6

(86.3 ÷ 91.6) × 100 = 94.2 %

∴ PCT

	n	%
EG	3	85.5
FG	3	8.8

GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. N: native, E: exotic, HTE: high threat exotic.
Cover: 0.1, 0.2, 0.5, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.

BAM Plot – Field Survey Form	Site Sheet no:

		Survey Name	Plot Identifier	Recorders	
Date	05.02.19	Rangers Valley	15	Phil Cameron, Addy Watson	
Zone 56	Datum	IBRA region		Photo #	Zone ID
Easting 376390	Northing 6335410	Plot Dimensions	20 x 20 m 20 x 50	Orientation of midline from the 0 m point.	Magnetic °
Likely Vegetation Class					Confidence: H M L
Plant Community Type	PCT 510 (Yellow Box Derived [illegible])			EEC:	Confidence: H M L

[illegible]

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	Ø
	Grasses etc.	Ø
	Forbs	2
	Ferns	Ø
	Other	Ø
Sum of Cover of native vascular plants by growth form group	Trees	10
	Shrubs	Ø
	Grasses etc.	Ø
	Forbs	7
	Ferns	Ø
	Other	Ø
High Threat Weed cover %		Ø

BAM Attribute (20 x 50 m plot) dbh	Stem Classes and Hollows: Euc*	Non Euc	Hollows†
80 + cm	1,1 (2)	–	0
50 – 79 cm	–	–	
30 – 49 cm	–	–	Hollows 20cm+
20 – 29 cm	–	–	2
10 – 19 cm	–	–	
5 – 9 cm	–	–	
< 5 cm	–	–	This size class records tree regeneration
Length of logs (m) (≥10 cm diameter, >50 cm in length)	33		total 33

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	15, 45, 30, 45	30, 30, 30, 15	0, 0, 10, [illegible], [illegible]	[illegible]
Average of the 5 subplots				

Plot Disturbance	Severity code	Age code
Clearing (inc. logging)	3	O
Cultivation (inc pasture)	3	O
Soil erosion	2	O
Firewood / CWD removal	–	–
Grazing (identify native/stock)	2	R
Fire damage	–	–
Storm damage	–	–

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe   Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Free Text Section for brief site description

[illegible] trees and left on ground [illegible] were trying to [illegible] them. Just [illegible] Zone [illegible]. [illegible] mostly cleared at [illegible] residual large native trees left [illegible] that [illegible] (redo [illegible]). [illegible] > 3 residual trees [illegible] we have assessment this as a PCT.

Leaf Litter and end point GPS: ID	Easting	Northing
5m		
15m		
25m		
35m		
45m		
End point	376400	6735364

Form version designed 15 September 2017   Printed 28 March 2018

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 8/2/19	Rangers Valley	15 Stone Paddock	Phil Cameron / Ashley Watson

#	GF Code	Top 3	Full species name	N, E or HTE	Cover	Abund	[illegible]	[illegible]	[illegible]
1	TG	✓	Eucalyptus melliodora — Yellow Box	N	10	2	u	–	10
2	—		Whiteheaded [illegible]	E	5	100	l		0.3
3	TG	✓	[illegible] pressa — Australian [illegible]	N	2	50	l		0.2
4	FG	✓	Urtica — Tall Stinging Nettle	N	5	100	l		0.3
5	—		Sisymbrium officinale — Hedge Mustard	E	5	500	l		0.2
6	—		Bromus catharticus — Prairie Grass	E	5	100	l		0.2
7	—		Cynodon [illegible] — Bermuda Grass	E	5	100	l		0.1
8	—		Lolium perenne — Perennial Rye Grass	E	5	100	l		0.2
9	—		Bidens [illegible] — Cobblers Pegs	E	5	100	l		0.1
10	—		Chenopodium album — White Goosefoot	E	20	200	l		0.3
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									
40									

native ground cover : 7
exotic cover : 45
52

(7 ÷ 52) × 100 = 13.46%

∴ not native ground cover.

	n	%
TG	1	10
FG	2	7

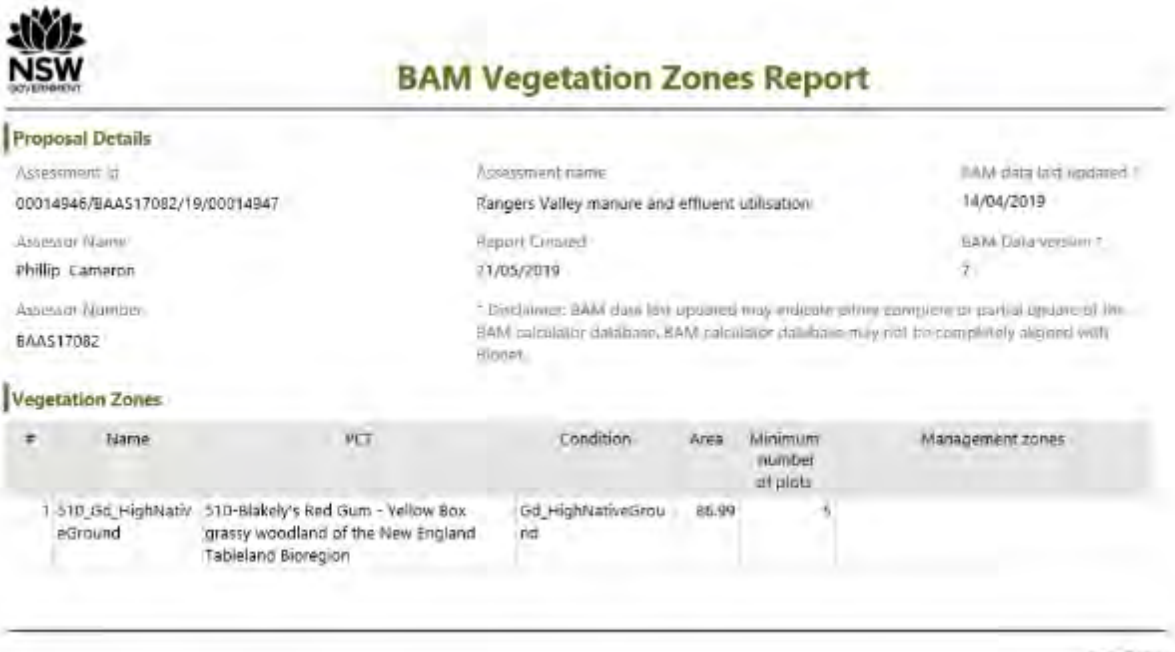
GF Code: see Growth Form definitions in BAM Appendix 1. Identify top 3 dominants in the veg zone. **N:** native, **E:** exotic, **HTE:** high threat exotic.
Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Print more copies of this sheet to allow for higher species counts at a plot. All species at a plot need to be recorded.

Form version designed 15 September 2017 Printed 28 March 2018

Appendix B: **BAMCC REPORTS**

PCT510 – BAM Outputs



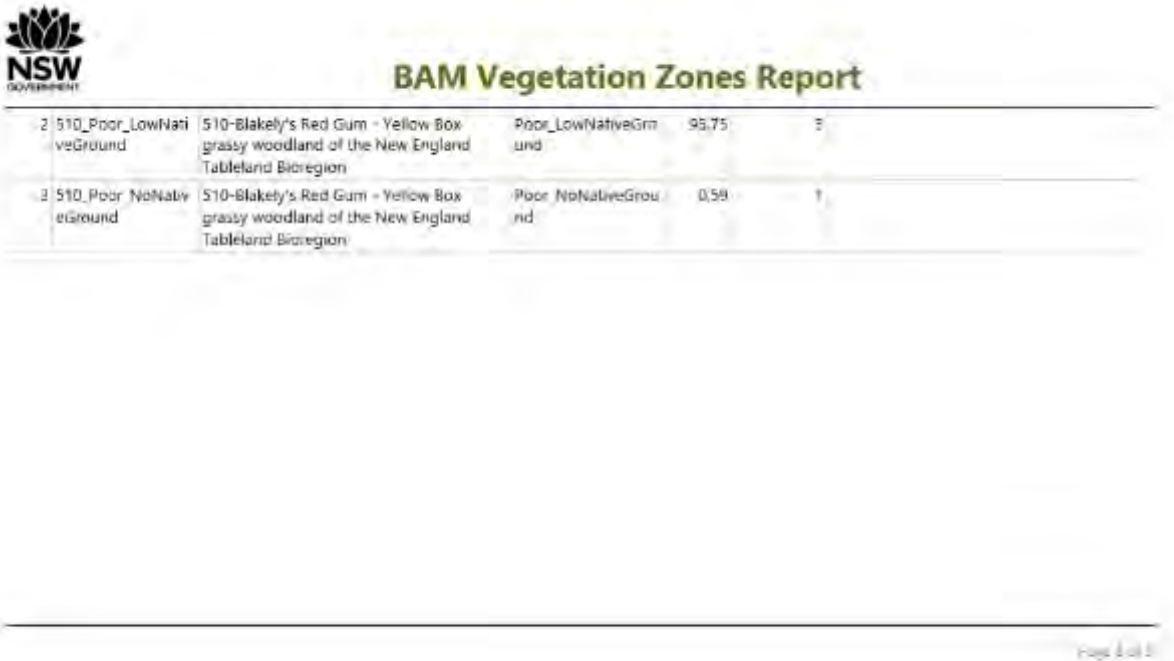
BAM Vegetation Zones Report

Proposal Details

Assessment Id	Assessment name	BAM data last updated *
00014946/BAAS17082/19/00014947	Rangers Valley manure and effluent utilisation	14/04/2019
Assessor Name	**Report Created**	**BAM Data version ***
Phillip Cameron	21/05/2019	7
Assessor Number	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
BAAS17082		

Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	510_Gd_HighNativeGround	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	Gd_HighNativeGround	86.99	5	



BAM Vegetation Zones Report

2	510_Poor_LowNativeGround	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	Poor_LowNativeGround	95.75	3	
3	510_Poor_NoNativeGround	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	Poor_NoNativeGround	0.59	1	

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00014946/BAAS17082/19/00014947	Rangers Valley manure and effluent utilisation	14/04/2019
Assessor Name	**Report Created**	**BAM Data version ***
Phillip Cameron	21/05/2019	7
Assessor Number	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
BAAS17082		

Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

Common Name	Scientific Name	Vegetation Types(s)
Barking Owl	Ninox connivens	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
Black-chinned Honeyeater (eastern subspecies)	Melithreptus gularis gularis	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
Diamond Firetail	Stagonopleura guttata	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
Eastern Bentwing-bat	Miniopterus schreibersii oceanensis	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
Eastern False Pipistrelle	Falsistrellus tasmaniensis	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
Flame Robin	Petroica phoenicea	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
Glossy Black-Cockatoo	Calyptorhynchus lathami	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
Grey-headed Flying-fox	Pteropus poliocephalus	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
Hooded Robin (south-eastern form)	Melanodryas cucullata cucullata	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
Koala	Phascolarctos cinereus	510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion

NSW

BAM Predicted Species Report

Little Eagle	Hieraaetus morphnoides	S10-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
Little Lorikeet	Glossopsitta pusilla	S10-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
Regent Honeyeater	Anthochaera phrygia	S10-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
Scarlet Robin	Petroica boodang	S10-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
Speckled Warbler	Chthonicola sagittata	S10-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
Spotted-tailed Quoll	Dasyurus maculatus	S10-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
Square-tailed Kite	Lophoictinia isura	S10-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
Swift Parrot	Lathamus discolor	S10-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
Turquoise Parrot	Neophema pulchella	S10-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
Varied Sittella	Daphoenositta chrysoptera	S10-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
White-bellied Sea-Eagle	Haliaeetus leucogaster	S10-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	S10-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion

BAM Candidate Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00014946/BAAS17082/19/00014947	Rangers Valley manure and effluent utilisation	14/04/2019
Assessor Name	**Report Created**	**BAM Data version ***
Phillip Cameron	21/05/2019	7
Assessor Number	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
BAAS17082		

List of Species Requiring Survey

Name	Presence	Survey Months
Calyptorhynchus lathami Glossy Black-Cockatoo	Yes (assumed present)	Mar Apr May Jun Jul Aug
Dichanthium setosum Bluegrass	Yes (assumed present)	Jan Feb Mar Apr May Dec
Hoplocephalus bitorquatus Pale-headed Snake	Yes (assumed present)	Jan Feb Mar Nov Dec
Lophoictinia isura Square-tailed Kite	Yes (assumed present)	Jan Sep Oct Nov Dec
Phascolarctos cinereus Koala	Yes (assumed present)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Anthochaera phrygia Regent Honeyeater	Yes (assumed present)	Sep Oct Nov Dec
Hieraaetus morphnoides Little Eagle	Yes (assumed present)	Aug Sep Oct

Page 1 of 3

BAM Candidate Species Report

Haliaeetus leucogaster White-bellied Sea-Eagle	Yes (assumed present)	Jul Aug Sep Oct Nov Dec
Vespadelus troughtoni Eastern Cave Bat	Yes (surveyed)	Jan Nov Dec

List of Species Not On Site

Name
Eucalyptus magnificata Northern Blue Box
Eucalyptus nicholii Narrow-leaved Black Peppermint
Diuris pedunculata Small Snake Orchid
Lathamus discolor Swift Parrot
Thesium australe Austral Toadflax
Miniopterus schreibersii oceanensis Eastern Bentwing-bat
Ninox connivens Barking Owl
Pteropus poliocephalus Grey-headed Flying-fox
Adelotus brevis - endangered population Tusked Frog population in the Nandewar and New England Tableland Bioregions

NSW GOVERNMENT

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00014946/BAAS17082/19/00014947	Rangers Valley manure and effluent utilisation	14/04/2019
Assessor Name	**Report Created**	**BAM Data version ***
Phillip Cameron	21/05/2019	7
Assessor Number	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Business...	
BAAS17082		

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Candidate SAII	Ecosystem credits
Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion								
1	510_Gd_HighNativeGround	0.0	87.0	0.25	High Sensitivity to Potential Gain	2.00	TRUE	1
2	510_Poor_LowNativeGround	0.0	95.8	0.25	High Sensitivity to Potential Gain	2.00	TRUE	0

NSW GOVERNMENT

BAM Credit Summary Report

3	510_Poor_NoNativeGround	6.1	0.6	0.25	High Sensitivity to Potential Gain	2.00	TRUE	0
							Subtotal	**1**
							Total	**1**

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Biodiversity risk weighting	Candidate SAII	Species credits
Anthochaera phrygia / Regent Honeyeater (Fauna)						
510_Gd_HighNativeGround	0.0	66.3	0.25	3	True	0
510_Poor_LowNativeGround	0.0	71.31	0.25	3	True	1
					Subtotal	**1**
Calyptorhynchus lathami / Glossy Black-Cockatoo (Fauna)						
510_Gd_HighNativeGround	0.0	66.3	0.25	2	N/A	0
510_Poor_LowNativeGround	0.0	79.88	0.25	2	N/A	1

NSW

BAM Credit Summary Report

510_Poor_NoNativeGround	6.1	0.59	0.25	3	N/A	3
					Subtotal	**3**
Dichanthium setosum / Bluegrass (Flora)						
510_Gd_HighNativeGround	0.0	66.93	0.25	2	False	0
					Subtotal	**0**
Haliaeetus leucogaster / White-bellied Sea-Eagle (Fauna)						
510_Gd_HighNativeGround	0.0	66.3	0.25	2	N/A	0
510_Poor_LowNativeGround	0.0	79.86	0.25	2	N/A	1
510_Poor_NoNativeGround	6.1	0.59	0.25	2	N/A	2
					Subtotal	**3**
Hieraaetus morphnoides / Little Eagle (Fauna)						
510_Gd_HighNativeGround	0.0	66.3	0.25	1.5	N/A	0

NSW

BAM Credit Summary Report

510_Poor_LowNativeGround	0.0	79.86	0.25	1.5	N/A	1
510_Poor_NoNativeGround	6.1	0.59	0.25	1.5	N/A	1
					Subtotal	**2**
Hoplocephalus bitorquatus / Pale-headed Snake (Fauna)						
510_Gd_HighNativeGround	0.0	66.3	0.25	2	False	0
510_Poor_LowNativeGround	0.0	79.86	0.25	2	False	1
510_Poor_NoNativeGround	6.1	0.59	0.25	2	False	2
					Subtotal	**3**
Lophoictinia isura / Square-tailed Kite (Fauna)						
510_Gd_HighNativeGround	0.0	66.3	0.25	1.5	N/A	0
510_Poor_LowNativeGround	0.0	79.86	0.25	1.5	N/A	1
510_Poor_NoNativeGround	6.1	0.59	0.25	1.5	N/A	1

NSW GOVERNMENT

BAM Credit Summary Report

					Subtotal	**2**
Phascolarctos cinereus / Koala (Fauna)						
510_Gd_HighNativeGround	0.0	66.3	0.25	2	N/A	0
510_Poor_LowNativeGround	0.0	71.31	0.25	2	N/A	1
					Subtotal	**1**
Vespadelus troughtoni / Eastern Cave Bat (Fauna)						
510_Gd_HighNativeGround	0.0	66.3	0.25	3	True	0
510_Poor_LowNativeGround	0.0	79.86	0.25	3	True	1
510_Poor_NoNativeGround	0.1	0.59	0.75	3	True	3
					Subtotal	**4**

NSW GOVERNMENT

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00014946/BAAS17082/19/00014947	Rangers Valley manure and effluent utilisation	14/04/2019
Assessor Name	Assessor Number	BAM Data version *
Phillip Cameron	BAAS17082	7
Proponent Names	Report Created	
	21/05/2019	

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Candidate Serious and Irreversible Impacts

PCT	TEC
510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	White Box Yellow Box Blakely's Red Gum Woodland

Species
Anthochaera phrygia / Regent Honeyeater
Anthochaera phrygia / Regent Honeyeater
Vespadelus troughtoni / Eastern Cave Bat
Vespadelus troughtoni / Eastern Cave Bat
Vespadelus troughtoni / Eastern Cave Bat

Additional Information for Approval

NSW

BAM Biodiversity Credit Report (Like for like)

PCTs With Customized Benchmarks

No Changes

Predicted Threatened Species Not On Site

No Changes

Ecosystem Credit Summary

PCT	TEC	Area	Credits
510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	White Box Yellow Box Blakely's Red Gum Woodland	183.3	1.00

Credit classes for 510	Like-for-like options	
	Any PCT with the below TEC	Containing HBT in the below IBRA subregions

NSW

BAM Biodiversity Credit Report (Like for like)

White Box Yellow Box Blakely's Red Gum Woodland (including PCTs 2, 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 506, 508, 509, 510, 511, 528, 538, 544, 562, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1601, 1606, 1608, 1611, 1691, 1693, 1695, 1698)	Yes	Deepwater Downs Beardy River Hills, Binghi Plateau, Glenn Innes Guyra Basalts, Northeast Forest Lands, Severn River Volcanics and Tenterfield Plateau. Or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Area	Credits
Anthochaera phrygia / Regent Honeyeater	137.6	1.00
Calyptorhynchus lathami / Glossy Black-Cockatoo	146.6	3.00
Dichanthium setosum / Bluegrass	87.0	0.00
Haliaeetus leucogaster / White-bellied Sea-Eagle	146.6	3.00

BAM Biodiversity Credit Report (Like for like)

Hieraaetus morphnoides / Little Eagle			146.8	2.00
Hoplocephalus bitorquatus / Pale-headed Snake			146.8	3.00
Lophoictinia isura / Square-tailed Kite			146.8	2.00
Phascolarctos cinereus / Koala			137.0	1.00
Vespadelus troughtoni / Eastern Cave Bat			146.8	4.00
Anthochaera phrygia/ Regent Honeyeater	510_Gd_HighNative Ground	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Anthochaera phrygia/Regent Honeyeater	Any in NSW	
	510_Poor_LowNative Ground	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Anthochaera phrygia/Regent Honeyeater	Any in NSW	
Calyptorhynchus lathami/ Glossy Black-Cockatoo	510_Gd_HighNative Ground	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Calyptorhynchus lathami/Glossy Black-Cockatoo	Any in NSW	
	510_Poor_LowNative Ground	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	

BAM Biodiversity Credit Report (Like for like)

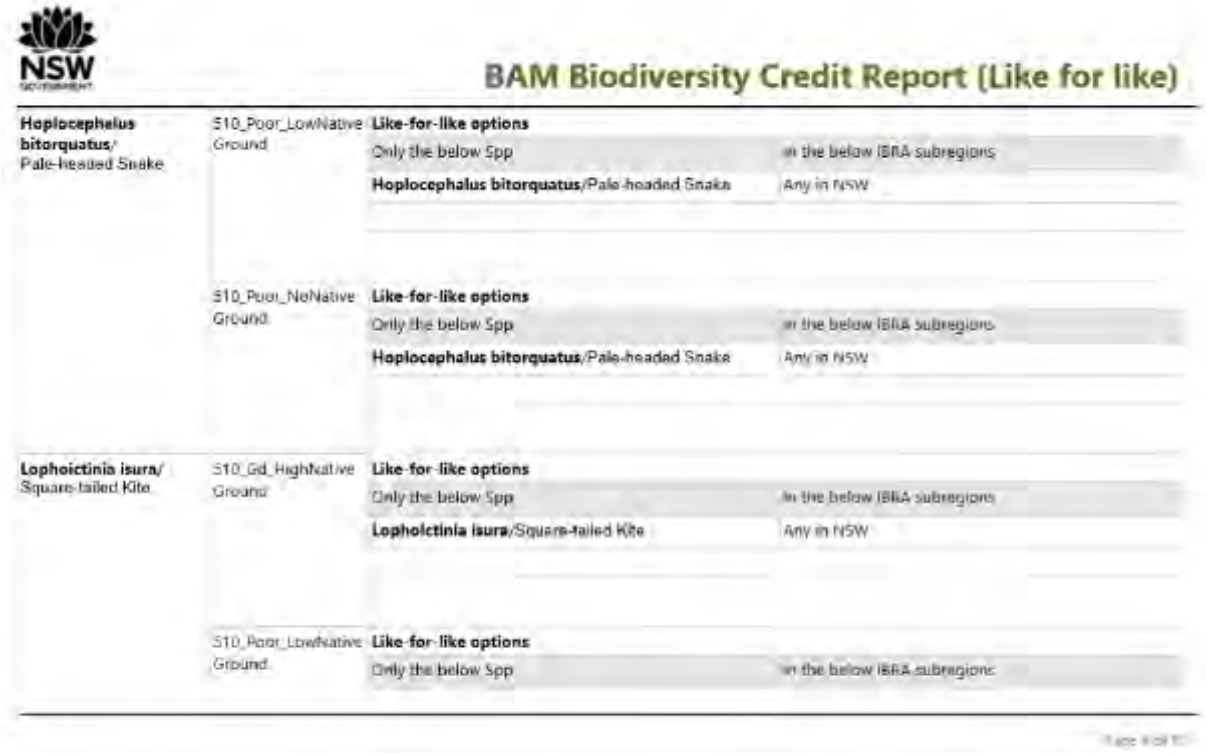
		Calyptorhynchus lathami/Glossy Black-Cockatoo	Any in NSW
	510_Poor_NoNative Ground	**Like-for-like options**	
		Only the below Spp	In the below IBRA subregions
		Calyptorhynchus lathami/Glossy Black-Cockatoo	Any in NSW
Dichanthium setosum/ Bluegrass	510_Gd_HighNative Ground	**Like-for-like options**	
		Only the below Spp	In the below IBRA subregions
		Dichanthium setosum/Bluegrass	Any in NSW
Haliaeetus leucogaster/ White-bellied Sea-Eagle	510_Gd_HighNative Ground	**Like-for-like options**	
		Only the below Spp	In the below IBRA subregions
		Haliaeetus leucogaster/White-bellied Sea-Eagle	Any in NSW

BAM Biodiversity Credit Report (Like for like)

Haliaeetus leucogaster/ White-bellied Sea-Eagle	510_Gd_HighNative Ground		
	510_Poor_LowNative Ground	**Like-for-like options**	
		Only the below Spp	In the below IBRA subregions
		Haliaeetus leucogaster/White-bellied Sea-Eagle	Any in NSW
	510_Poor_NoNative Ground	**Like-for-like options**	
		Only the below Spp	In the below IBRA subregions
		Haliaeetus leucogaster/White-bellied Sea-Eagle	Any in NSW
Hieraaetus morphnoides/ Little Eagle	510_Gd_HighNative Ground	**Like-for-like options**	
		Only the below Spp	In the below IBRA subregions
		Hieraaetus morphnoides/Little Eagle	Any in NSW

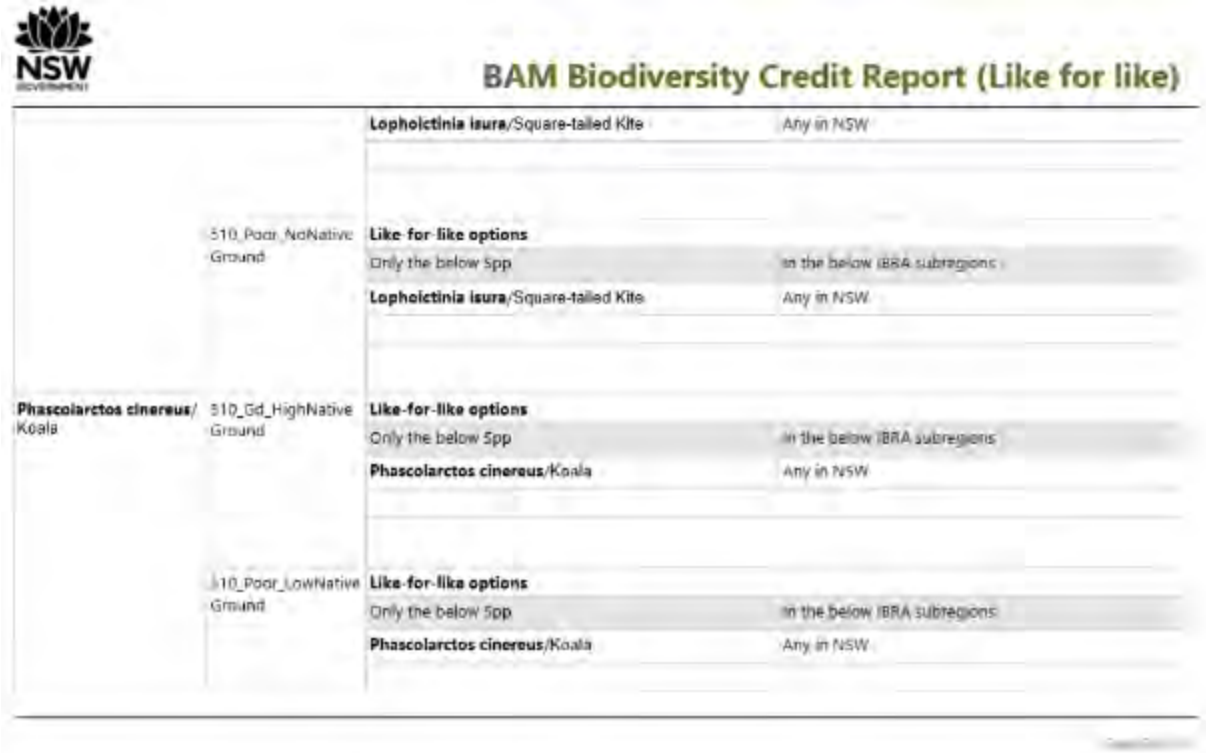
BAM Biodiversity Credit Report (Like for like)

Hieraaetus morphnoides/ Little Eagle	510_Poor_LowNative Ground	**Like-for-like options**	
		Only the below Spp	In the below IBRA subregions
		Hieraaetus morphnoides/Little Eagle	Any in NSW
	510_Poor_NoNative Ground	**Like-for-like options**	
		Only the below Spp	In the below IBRA subregions
		Hieraaetus morphnoides/Little Eagle	Any in NSW
Hoplocephalus bitorquatus/ Pale-headed Snake	510_Gd_HighNative Ground	**Like-for-like options**	
		Only the below Spp	In the below IBRA subregions
		Hoplocephalus bitorquatus/Pale-headed Snake	Any in NSW



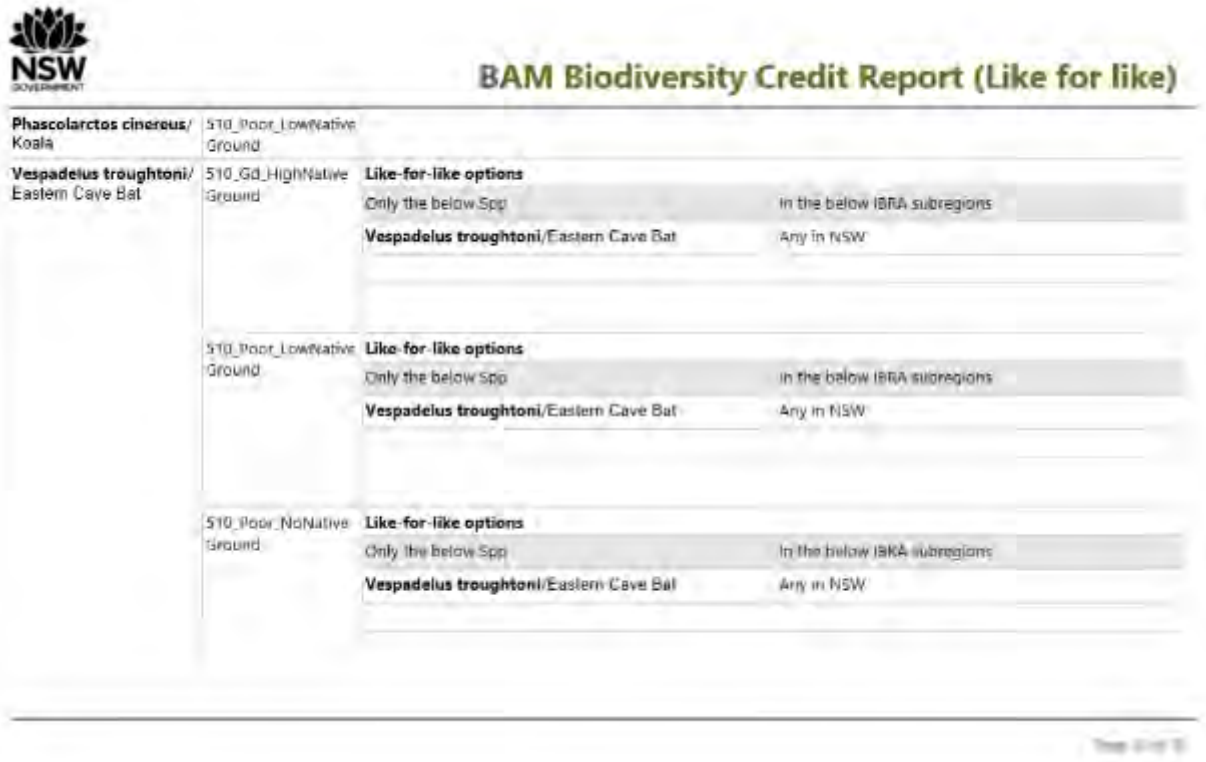
BAM Biodiversity Credit Report (Like for like)

Hoplocephalus bitorquatus/ Pale-headed Snake	S10_Poor_LowNative Ground	**Like-for-like options**	
		Only the below Spp	in the below IBRA subregions
		Hoplocephalus bitorquatus/Pale-headed Snake	Any in NSW
	S10_Poor_NoNative Ground	**Like-for-like options**	
		Only the below Spp	in the below IBRA subregions
		Hoplocephalus bitorquatus/Pale-headed Snake	Any in NSW
Lophoictinia isura/ Square-tailed Kite	S10_Gd_HighNative Ground	**Like-for-like options**	
		Only the below Spp	in the below IBRA subregions
		Lophoictinia isura/Square-tailed Kite	Any in NSW
	S10_Poor_LowNative Ground	**Like-for-like options**	
		Only the below Spp	in the below IBRA subregions



BAM Biodiversity Credit Report (Like for like)

		Lophoictinia isura/Square-tailed Kite	Any in NSW
	S10_Poor_NoNative Ground	**Like-for-like options**	
		Only the below Spp	in the below IBRA subregions
		Lophoictinia isura/Square-tailed Kite	Any in NSW
Phascolarctos cinereus/ Koala	S10_Gd_HighNative Ground	**Like-for-like options**	
		Only the below Spp	in the below IBRA subregions
		Phascolarctos cinereus/Koala	Any in NSW
	S10_Poor_LowNative Ground	**Like-for-like options**	
		Only the below Spp	in the below IBRA subregions
		Phascolarctos cinereus/Koala	Any in NSW



BAM Biodiversity Credit Report (Like for like)

Phascolarctos cinereus/ Koala	510_Poor_LowNative Ground		
Vespadelus troughtoni/ Eastern Cave Bat	510_Gd_HighNative Ground	**Like-for-like options**	
		Only the below Spp	In the below IBRA subregions
		Vespadelus troughtoni/Eastern Cave Bat	Any in NSW
	510_Poor_LowNative Ground	**Like-for-like options**	
		Only the below Spp	In the below IBRA subregions
		Vespadelus troughtoni/Eastern Cave Bat	Any in NSW
	510_Poor_NoNative Ground	**Like-for-like options**	
		Only the below Spp	In the below IBRA subregions
		Vespadelus troughtoni/Eastern Cave Bat	Any in NSW

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00014946/BAAS17082/19/00014947	Rangers Valley manure and effluent utilisation	14/04/2019
Assessor Name	Assessor Number	BAM Data version *
Phillip Cameron	BAAS17082	7
Proponent Name(s)	Report Created	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with biomet
	21/05/2019	

Candidate Serious and Irreversible Impacts

PCT	TEC
510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	White Box Yellow Box Blakely's Red Gum Woodland

Species
Anthochaera phrygia / Regent Honeyeater
Anthochaera phrygia / Regent Honeyeater
Vespadelus troughtoni / Eastern Cave Bat
Vespadelus troughtoni / Eastern Cave Bat
Vespadelus troughtoni / Eastern Cave Bat

Additional Information for Approval

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BAM Biodiversity Credit Report (Variations)

PCTs With Customized Benchmarks

No Changes

Predicted Threatened Species Not On Site

No Changes

Ecosystem Credit Summary

PCT	TEC	Area	Credits
510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	White Box Yellow Box Blakely's Red Gum Woodland	183.3	1.00

Credit classes for 510	Like-for-like options		
	Any PCT with the below TEC	Containing HBT	In the below IBRA subregions

BAM Biodiversity Credit Report (Variations)

White Box Yellow Box Blakely's Red Gum Woodland (including PCT's 2, 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 303, 312, 341, 342, 347, 350, 352, 356, 387, 391, 392, 395, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 493, 496, 506, 508, 509, 510, 511, 529, 538, 544, 562, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1089, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1388, 1401, 1512, 1601, 1606, 1608, 1611, 1691, 1693, 1695, 1698)	Yes	Deepwater Downs,Beardy River Hills, Bingiti Plateau, Glenn Innes-Guyra Basalts, Northeast Forest Lands, Severn River Volcanics and Tenterfield Plateau. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.	

Variation options

Any PCT in the below Formation	And in any of below trading groups	Containing HBT	In the below IBRA regions/subregions:
Grassy Woodlands	Tier 3 or higher	Yes (including artificial)	IBRA Region: New England Tablelands or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

BAM Biodiversity Credit Report (Variations)

Species	Area	Credits
Anthochaera phrygia / Regent Honeyeater	137.6	1.00
Calyptorhynchus lathami / Glossy Black-Cockatoo	146.8	3.00
Dichanthium setosum / Bluegrass	87.0	0.00
Haliaeetus leucogaster / White-bellied Sea-Eagle	146.8	3.00
Hieraaetus morphnoides / Little Eagle	146.8	2.00
Hoplocephalus bitorquatus / Pale-headed Snake	146.8	3.00
Lophoictinia isura / Square-tailed Kite	146.8	2.00
Phascolarctos cinereus / Koala	137.6	1.00
Vespadelus troughtoni / Eastern Cave Bat	146.8	4.00

Anthochaera phrygia/ Regent Honeyeater	510_GS_HighNative Ground	**Like-for-like options**	
		Only the below Spp	in the below IBRA subregions
		Anthochaera phrygia/Regent Honeyeater	Any in NSW
	510_Poor_LowNative Ground	**Like-for-like options**	
		Only the below Spp	in the below IBRA subregions
		Anthochaera phrygia/Regent Honeyeater	Any in NSW
Calyptorhynchus lathami/ Glossy Black-Cockatoo	510_GS_HighNative Ground	**Like-for-like options**	
		Only the below Spp	in the below IBRA subregions
		Calyptorhynchus lathami/Glossy Black-Cockatoo	Any in NSW

NSW GOVERNMENT

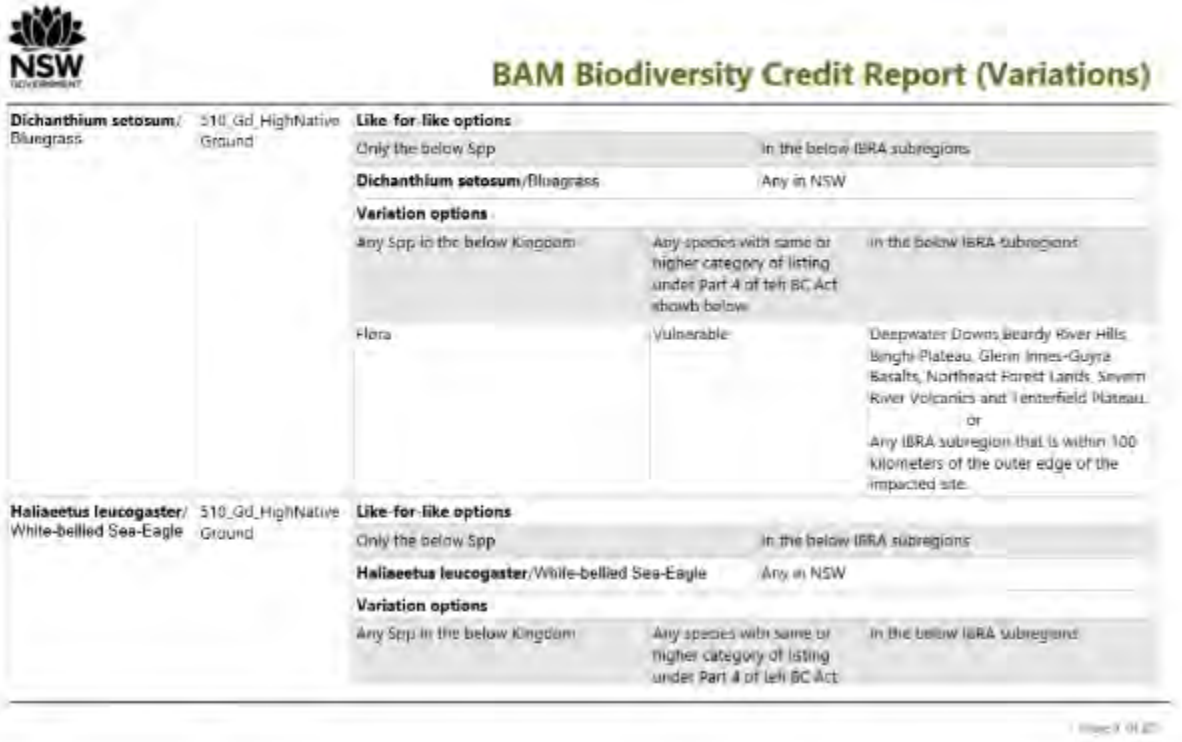
BAM Biodiversity Credit Report (Variations)

Calyptorhynchus lathami/ Glossy Black-Cockatoo	510_Gd_HighNative Ground	**Variation options**		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act showb below	in the below IBRA subregions
		Fauna	Vulnerable	Deepwater Downs Beardy River Hills, Binghi Plateau, Glenn Innes-Guyra Basalts, Northeast Forest Lands, Severn River Volcanics and Tenterfield Plateau. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	510_Poor_LowNative Ground	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Calyptorhynchus lathami/Glossy Black-Cockatoo	Any in NSW	
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act showb below	in the below IBRA subregions

NSW GOVERNMENT

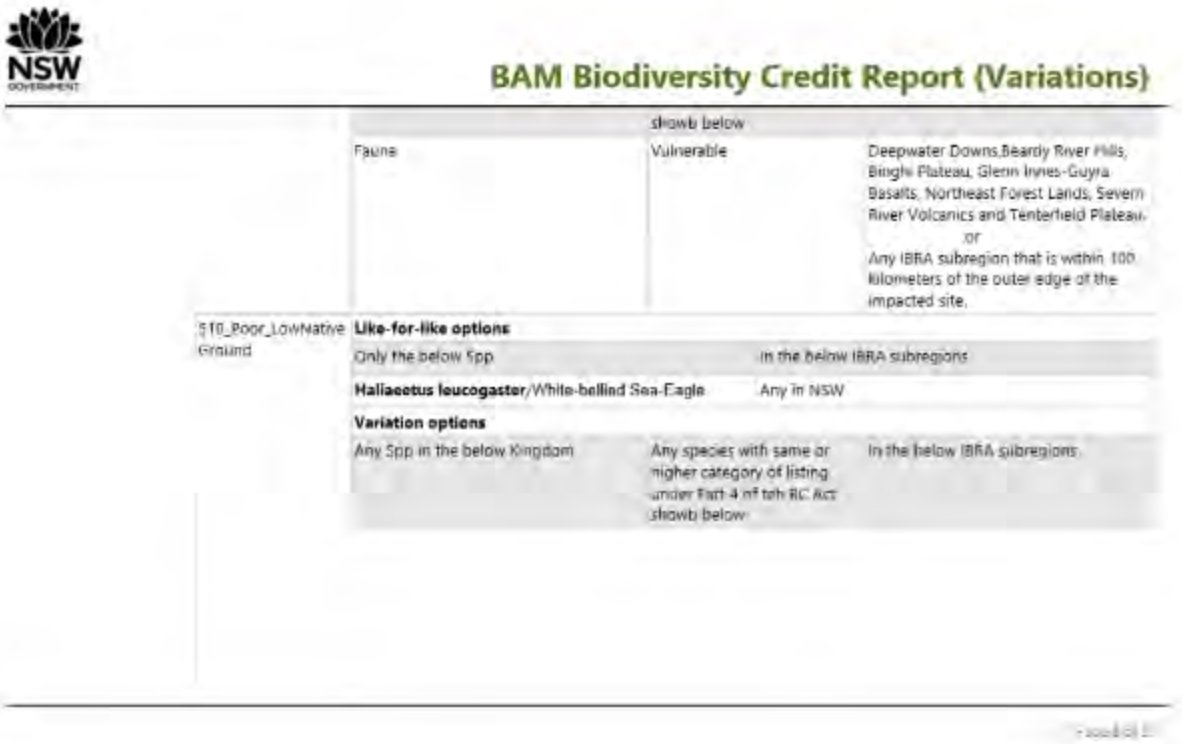
BAM Biodiversity Credit Report (Variations)

		Fauna	Vulnerable	Deepwater Downs Beardy River Hills, Binghi Plateau, Glenn Innes-Guyra Basalts, Northeast Forest Lands, Severn River Volcanics and Tenterfield Plateau. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	510_Poor_NoNative Ground	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Calyptorhynchus lathami/Glossy Black-Cockatoo	Any in NSW	
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act showb below	in the below IBRA subregions
		Fauna	Vulnerable	Deepwater Downs Beardy River Hills, Binghi Plateau, Glenn Innes-Guyra Basalts, Northeast Forest Lands, Severn River Volcanics and Tenterfield Plateau. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.



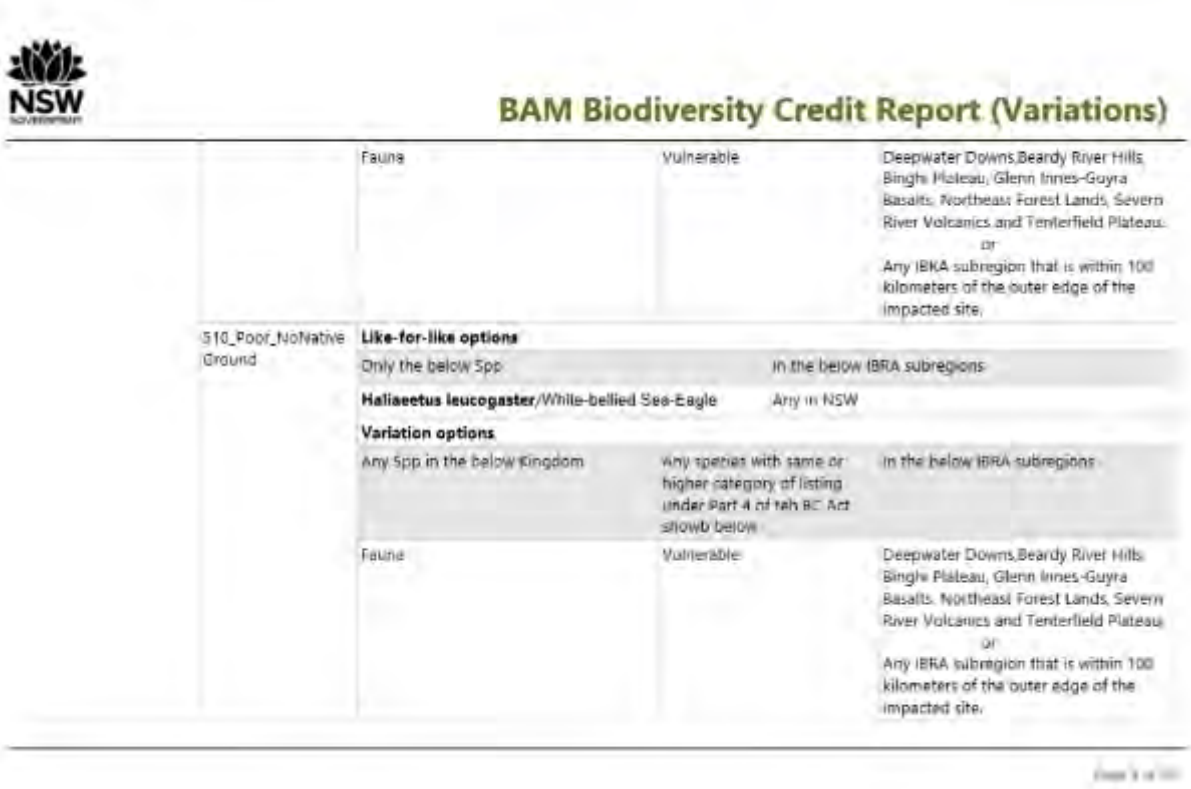
BAM Biodiversity Credit Report (Variations)

Dichanthium setosum/ Bluegrass	510_Gd_HighNative Ground	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Dichanthium setosum/Bluegrass	Any in NSW	
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act shown below	In the below IBRA subregions
		Flora	Vulnerable	Deepwater Downs Beardy River Hills Binghi Plateau Glenn Innes-Guyra Basalts Northeast Forest Lands Severn River Volcanics and Tenterfield Plateau or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Haliaeetus leucogaster/ White-bellied Sea-Eagle	510_Gd_HighNative Ground	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Haliaeetus leucogaster/White-bellied Sea-Eagle	Any in NSW	
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act	In the below IBRA subregions



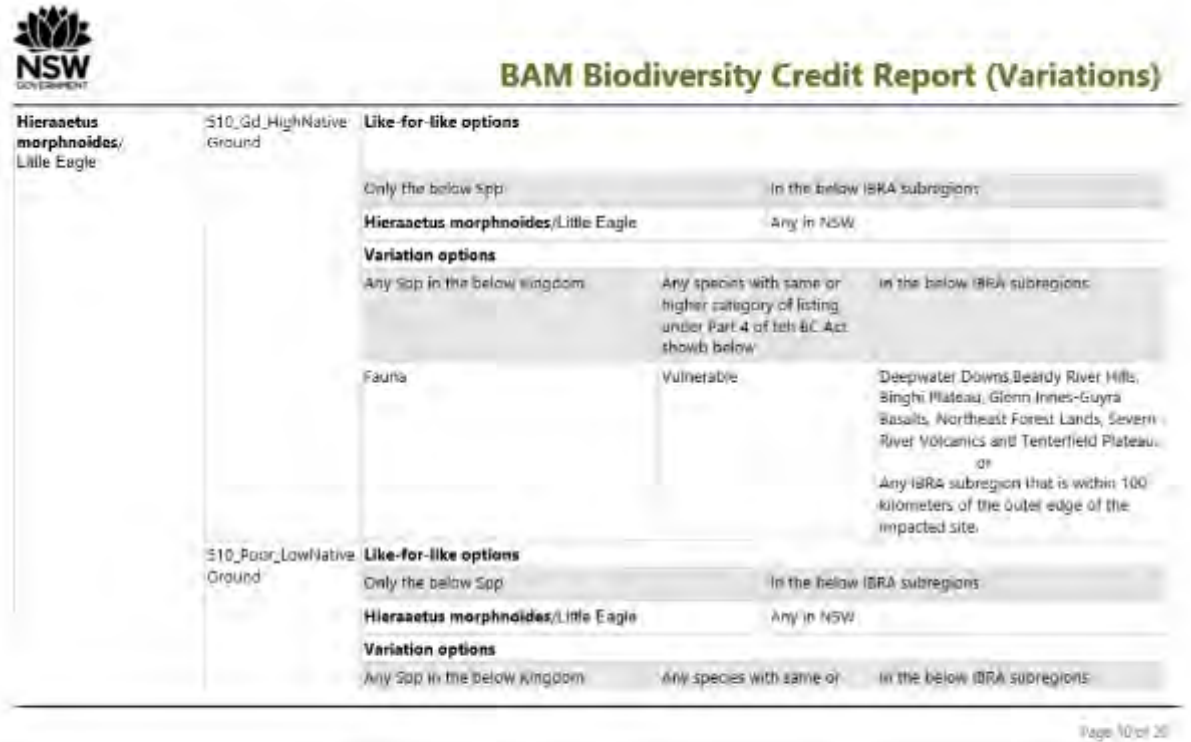
BAM Biodiversity Credit Report (Variations)

		shown below		
		Fauna	Vulnerable	Deepwater Downs Beardy River Hills Binghi Plateau Glenn Innes-Guyra Basalts Northeast Forest Lands Severn River Volcanics and Tenterfield Plateau or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	510_Poor_LowNative Ground	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Haliaeetus leucogaster/White-bellied Sea-Eagle	Any in NSW	
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act shown below	In the below IBRA subregions



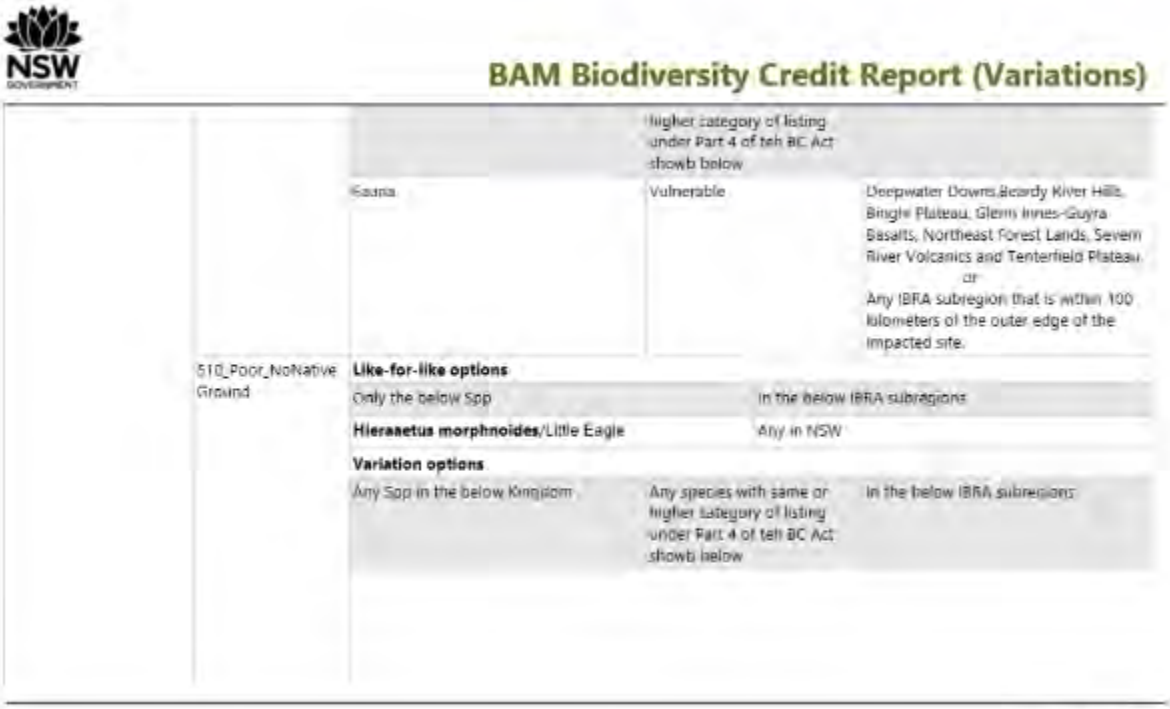
BAM Biodiversity Credit Report (Variations)

		Fauna	Vulnerable	Deepwater Downs,Beardy River Hills, Bingle Plateau, Glenn Innes-Guyra Basalts, Northeast Forest Lands, Severn River Volcanics and Tenterfield Plateau or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	S10_Poor_NoNative Ground	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Haliaeetus leucogaster/White-bellied Sea-Eagle	Any in NSW	
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act showb below	In the below IBRA subregions
		Fauna	Vulnerable	Deepwater Downs,Beardy River Hills, Bingle Plateau, Glenn Innes-Guyra Basalts, Northeast Forest Lands, Severn River Volcanics and Tenterfield Plateau or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.



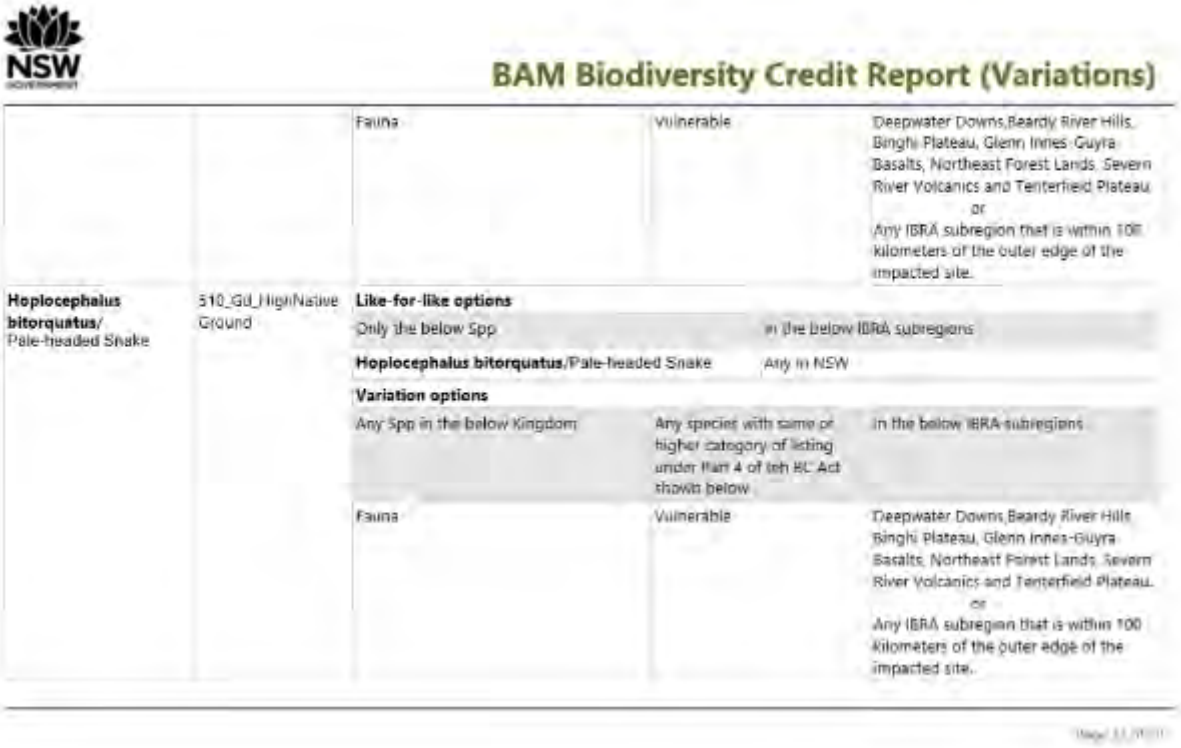
BAM Biodiversity Credit Report (Variations)

Hieraaetus morphnoides/ Little Eagle	S10_Gd_HighNative Ground	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Hieraaetus morphnoides/Little Eagle	Any in NSW	
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act showb below	In the below IBRA subregions
		Fauna	Vulnerable	Deepwater Downs,Beardy River Hills, Bingle Plateau, Glenn Innes-Guyra Basalts, Northeast Forest Lands, Severn River Volcanics and Tenterfield Plateau or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	S10_Poor_LowNative Ground	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Hieraaetus morphnoides/Little Eagle	Any in NSW	
		Variation options		
		Any Spp in the below Kingdom	Any species with same or	In the below IBRA subregions



BAM Biodiversity Credit Report (Variations)

			higher category of listing under Part 4 of teh BC Act showb below	
		Fauna	Vulnerable	Deepwater Downs,Beardy River Hills, Binghi Plateau, Glenn Innes-Guyra Basalts, Northeast Forest Lands, Severn River Volcanics and Tenterfield Plateau or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	510_Poor_NoNative Ground	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Hieraaetus morphnoides/Little Eagle	Any in NSW	
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act showb below	In the below IBRA subregions



BAM Biodiversity Credit Report (Variations)

		Fauna	Vulnerable	Deepwater Downs,Beardy River Hills, Binghi Plateau, Glenn Innes-Guyra Basalts, Northeast Forest Lands, Severn River Volcanics and Tenterfield Plateau or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Hoplocephalus bitorquatus/ Pale-headed Snake	510_Gd_HighNative Ground	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Hoplocephalus bitorquatus/Pale-headed Snake	Any in NSW	
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act showb below	In the below IBRA subregions
		Fauna	Vulnerable	Deepwater Downs,Beardy River Hills, Binghi Plateau, Glenn Innes-Guyra Basalts, Northeast Forest Lands, Severn River Volcanics and Tenterfield Plateau or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Variations)

Hoplocephalus bitorquatus/ Pale-headed Snake	510_Pool_LowNative Ground	**Like-for-like options**		
		Only the below Spp		In the below IBRA subregions
		Hoplocephalus bitorquatus/Pale-headed Snake		Any in NSW
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act showb below	In the below IBRA subregions
		Fauna	Vulnerable	Deepwater Downs,Beardy River Hills, Binghi Plateau, Glenn Innes-Guyra Basalts, Northeast Forest Lands, Severn River Volcanics and Tenterfield Plateau or Any IBRA subregion that is within 100 Kilometers of the outer edge of the impacted site.
	510_Pool_NoNative Ground	**Like-for-like options**		
		Only the below Spp		In the below IBRA subregions
		Hoplocephalus bitorquatus/Pale-headed Snake		Any in NSW
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing	In the below IBRA subregions

BAM Biodiversity Credit Report (Variations)

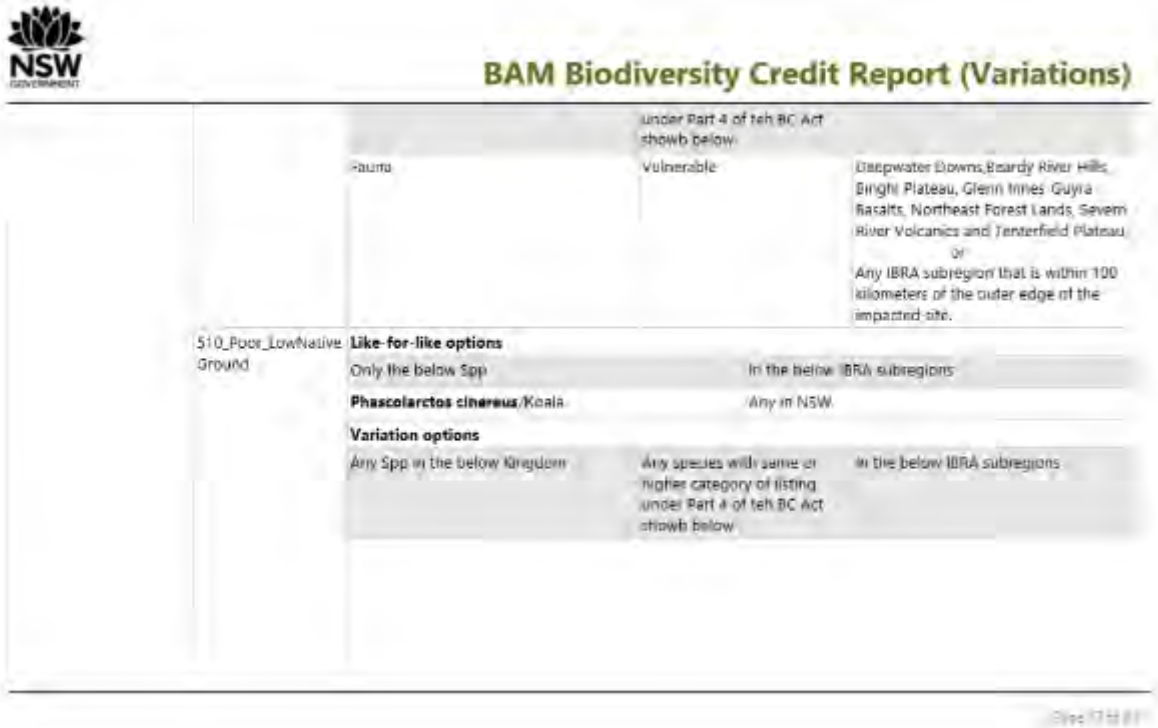
			under Part 4 of teh BC Act showb below	
		Fauna	Vulnerable	Deepwater Downs,Beardy River Hills, Binghi Plateau, Glenn Innes-Guyra Basalts, Northeast Forest Lands, Severn River Volcanics and Tenterfield Plateau or Any IBRA subregion that is within 100 Kilometers of the outer edge of the impacted site.
Lophoictinia isura/ Square-tailed Kite	510_Gd_HighNative Ground	**Like-for-like options**		
		Only the below Spp		In the below IBRA subregions
		Lophoictinia isura/Square-tailed Kite		Any in NSW
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act showb below	In the below IBRA subregions

BAM Biodiversity Credit Report (Variations)

		Fauna	Vulnerable	Deepwater Downs,Beardy River Hills, Binghi Plateau, Glenn Innes-Guyra Basalts, Northeast Forest Lands, Severn River Volcanics and Tenterfield Plateau. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	510_Poor_LowNative Ground	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Lophoictinia isura/Square-tailed Kite	Any in NSW	
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act shown below	In the below IBRA subregions
		Fauna	Vulnerable	Deepwater Downs,Beardy River Hills, Binghi Plateau, Glenn Innes-Guyra Basalts, Northeast Forest Lands, Severn River Volcanics and Tenterfield Plateau. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

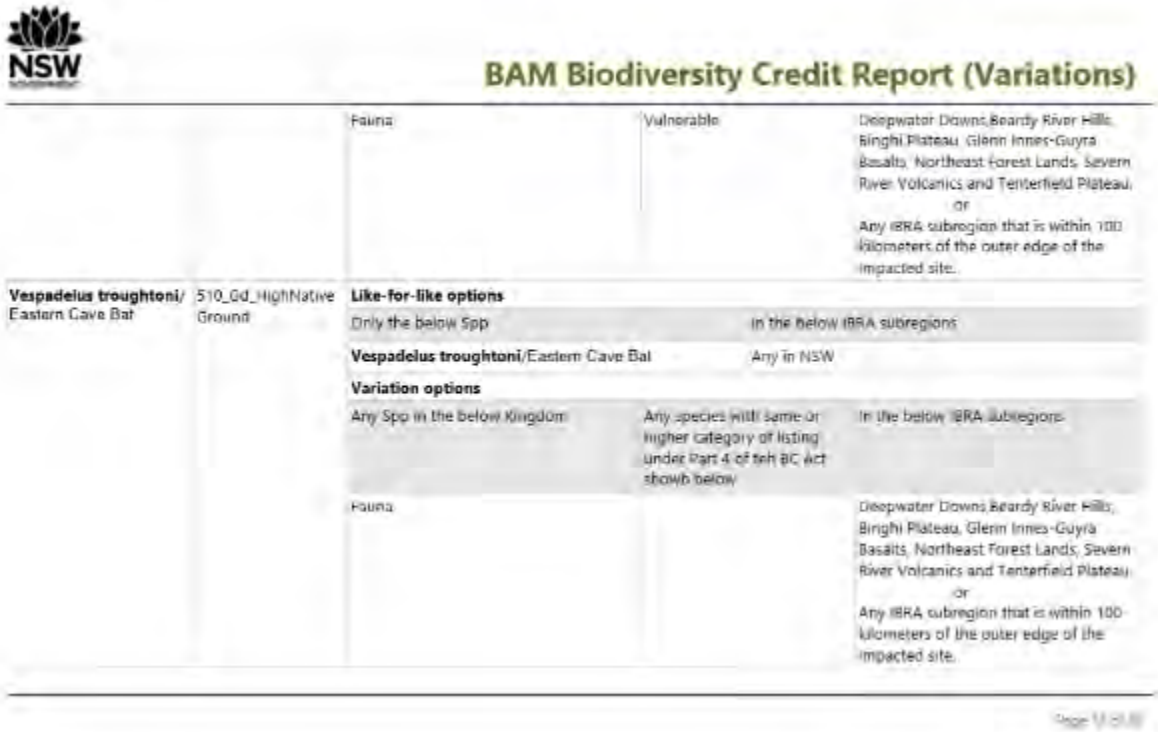
BAM Biodiversity Credit Report (Variations)

	510_Poor_NoNative Ground	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Lophoictinia isura/Square-tailed Kite	Any in NSW	
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act shown below	In the below IBRA subregions
		Fauna	Vulnerable	Deepwater Downs,Beardy River Hills, Binghi Plateau, Glenn Innes-Guyra Basalts, Northeast Forest Lands, Severn River Volcanics and Tenterfield Plateau. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Phascolarctos cinereus/ Koala	510_Gd_HighNative Ground	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Phascolarctos cinereus/Koala	Any in NSW	
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing	In the below IBRA subregions



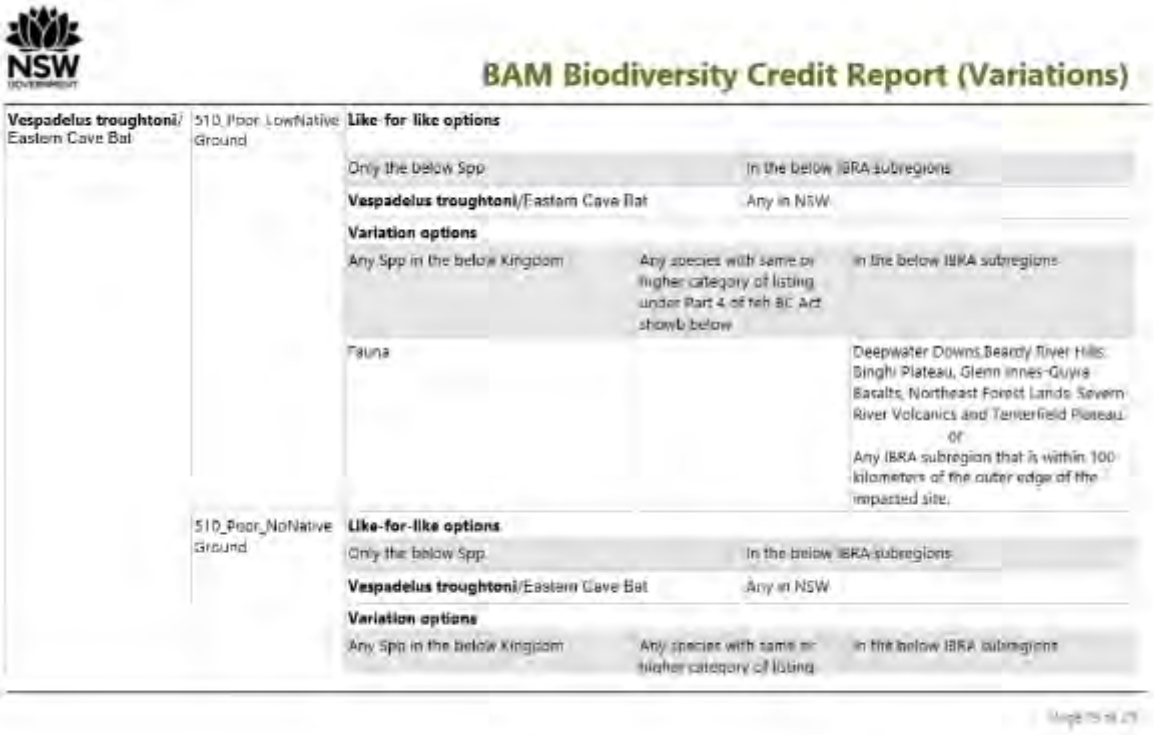
BAM Biodiversity Credit Report (Variations)

		under Part 4 of teh BC Act shown below		
		Fauna	Vulnerable	Deepwater Downs,Beardy River Hills, Binghi Plateau, Glenn Innes Guyra Basalts, Northeast Forest Lands, Severn River Volcanics and Tenterfield Plateau or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	510_Poor_LowNative Ground	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Phascolarctos cinereus/Koala	Any in NSW	
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act shown below	In the below IBRA subregions



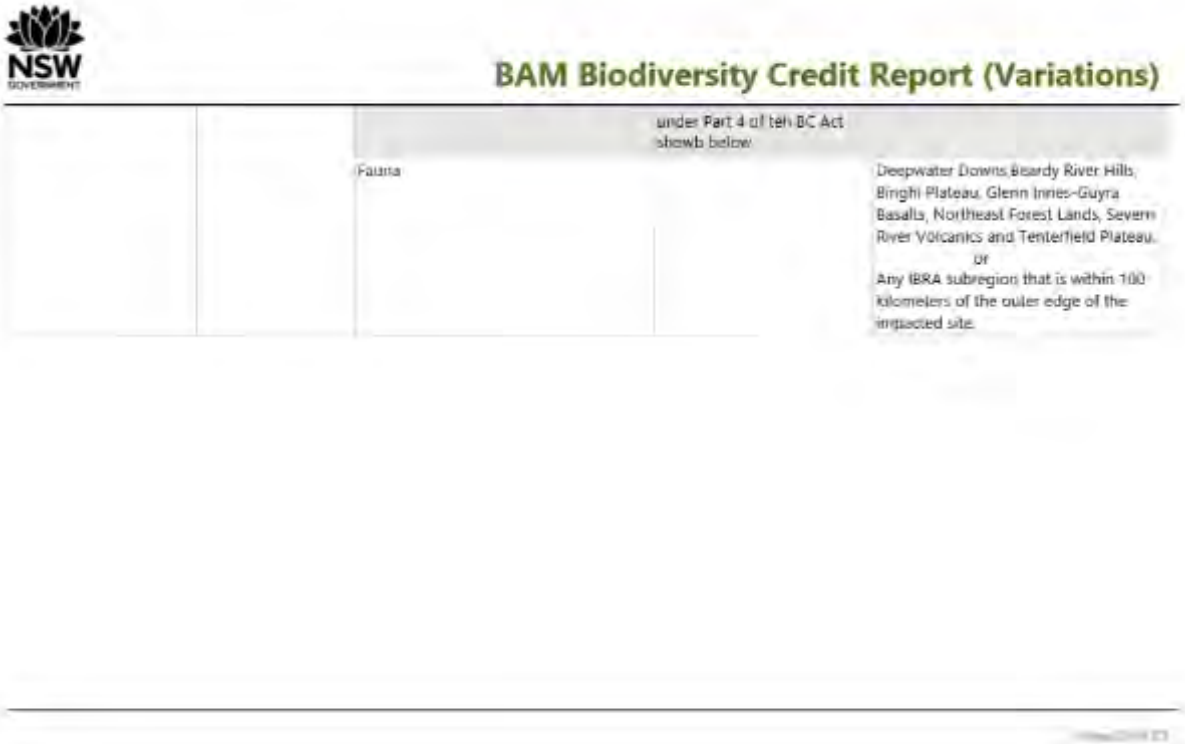
BAM Biodiversity Credit Report (Variations)

		Fauna	Vulnerable	Deepwater Downs,Beardy River Hills, Binghi Plateau, Glenn Innes-Guyra Basalts, Northeast Forest Lands, Severn River Volcanics and Tenterfield Plateau or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Vespadelus troughtoni/ Eastern Cave Bat	510_Gd_HighNative Ground	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Vespadelus troughtoni/Eastern Cave Bat	Any in NSW	
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act shown below	In the below IBRA subregions
		Fauna		Deepwater Downs,Beardy River Hills, Binghi Plateau, Glenn Innes-Guyra Basalts, Northeast Forest Lands, Severn River Volcanics and Tenterfield Plateau or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.



BAM Biodiversity Credit Report (Variations)

Vespadelus troughtoni/ Eastern Cave Bat	510_Poor_LowNative Ground	**Like-for-like options**		
		Only the below Spp		In the below IBRA subregions
		Vespadelus troughtoni/Eastern Cave Bat		Any in NSW
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act shown below	In the below IBRA subregions
		Fauna		Deepwater Downs,Beardy River Hills, Binghi Plateau, Glenn Innes-Guyra Basalts, Northeast Forest Lands, Severn River Volcanics and Tenterfield Plateau. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	510_Poor_NoNative Ground	**Like-for-like options**		
		Only the below Spp		In the below IBRA subregions
		Vespadelus troughtoni/Eastern Cave Bat		Any in NSW
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing	In the below IBRA subregions



BAM Biodiversity Credit Report (Variations)

			under Part 4 of teh BC Act shown below	
		Fauna		Deepwater Downs,Beardy River Hills, Binghi Plateau, Glenn Innes-Guyra Basalts, Northeast Forest Lands, Severn River Volcanics and Tenterfield Plateau. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Biodiversity payment summary report

Assessment Id	Payment data version	Revision number	Report created
00014946/BAAS17082/19/00014947	57	0	21/05/2019

PCT list

Include	PCT common name	Credits
Yes	510 - Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	1

Species list

Include	Species	Credits
Yes	***Calyptorhynchus lathami*** (Glossy Black-Cockatoo)	3
Yes	***Dichanthium setosum*** (Bluegrass)	0
Yes	***Hoplocephalus bitorquatus*** (Pale-headed Snake)	3
Yes	***Lophoictinia isura*** (Square-tailed Kite)	2
Yes	***Phascolarctos cinereus*** (Koala)	1
Yes	***Vespadelus troughtoni*** (Eastern Cave Bat)	4
Yes	***Anthochaera phrygia*** (Regent Honeyeater)	1
Yes	***Hieraaetus morphnoides*** (Little Eagle)	2
Yes	***Haliaeetus leucogaster*** (White-bellied Sea-Eagle)	3

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Biodiversity payment summary report

IBRA sub region	PCT common name	Baseline price	Dynamic coefficient	Market coefficient	Risk premium	Administrative cost	Methodology adjustment factor	Price per credit	No. of ecosystem credits	Final credits price
Deepwater Downs	**510** - Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion **Warning: This PCT has NO trades recorded in Deepwater Downs**	$627.25	0.71702200	2.51860000	19.99%	$20.00	1.0000	$1,537.13	1	$1,537.13
								Subtotal (excl. GST)		**$1,537.13**
								GST		**$153.71**
								Total ecosystem credits (incl. GST)		**$1,690.84**

Species credits for threatened species

Species profile ID	Species	Threat status	Price per credit	Risk premium	Administrative cost	No. of species credits	Final credits price
10140	***Calyptorhynchus lathami*** (Glossy Black-Cockatoo)	Vulnerable	$506.66	19.9900%	$20.00	3	$1,803.82
10221	***Dichanthium setosum*** (Bluegrass)	Vulnerable	$158.64	19.9900%	$20.00	0	Contact BCT for pricing
10412	***Hoplocephalus bitorquatus*** (Pale-headed Snake)	Vulnerable	$434.47	19.9900%	$20.00	3	$1,623.96

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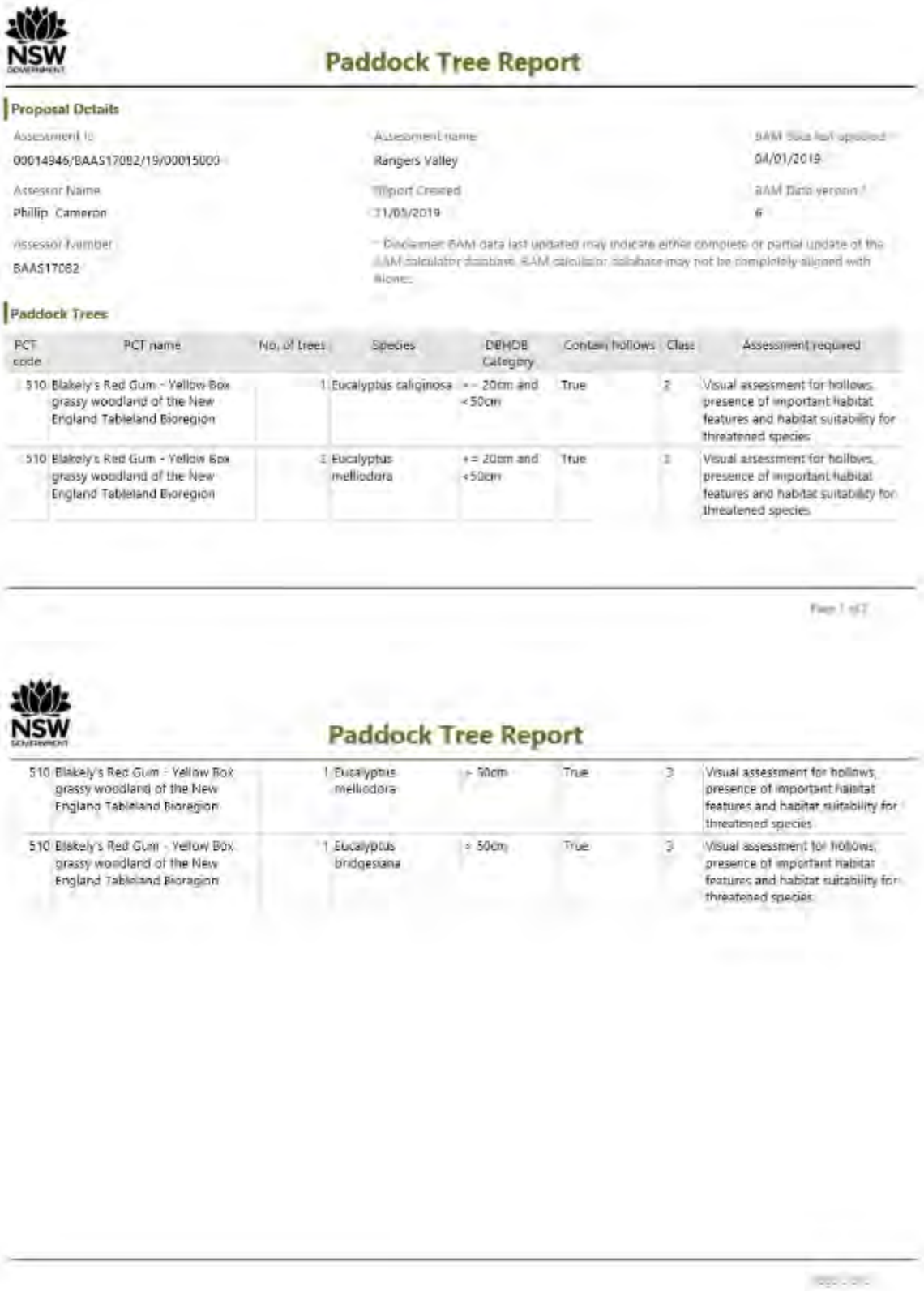
Biodiversity payment summary report

10495	***Lophoictinia isura*** (Square-tailed Kite)	Vulnerable	$506.66	19.9900%	$20.00	2	$1,255.88
10616	***Phascolarctos cinereus*** (Koala)	Vulnerable	$434.47	19.9900%	$20.00	1	$541.32
10829	***Vespadelus troughtoni*** (Eastern Cave Bat)	Vulnerable	$725.00	19.9900%	$20.00	4	$3,559.71
10841	***Anthochaera phrygia*** (Regent Honeyeater)	Critically Endangered	$443.54	19.9900%	$20.00	1	$539.00
20131	***Hieraaetus morphnoides*** (Little Eagle)	Vulnerable	$506.66	19.9900%	$20.00	2	$1,255.88
20322	***Haliaeetus leucogaster*** (White-bellied Sea-Eagle)	Vulnerable	$173.02	19.9900%	$20.00	3	$682.62
						Subtotal (excl. GST)	**$11,342.39**
						GST	**$1,134.24**
						Total species credits (incl. GST)	**$12,476.63**
						Grand total	**$14,167.47**

Paddock Trees BAM Output



NSW GOVERNMENT

Paddock Tree Report

Proposal Details

Assessment Id	Assessment name	BAM Data last updated *
00014946/BAAS17082/19/00015000	Rangers Valley	04/01/2019
Assessor Name	**Report Created**	**BAM Data version ***
Phillip Cameron	21/05/2019	6
Assessor Number	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Biones.	
BAAS17082		

Paddock Trees

PCT code	PCT name	No. of trees	Species	DBHOB Category	Contain hollows	Class	Assessment required
510	Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	1	Eucalyptus caliginosa	>= 20cm and <50cm	True	2	Visual assessment for hollows, presence of important habitat features and habitat suitability for threatened species
510	Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	1	Eucalyptus melliodora	>= 20cm and <50cm	True	2	Visual assessment for hollows, presence of important habitat features and habitat suitability for threatened species

NSW GOVERNMENT

Paddock Tree Report

510	Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	1	Eucalyptus melliodora	> 50cm	True	3	Visual assessment for hollows, presence of important habitat features and habitat suitability for threatened species
510	Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	1	Eucalyptus bridgesiana	> 50cm	True	3	Visual assessment for hollows, presence of important habitat features and habitat suitability for threatened species

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00014946/BAAS17082/19/00015000	Rangers Valley	04/01/2019
Assessor Name	**Report Created**	**BAM Data version ***
Phillip Cameron	21/05/2019	6
Assessor Number	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
BAAS17082		

Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

Common Name	Scientific Name
Barking Owl	Ninox connivens
Black-chinned Honeyeater (eastern subspecies)	Melithreptus gularis gularis
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae
Eastern False Pipistrelle	Falsistrellus tasmaniensis
Flame Robin	Petroica phoenicea
Glossy Black-Cockatoo	Calyptorhynchus lathami
Hooded Robin (south-eastern form)	Melanodryas cucullata cucullata
Koala	Phascolarctos cinereus
Little Eagle	Hieraaetus morphnoides
Little Lorikeet	Glossopsitta pusilla
Scarlet Robin	Petroica boodang
Speckled Warbler	Chthonicola sagittata
Swift Parrot	Lathamus discolor
Varied Sittella	Daphoenositta chrysoptera
White-bellied Sea-Eagle	Haliaeetus leucogaster
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris

Page 1 of 1

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00014948/BAAS17082/19/00015000	Rangers Valley	04/01/2019
Assessor Name	Assessor Number	BAM Data version *
Phillip Cameron	BAAS17082	6
Proponent Names	Report Created	
	21/05/2019	

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Candidate Serious and Irreversible Impacts

Nil

Additional Information for Approval

PCTs With Customized Benchmarks

No Changes

Ecosystem Credit Summary

BAM Biodiversity Credit Report (Like for like)

PCT	TEC	Credits
510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	White Box Yellow Box Blakely's Red Gum Woodland	5.00

Credit classes for 510

Like-for-like options		
Any PCT with the below TEC	Containing HBT	In the below IBRA subregions
White Box Yellow Box Blakely's Red Gum Woodland	Yes	Deepwater Downs,Beardy River Hills, Binghi Plateau, Glenn Innes-Guyra Basalts, Northeast Forest Lands, Severn River Volcanics and Tenterfield Plateau. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00014946/BAAS17082/19/00015000	Rangers Valley	04/01/2019
Assessor Name	**Assessor Number**	**BAM Data version ***
Phillip Cameron	BAAS17082	6
Proponent Name(s)	**Report Created**	
	21/05/2019	

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Dioma.

Candidate Serious and Irreversible Impacts

Nil

Additional Information for Approval

PCTs With Customized Benchmarks

No Changes

Ecosystem Credit Summary

BAM Biodiversity Credit Report (Variations)

PCT	TEC	Credits
510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	White Box Yellow Box Blakely's Red Gum Woodland	5.00

Credit classes for 510

Like-for-like options

Any PCT with the below TEC	Containing HBT	In the below IBRA subregions
White Box Yellow Box Blakely's Red Gum Woodland	Yes	Deepwater Downs,Beardy River Hills, Binghi Plateau, Glenn Innes-Guyra Basalts, Northeast Forest Lands, Severn River Volcanics and Tenterfield Plateau. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Variation options

Any PCT in the below Formation	And in any of below trading groups	Containing HBT	In the below IBRA regions/subregions
Grassy Woodlands	Tier 3	Yes (including artificial)	

NSW GOVERNMENT

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00014946/BAAS17082/19/00015000	Rangers Valley	04/01/2019
Assessor Name	**Report Created**	**BAM Data version ***
Phillip Cameron	21/05/2019	6
Assessor Number	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
BAAS17082		

Paddock Trees Credit Requirement

Class	Contains hollows	Number of trees	Ecosystem credits
510-Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion			
2	True	1.0	1
2	True	2.0	2
3	True	1.0	1
3	True	1.0	1
			5
			5

Page 1 of 1

Biodiversity payment summary report

Assessment Id	Payment data version	Revision number	Report created
00014946/BAAS17082/19/00015000	46	0	21/05/2019

PCT list

Include	PCT common name	Credits
Yes	510 - Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion	5

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

IBRA sub region	PCT common name	Baseline price	Dynamic coefficient	Market coefficient	Risk premium	Administrative cost	Methodology adjustment factor	Price per credit	No. of ecosystem credits	Final credits price
Deepwater Downs	**510** - Blakely's Red Gum - Yellow Box grassy woodland of the New England Tableland Bioregion **Warning: This PCT has NO trades recorded**	$646.42	0.70927750	2.63175800	20.49%	$20.00	1.0000	$2,017.01	5	$10,085.04

Subtotal (excl. GST)	**$10,085.04**
GST	**$1,008.50**
Total credits (incl. GST)	**$11,093.54**

Appendix C: OEH AND EPBC DATABASE SEARCH RESULTS

BC Act

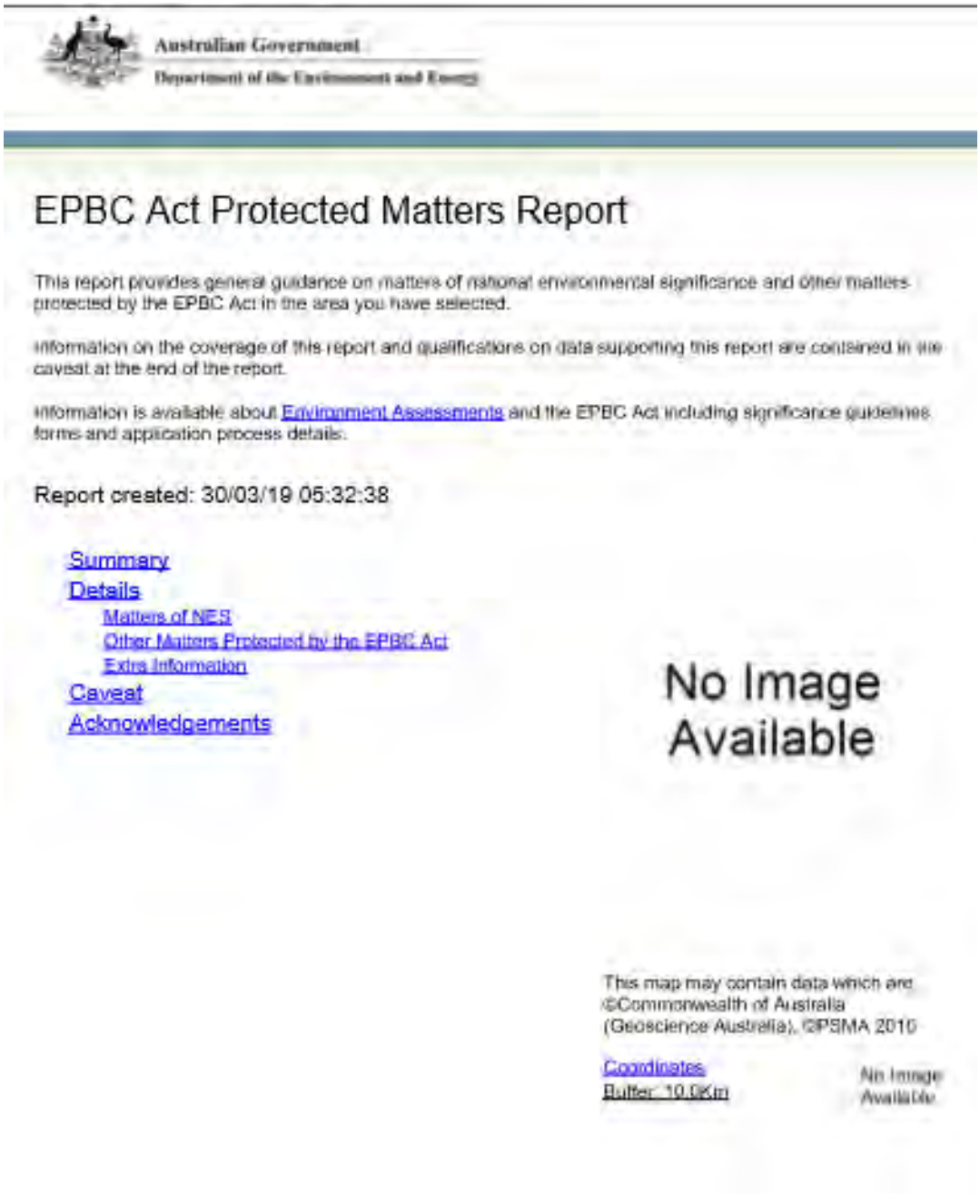
Scientific name	Common name	NSW status	Commonwealth status
Litoria booroolongensis	Booroolong Frog	Endangered	Endangered
Ninox connivens	Barking Owl	Vulnerable	
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Vulnerable	
Poephila cincta cincta	Black-throated Finch (southern subspecies)	Presumed Extinct	Endangered
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	Vulnerable	
Burhinus grallarius	Bush Stone-curlew	Endangered	
Stagonopleura guttata	Diamond Firetail	Vulnerable	
Artamus cyanopterus cyanopterus	Dusky Woodswallow	Vulnerable	
Petroica phoenicea	Flame Robin	Vulnerable	
Stictonetta naevosa	Freckled Duck	Vulnerable	
Calyptorhynchus lathami	Glossy Black-Cockatoo	Vulnerable	
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	Vulnerable	
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	Vulnerable	
Hieraaetus morphnoides	Little Eagle	Vulnerable	
Glossopsitta pusilla	Little Lorikeet	Vulnerable	
Tyto novaehollandiae	Masked Owl	Vulnerable	
Grantiella picta	Painted Honeyeater	Vulnerable	Vulnerable
Ninox strenua	Powerful Owl	Vulnerable	
Anthochaera phrygia	Regent Honeyeater	Critically Endangered	Critically Endangered
Petroica boodang	Scarlet Robin	Vulnerable	
Chthonicola sagittata	Speckled Warbler	Vulnerable	
Circus assimilis	Spotted Harrier	Vulnerable	
Lophoictinia isura	Square-tailed Kite	Vulnerable	
Geophaps scripta scripta	Squatter Pigeon (southern subspecies)	Critically Endangered	Vulnerable
Lathamus discolor	Swift Parrot	Endangered	Critically Endangered
Neophema pulchella	Turquoise Parrot	Vulnerable	
Daphoenositta chrysoptera	Varied Sittella	Vulnerable	
Haliaeetus leucogaster	White-bellied Sea-Eagle	Vulnerable	
Carex Sedgeland of	Carex Sedgeland of	Endangered	

Scientific name	Common name	NSW status	Commonwealth status
the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions	the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions	Ecological Community	
McKies Stringybark/Blackbutt Open Forest in the Nandewar and New England Tableland Bioregions	McKies Stringybark/Blackbutt Open Forest in the Nandewar and New England Tableland Bioregions	Endangered Ecological Community	
Ribbon Gumâ€"Mountain Gumâ€"Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion	Ribbon Gumâ€"Mountain Gumâ€"Snow Gum Grassy Forest/Woodland of the New England Tableland Bioregion	Endangered Ecological Community	
Upland Wetlands of the Drainage Divide of the New England Tableland Bioregion	Upland Wetlands of the Drainage Divide of the New England Tableland Bioregion	Endangered Ecological Community	Endangered
White Box Yellow Box Blakelyâ€™s Red Gum Woodland	White Box Yellow Box Blakelyâ€™s Red Gum Woodland	Endangered Ecological Community	Critically Endangered
Nyctophilus corbeni	Corben's Long-eared Bat	Vulnerable	Vulnerable
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	Vulnerable	
Falsistrellus tasmaniensis	Eastern False Pipistrelle	Vulnerable	
Cercartetus nanus	Eastern Pygmy-possum	Vulnerable	
Scoteanax rueppellii	Greater Broad-nosed Bat	Vulnerable	
Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable	Vulnerable
Chalinolobus nigrogriseus	Hoary Wattled Bat	Vulnerable	
Phascolarctos cinereus	Koala	Vulnerable	Vulnerable
Mormopterus lumsdenae	Northern Free-tailed Bat	Vulnerable	
Aepyprymnus rufescens	Rufous Bettong	Vulnerable	
Myotis macropus	Southern Myotis	Vulnerable	
Dasyurus maculatus	Spotted-tailed Quoll	Vulnerable	Endangered
Petaurus norfolcensis	Squirrel Glider	Vulnerable	
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Vulnerable	

Scientific name	Common name	NSW status	Commonwealth status
Callistemon pungens	Callistemon pungens	Not listed	Vulnerable
Hibbertia sp. B	Hibbertia sp. B	Not listed	
Prasophyllum sp. Wybong	Prasophyllum sp. Wybong	Not listed	Critically Endangered
Prostanthera staurophylla sensu stricto	Prostanthera staurophylla sensu stricto	Endangered	Vulnerable
Thesium australe	Austral Toadflax	Vulnerable	Vulnerable
Chiloglottis platyptera	Barrington Tops Ant Orchid	Vulnerable	
Eucalyptus rubida subsp. barbigerorum	Blackbutt Candlebark	Vulnerable	Vulnerable
Dichanthium setosum	Bluegrass	Vulnerable	Vulnerable
Boronia boliviensis	Bolivia Hill Boronia	Endangered	
Pimelea venosa	Bolivia Hill Pimelea	Endangered	Endangered
Homoranthus croftianus	Bolivia Homoranthus	Endangered	
Eucalyptus boliviana	Bolivia Stringybark	Vulnerable	
Boronia granitica	Granite Boronia	Vulnerable	Endangered
Arthraxon hispidus	Hairy Jointgrass	Vulnerable	Vulnerable
Picris evae	Hawkweed	Vulnerable	Vulnerable
Rutidosis heterogama	Heath Wrinklewort	Vulnerable	Vulnerable
Bothriochloa biloba	Lobed Bluegrass	Not listed	
Acacia macnuttiana	MacNutt's Wattle	Vulnerable	Vulnerable
Eucalyptus mckieana	McKie's Stringybark	Vulnerable	Vulnerable
Goodenia macbarronii	Narrow Goodenia	Not listed	
Eucalyptus nicholii	Narrow-leaved Black Peppermint	Vulnerable	Vulnerable
Polygala linariifolia	Native Milkwort	Endangered	
New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion	New England Peppermint (Eucalyptus nova-anglica) Woodland on Basalts and Sediments in the New England Tableland Bioregion	Critically Endangered Ecological Community	Critically Endangered
Eucalyptus magnificata	Northern Blue Box	Endangered	
Eucalyptus caleyi subsp. ovendenii	Ovenden's Ironbark	Vulnerable	Vulnerable
Acacia acrionastes	Pindari Wattle	Endangered	
Astrotricha roddii	Rodd's Star Hair	Endangered	Endangered
Pomaderris queenslandica	Scant Pomaderris	Endangered	
Muehlenbeckia costata	Scrambling Lignum	Vulnerable	
Micromyrtus grandis	Severn River Heath-myrtle	Endangered	Endangered

Scientific name	Common name	NSW status	Commonwealth status
Swainsona sericea	Silky Swainson-pea	Vulnerable	
Diuris pedunculata	Small Snake Orchid	Endangered	Endangered
Almaleea cambagei	Torrington Pea	Endangered	Vulnerable
Acacia pubifolia	Velvet Wattle	Endangered	Vulnerable
Adelotus brevis - endangered population	Tusked Frog population in the Nandewar and New England Tableland Bioregions	Endangered Population	
Uvidicolus sphyrurus	Border Thick-tailed Gecko	Vulnerable	Vulnerable
Hoplocephalus bitorquatus	Pale-headed Snake	Vulnerable	

EPBC MNES



Australian Government
Department of the Environment and Energy

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 30/03/19 05:32:38

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

No Image Available

This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
Buffer: 10.0Km

No Image Available

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	3
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	33
Listed Migratory Species:	11

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	18
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	1
Regional Forest Agreements:	1
Invasive Species:	23
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Bennock station wetland complex	1100 - 1200km
Riverland	1100 - 1200km
The coorong, and lakes alexandrina and albert wetland	1300 - 1400km

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	Critically Endangered	Community may occur within area
New England Peppermint (Eucalyptus nova-anglica) Grassy Woodlands	Critically Endangered	Community may occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Geophaps scripta scripta Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Fish		
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Mammals		
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat likely to occur within area
Nyctophilus corbeni Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat may occur within area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat likely to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat likely to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Plants		
Acacia pubifolia Velvet Wattle [19799]	Vulnerable	Species or species habitat may occur within area
Acacia ruppii Rupp's Wattle [7559]	Endangered	Species or species habitat may occur within area
Boronia granitica Granite Boronia [18598]	Endangered	Species or species habitat may occur within area
Cadellia pentastylis Ooline [9828]	Vulnerable	Species or species habitat may occur within area
Callistemon pungens [55581]	Vulnerable	Species or species habitat likely to occur within area
Dichanthium setosum bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area
Diuris pedunculata Small Snake Orchid, Two-leaved Golden Moths, Golden Moths, Cowslip Orchid, Snake Orchid [18325]	Endangered	Species or species habitat likely to occur within area
Eucalyptus mckieana McKie's Stringybark [20199]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus nicholii Narrow-leaved Peppermint, Narrow-leaved Black Peppermint [20992]	Vulnerable	Species or species habitat known to occur within area
Eucalyptus rubida subsp. barbigerorum Blackbutt Candlebark [64618]	Vulnerable	Species or species habitat likely to occur

Name	Status	Type of Presence within area
Haloragis exalata subsp. velutina Tall Velvet Sea-berry [16839]	Vulnerable	Species or species habitat may occur within area
Lepidium peregrinum Wandering Pepper-cress [14035]	Endangered	Species or species habitat may occur within area
Ruidosia heterogama Heath Wrinklewort [13132]	Vulnerable	Species or species habitat likely to occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat known to occur within area
Reptiles		
Delma torquata Adorned Delma, Collared Delma [1656]	Vulnerable	Species or species habitat may occur within area
Lividicolus spinipunus Border Thick-tailed Gecko, Granite Belt Thick-tailed Gecko [84578]	Vulnerable	Species or species habitat likely to occur within area
Wollumbinia belli Bell's Turtle, Western Sawshelled Turtle, Namoi River Turtle, Bell's Saw-shelled Turtle [88071]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat likely to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat likely to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat likely to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Fladbury	NSW

Regional Forest Agreements	[Resource Information]
Note that all areas with completed RFAs have been included.	
Name	State
North East NSW RFA	New South Wales

Invasive Species	[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
Birds		
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat may occur within area
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area

Name	Status	Type of Presence
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-29.52602 151.72754

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

Annexure E.2 – OEH Aboriginal cultural heritage matters

NSW GOVERNMENT | Office of Environment & Heritage

Our Ref: DOC18/584487
Your Ref: DA 261-8-2002-I MOD 2

Department of Planning and Environment
GPO Box 39
Sydney NSW 2000

Attention: Mr Kane Winwood

Dear Mr Winwood

Re: Rangers Valley Cattle Feedlot – Proposed Modification 2

Thank you for your letter dated 10 August 2018 about the proposed modification to the Rangers Valley Cattle Feedlot approval, seeking advice from the Office of Environment and Heritage (OEH). I appreciate the opportunity to provide input.

The OEH understands that the proposal is being assessed as State Significant Development. We have reviewed the Environmental Assessment prepared by EnviroAg Australia dated 23 July 2018 and note that the report has not addressed:

1. Biodiversity matters – These relate to the potential impacts on biodiversity from the additional manure application areas, which appear to be located within vegetated parts of the property, and the possibility of the vegetation to be affected forming part of an Endangered Ecological Community. As the proposal is being assessed as State Significant Development, the application must be accompanied by a Biodiversity Development Assessment Report prepared by an accredited assessor.

2. Aboriginal cultural heritage matters – The report should detail the level of assessment that has been undertaken to consider any Aboriginal cultural heritage values that may be present on site and an Aboriginal Cultural Heritage Management Plan should be prepared if required.

The OEH recommends that the Modification application should be updated to address the outstanding information set out in points 1 and 2 above, before the application is again referred to OEH for further review.

If you have any further questions about this issue, Mr Krister Waern, Senior Operations Officer, Conservation and Regional Delivery, OEH, can be contacted on 6640 2503 or at krister.waern@environment.nsw.gov.au.

Yours sincerely

Dimitri Young 31 August 2018

DIMITRI YOUNG
Senior Team Leader Planning, North East Branch
Conservation and Regional Delivery

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NSW GOVERNMENT | Office of Environment & Heritage

Our Ref: DOC18/584487
Your Ref: DA 261-8-2002-i MOD 2

Department of Planning and Environment
GPO Box 39
Sydney NSW 2001

Attention: Mr Kane Winwood

Dear Mr Winwood

Re: Modification 2 - Rangers Valley Cattle Feedlot – Aboriginal Cultural Heritage matters

Thank you for your email dated 10 August 2018 about the above proposed modification to the Rangers Valley Cattle Feedlot seeking comments from the Office of Environment and Heritage (OEH). I appreciate the opportunity to provide input.

The OEH provided initial comments on this modification to you in our letter dated 31 August 2018. Further to that advice, the applicant has provided a copy of the original Aboriginal Cultural Heritage Assessment Report (ACHAR) which informed the original approval.

The OEH has reviewed the ACHAR dated 2001 and we generally concur with the findings, although we note that since the original assessment in 2001, the visible archaeological signature within the project area may have been altered by taphonomic processes.

Given the timespan since the original survey was carried out the OEH recommends that:

1. further consultation with the local Aboriginal community is carried out to ensure that the current community understanding is consistent with that at the time of the ACHAR being prepared;

2. an onsite archaeological survey of any areas where ground disturbing works are proposed is carried out prior to any final approval. This will ensure that any unexpected Aboriginal objects that may be present are treated in a scientifically and culturally appropriate manner.

If you have any further questions about this issue, Mr Krister Waern, Senior Operations Officer, Conservation and Regional Delivery, OEH, can be contacted on 6640 2503 or at Krister.Waern@environment.nsw.gov.au.

Yours sincerely

Dimitri Young 23 October 2018

DIMITRI YOUNG
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30th November 2018

Following are responses to the requirements of the revised project scope, supplied by RDC Engineers on behalf of Rangers Valley Feedlot. This report relates to the proposed modifications to expand the beef cattle feedlot, as outlined within the blue lined area in Drawing No: A8-114-10-01 Rev A.

Table 1 has been prepared by the Northern Tablelands Local Land Services (Northern Tablelands LLS). Column 1 lists the client requirements, and Column 2 reports the findings of the assessment. This report must be read in conjunction with the report compiled by Mr Tony Sonter (Consulting Archaeologist).

This report is in reference to the following supplied documentation;

- Drawing No: A8-114-10-01 Rev A (RDC Engineers – October 2018)
- Archaeological Surveys and Reports Pty Limited – September 2001 (John Appleton)
- Archaeological Investigation (EA Systems Pty Limited – September 2001) (Figure 3)
- Letter Glen Innes Local Aboriginal Land Council (19th September 2001)

Scope of work:

- Assessment of Aboriginal Cultural Heritage items and or values in the proposed cattle feedlot located at Rangers Valley Road, Glen Innes (as shown within blue lined section of referred drawing).
- A walkover of the area occurred to ensure no artefacts may have been uncovered during any rainfall events since the previous Archaeological study was undertaken.
- Correspondence with the Glen Innes Local Aboriginal Land Council to ensure that their position stated in their letter dated September 2001 still applies.
- Compile a report indicating area assessed and details of any items found.

Date of site visit and assessment. Wednesday 14th November 2018

Time on site: 3.5 hours

Attendees: Mr Tony Sonter (Archaeologist), Mr Jaydyn Potter (CEO – Glen Innes Local Aboriginal Land Council, Aboriginal Field Officer) and Mr Harry White (Senior Land Services Officer, Aboriginal Communities)

Table 1: Summary of Findings

Client requirements	Reporting Findings
Objects and Places: A description of the Aboriginal objects and declared Aboriginal places within the site.	This assessment has followed a robust procedure, and found no evidence of objects of Aboriginal Cultural Heritage within the 'revised field of works' as outlined within Drawing No: A8-114-10-01 Rev A, that would preclude the commencement of work on this project.
Values and significance: An assessment of Aboriginal Cultural Heritage values including the significance of the Aboriginal objects and declared Aboriginal places, that exist across the revised feedlot areas, (not previously surveyed), that will be affected by the proposal, and the significance of these values for the Aboriginal people who have a cultural association with the land.	This assessment found no evidence of objects of Aboriginal Cultural Heritage within the 'revised field of works' as outlined within Drawing No: A8-114-10-01 Rev A, that would preclude the commencement of work of the project.
Consultation: A description of any consultation with Aboriginal people regarding the significance of any Aboriginal cultural heritage values identified through that consultation.	**Glen Innes Local Aboriginal Land Council (GILALC)** • GILALC were contacted on the 5th November 2018 via email (Attachment 1). This email outlined the scope of the works and advised on the date of the survey. An undertaking was given to report back to GILALC at the conclusion of the survey. GILALC would receive copies of the reports by Northern Tablelands LLS and the consulting Archaeologist. • On the 14th November 2018 Mr Jaydyn Potter (CEO GILALC, Aboriginal Field Officer) attended the site in conjunction with Mr Harry White and Mr Tony Sonter to complete the scope of the works, as outlined above.
Likely Harm: A description of the actual or likely harm posed to the Aboriginal objects or declared Aboriginal places from the proposal, with reference to the cultural heritage values identified.	This assessment found no evidence of objects of Aboriginal Cultural Heritage within the 'revised field of works' as outlined within Drawing No: A8-114-10-01 Rev A, that would preclude the commencement of this project. Using a combination of skills and experience it is noted that the finding of any Aboriginal Cultural Heritage items particularly stone artefacts, would be extremely unlikely and if so, would be by chance encounter. Previous archaeological work and site field assessment have confirmed that the likelihood of the

Client requirements	Reporting Findings
	existence of Aboriginal Cultural Heritage sites or artefacts within the area, are extremely unlikely.
Protection and Conservation: A description of any practical measures that may be taken to protect and conserve those Aboriginal objects of declared Aboriginal places.	Using a combination of skills and experience it is noted that the finding of further Aboriginal Cultural heritage values, particularly stone artefacts, would be by chance encounter. Consideration should be given, to an Aboriginal Cultural Heritage education and orientation program, for all employees and contractors that undertake work that disturbs land or clears mature trees both living and dead. Such a program must involve the recognition of Aboriginal Cultural Heritage items in the field, so that employees and contractors, may act with due diligence in accordance with current legislation.
Avoid or mitigate likely harm: A description of any practical measures that may be taken to avoid or mitigate any actual or likely harm, alternatives to harm or, if this is not possible, to manage (minimise) harm.	As applicable. As above (Protection and Conservation)
Site Impact Recording: An Aboriginal Site Impact Permit (AHIP) must be completed and submitted to the Office of Environment and Heritage prior to the commencement of site works to the affected areas as assessed.	This assessment found no evidence of objects of Aboriginal Cultural Heritage within the 'revised field of works' as outlined within Drawing No: A8-114-10-01 Rev A, that would preclude the commencement of work of the project. Using a combination of skills and experience it is noted that the finding of further Aboriginal Cultural heritage values, particularly stone artefacts, would be by chance encounter.
Section 89A of the National Parks and Wildlife Act 1974: It is an offence for a person not to notify OEH of the location of any Aboriginal object the person becomes aware of, not already recorded on the Aboriginal Heritage Information Management System (AHIMS). An Aboriginal Site Impact Permit (AHIP) must be completed and submitted to the Office of Environment and Heritage	As applicable

Client requirements	Reporting Findings
prior to the commencement of site works to the affected areas as assessed.	

Attachments:

- Drawing No: A8-114-10-01 Rev A (RDC Engineers – October 2018)
- Archaeological Surveys and Reports Pty Limited – September 2001 (John Appleton)
- Archaeological Investigation (EA Systems Pty Limited – September 2001) (Figure 3)
- Letter Glen Innes Local Aboriginal Land Council (19th September 2001)
- Copy email to Glen Innes Local Aboriginal Land Council (5th November 2018)
- Letter from Glen Innes Local Aboriginal land Council (Undated) received 23rd November 2018
- Report T.Sonter (Archaeologist) December 2018

End of Report

……..

Figure 3 - Detail of the aerial photograph showing the survey paths (purple). The yellow bounded areas are the survey units.

Glen Innes Local Aboriginal Land Council
P.O. Box 157, Glen Innes NSW 2370
Ph (02) 67321150 Fax (02) 67326413
Email: gilalc@northnet.com.au

19th September 2001

Mr John Appleton
~~P.O Box 596~~, 10 Rosyn Ave
ARMIDALE NSW 2350

RE: SITES SURVEY - RANGERS VALLEY CATTLE STATION - 18/9/01

Dear Mr Appleton,

I Alfred Livermore surveyed a proposed site for a Feedlot in the Rangers Valley Cattle Station area yesterday.

I can conclude from my observations that this area is of no cultural significance to the Aboriginal community of Glen Innes.

Should you require any further information concerning this information please do not hesitate to contact me.

Yours Faithfully

Alfred Livermore

LEGEND

- RANGERS VALLEY CATTLE STATION
- CADASTRAL BOUNDARIES
- MAXIMUM EXTENT OF PROPOSED DISTURBANCE AREA
- AREA WITHIN PROPOSED DISTURBANCE AREA WITH LIMITED DISTURBANCE (SINCE EIS)

NOTES:

1. CADASTRAL INFORMATION BASED ON THE NSW GOVERNMENT SPATIAL SERVICES DIGITAL CADASTRAL DATABASE (DCDB) 2018, PROVIDED BY THE NSW DEPARTMENT OF FINANCE, SERVICES AND INNOVATION (DFSI) SPATIAL INFORMATION eXCHANGE AND ACCURACY IS LIMITED.
2. TOPOGRAPHIC INFORMATION BASED ON THE NSW GOVERNMENT SPATIAL SERVICES DIGITAL TOPOGRAPHIC DATABASE (DTDB) 2018, PROVIDED BY THE NSW DEPARTMENT OF FINANCE, SERVICES AND INNOVATION (DFSI) SPATIAL INFORMATION eXCHANGE AND ACCURACY IS LIMITED.
3. THIS MAP SHOWS THE LOCATION OF HYDROLINES TAKEN FROM THE DTDB.
4. INFORMATION MAY HAVE BEEN CAPTURED AT DIFFERENT ACCURACIES AND SCALES.
5. IMAGERY OBTAINED FROM NSW LAND AND PROPERTY INFORMATION 2015.
6. HORIZONTAL DATUM - UTM ZONE 56.

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STATUS: FOR EXTERNAL ISSUE
NOT TO BE USED FOR CONSTRUCTION PURPOSES

RPEQ

RDC ENGINEERS
AGRICULTURAL
ENVIRONMENTAL
PROJECT MANAGEMENT
ABN 37 627 163 071
PO BOX 1223
TOOWOOMBA QLD 4350
M: 0427 629 203
E: info@rdcengineers.com.au

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHECK	APPROVED
A	29/10/18	ISSUE TO CLIENT	RJD	RJD	RJD

SCALE	1:10,000 (A3)
DRAWN	RJD
DATE	29/10/2018
CHECKED	RJD
DATE	29/10/2018
APPROVED	RJD
DATE	29/10/2018

CLIENT: RANGERS VALLEY CATTLE STATION PTY LTD
PROJECT: RANGERS VALLEY FEEDLOT EXPANSION
TITLE: ABORIGINAL HERITAGE ASSESSMENT
DISTURBANCE AREA

CLIENT REFERENCE	SUPPLIED DRAWING NUMBER	A3	DRAWING NUMBER	REV.
			A8-114-10-01	A

DATE PLOTTED: 29 October 2018 BY : ROC Engineers PTY LTD
XREFs:
FILE PATH: C:\RDC Engineers\RDCE - Projects\A8-114 Rangers Valley FL Expansion\05 - ACAD MasterPlan\05.1 Drawings - CURRENT FILE NAME: A8-114 Rangers Valley Master Plan RDCE.dwg

Emails to Jaydyn Potter – Glen Innes LALC.

5th November 2018.

Hi Jaydyn

Many thanks for our conversation today's date in respect of the above project.

I attach five (5) files relating to this project, which was first surveyed by John Appleton (Archaeologist) back in 2001.

My brief, is to provide a quotation to complete a 'walk through' of the revised site, taking into account any Aboriginal Cultural Heritage items that may be found. From reading the Archaeologists report (Appleton 2001) the likelihood of occurrence is fairly minimal, however we need to confirm with the proprietors that this is (or is not) the case.

For the purpose of this request I will allow the nominal sum of $100.00 to cover any expenses you may incur on behalf of the Glen Innes Local Aboriginal Land Council. We will provide transport to and from the site at date to be confirmed. This fee is to include an updated statement of compliance, as per attached file from Alfred Livermore, provided that the status quo has been confirmed.

Should there be an occurrence of location of Aboriginal Cultural Heritage objects on the revised site (this scope of works), then a more detailed survey would need to take place in accordance with the legislation. This would form an extra/over cost to be negotiated, if required at a latter date.

I shall keep you informed of progress in this matter, and remain, yours faithfully

Harry

--
Kind regards - Harry

Harry White
Senior Land Service Officer (Aboriginal Communities)
Northern Tablelands Local Land Services
15 Vivian Street | Inverell NSW 2360
PO Box 411 | Inverell NSW 2360
Ph (02) 6720 8303 | Fax (02) 6720 8398 | Mob 0437 678 720
Email: harry.white@lls.nsw.gov.au
Web: northerntablelands.lls.nsw.gov.au

Glen Innes Local Aboriginal Land Council

Po Box 157, Glen Innes NSW 2370

181 Lang Street Glen Innes

Phone: 02 6732 1150 Fax 02 6732 6413

ABN: 84 095 702 728

Northern Tablelands Local Land Services
PO Box 411
Inverell NSW 2360

Attention: Mr Harry White
Senior Land Services Officer (Aboriginal Communities)

Dear Harry

Re: Rangers Valley Cattle Station Pty Ltd
Rangers Valley Feedlot Expansion

I refer to the above site and project and confirm that I accompanied Mr Tony Sonter (Archaeologist) and yourself (Senior Aboriginal Field Officer) on 14th November 2018, for the purpose of conducting an Aboriginal site survey to proposed expansion works, as shown within the whole of the 'blue' outlined area within Drawing A8-114-10-01 Rev A.

I conclude from my observations, that this area as before mentioned is of no cultural significance to the Aboriginal community of Glen Innes.

Should you require any further information concerning this information, please do not hesitate to contact me.

Yours faithfully

Jaydyn Potter
CEO – Glen Innes LALC

Aboriginal Heritage Assessment Review

Proposed cattle feedlot expansion

Rangers Valley Cattle Station Pty. Ltd.

Prepared by Tony Sonter

"Artefact and Aspect"

39 Brae St. Inverell. 2360

For

Northern Tablelands Local Land Services

15 Vivian Street Inverell 2360

November 2018

TABLE OF CONTENTS

LIST OF FIGURES, MAPS and TABLES

PLATES

- All plates, figures and maps are photographed, prepared and designed by the report author unless otherwise noted.

- Scales: Red & white range pole in 20cm units.
  Black and white IFRAO scale in 1cm units.

- GPS locations recorded by Harry White Senior Strategic Land Services Officer Aboriginal Communities Northern Tablelands Local Land Services

1. Abbreviations

A.C.H – Aboriginal Cultural Heritage.

A.C.H.A.R - Aboriginal Cultural Heritage Assessment Review

A.H. – Aboriginal Heritage

A.H.I.M.S. – (N.S.W.) Aboriginal Heritage Information Management System that exists as a searchable data base of recorded sites.

A.H.I.P. – Aboriginal Heritage Impact Permit. A document which may permit interference with Aboriginal sites and or places after complying with legislated process.

G.P.S. - Global Positional System. Hand held device that uses satellites to accurately record a position of an object on the earth surface.

L.A.L.C. – Local Aboriginal Land Council. The organisation representing the local Aboriginal community – in this case Anaiwan.

L.L.S. – Local Land Services. A N.S.W. State Government organisation that delivers customer-focussed services to farmers, landholders and the community across rural and regional New South Wales. In this case Northern Tablelands.

O.E.H. – Office of Environment and Heritage. A Division of the N.S.W. State Government responsible for the care and protection of the environment and heritage, including natural environment, Aboriginal country, culture and heritage, and built heritage.

R.A.P – Registered Aboriginal Party. An organisation or individual that has a formal interest in a specific project.

2. Executive Summary.

This Aboriginal Heritage (A.H.) assessment was completed as a consultative report in accordance with the requirements as expressed by Mr. Harry White, Senior Strategic Land Services Officer Aboriginal Communities, Northern Tablelands Local Land Services (LLS), Inverell.

This Aboriginal assessment review has been undertaken in response to an Office of Environment & Heritage (O.E.H.) request for information in relation to Aboriginal Cultural Heritage (A.C.H.) matters. An on-site archaeological survey has been undertaken on areas where new ground disturbing works are proposed in order to assess these areas for any unexpected Aboriginal objects that may be present since the initial Aboriginal Cultural Heritage Assessment Review (A.C.H.A.R) was undertaken by John Appleton of Archaeological Surveys and Reports Pty.Ltd. in September, 2001.

A field assessment of the proposed expanded site of the feedlot found no items of AH value and therefore there are no constraints on the basis of AH to the proposed feedlot expansion.

The areas planned for expansion have in the past experienced ploughing; construction of rural infrastructure such as dams, fences, roads, earthworks; substantial grazing and involved clearing of vegetation.

Even though no items of AH value were located during the field assessments all employees and contractors should be aware of ACH values and legislative requirements should items be uncovered during construction activities. To this end consideration should be given to an ACH education program for all contractors and employees prior to construction beginning.

3. Background Statement and Predictive Model

In September 2001 John Appleton undertook an AH assessment of the proposed expansion of the feedlot site and consequently submitted an "Archaeological Investigation Report". (See Figure 1 / Table 1)

The proponent, Rangers Valley Cattle Station Pty. Ltd. is now proposing to further expand the feedlot and while some areas planned for expansion were previously surveyed in 2001 this additional assessment review was undertaken given the time lapse since the original report.

Several landform or landscape units are more likely to reveal Aboriginal objects as a result of Aboriginal people using those landscape units in their traditional lives. Of those landform and landscape units the only one present in the survey area is the ridge line. The area to be assessed would have most likely have been devoid of permanent water pre European settlement and therefore not appealing for traditional Aboriginal peoples occupation or settlement.

Based on the results of previous ACH studies and current field survey officers experience the most likely site type to occur, if any, within the field of works, is the presence of stone artefacts either as isolated finds or a low density scatter.

Given vegetation cover over much of the area to be surveyed the recently cultivated centre pivot paddock (Area X) was most likely to reveal any items of Aboriginal Cultural Heritage.

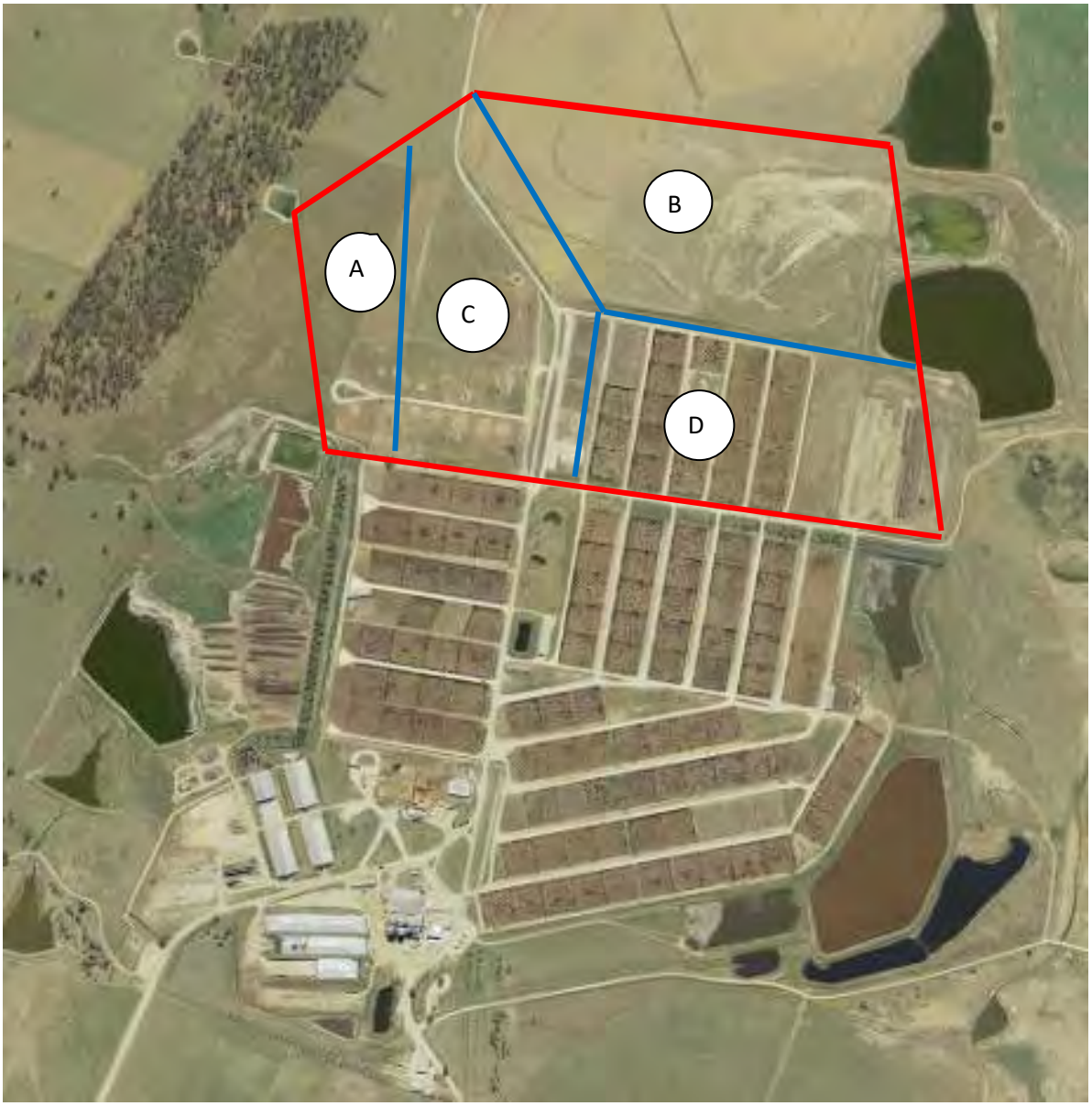

Figure 1. Area inside red irregular pentagon was surveyed in 2001 superimposed on 2018 aerial photo.

Area A – Western paddock

Area B – North-eastern paddock

Area C – Ridge

Area D – Eastern paddock

(Source: Assessment areas from Appleton, 2001 Figure 2 p.3 aerial photo www.maps.six.nsw.gov.au accessed 26th November, 2018.

Fig. 1 ref.	Appleton survey area	Original description: landuse / vegetation 2001	Changes 2018
A	Western Paddock	Originally grassy woodland predominantly box and white gum semi-closed dry sclerophyll	Totally cleared holding / grazing paddocks
B	North east paddock	Cleared pasture	Centre pivot irrigated crop land
C	Ridge	Originally grassy woodland predominantly box and white gum semi-closed dry sclerophyll	Totally cleared holding / grazing paddocks
D	Eastern paddock	Cleared pasture	Feedlot pens

Table 1. Changes to the landscape and feedlot infrastructure since 2001 survey

2018 Survey Areas	Average surface visibility %	Comments – no items of ACH origin were found in any area.
X. Centre pivot irrigation	100%	Heavily cultivated, very little stone material
Y. Grazing / Holding paddock	10%	Scattered scalds otherwise well covered by vegetation. (Plate 3)
Z. Dam and water catchment	20%	Some areas of exposed contour banks / water diversion channels.

Table 2. Visibility by area and assessment results

4. Site Assessment

The area for field assessment was divided into 3 sub sections. (Figure2)

Fieldwork was undertaken on Wednesday 14th November, 2018. Conditions were warm, sunny and clear and while the area had been drought declared for several months previously, 15mls of rain had fallen on the previous Wednesday / Thursday and surface visibility was fresh.

The field survey was undertaken by myself, Harry White, Senior Strategic Land Services Officer Aboriginal Communities, Northern Tablelands Local Land Services (LLS), Inverell and Jaydyn Potter (CEO – Aboriginal Sites Field Officer / CEO Glen Innes LALC). (Plates 1/2)

Field survey was undertaken in an "emu parade" boustrophedon manner with the 3 survey members walking approx 5-6m apart over the survey sweeps.

5. ACH Findings

No items of AH origin were identified during the field assessment and the likelihood of finding any during the construction phase of the feedlot expansion is minimal, however, notice should be taken of recommendations in the executive summary over awareness of AH items and value.

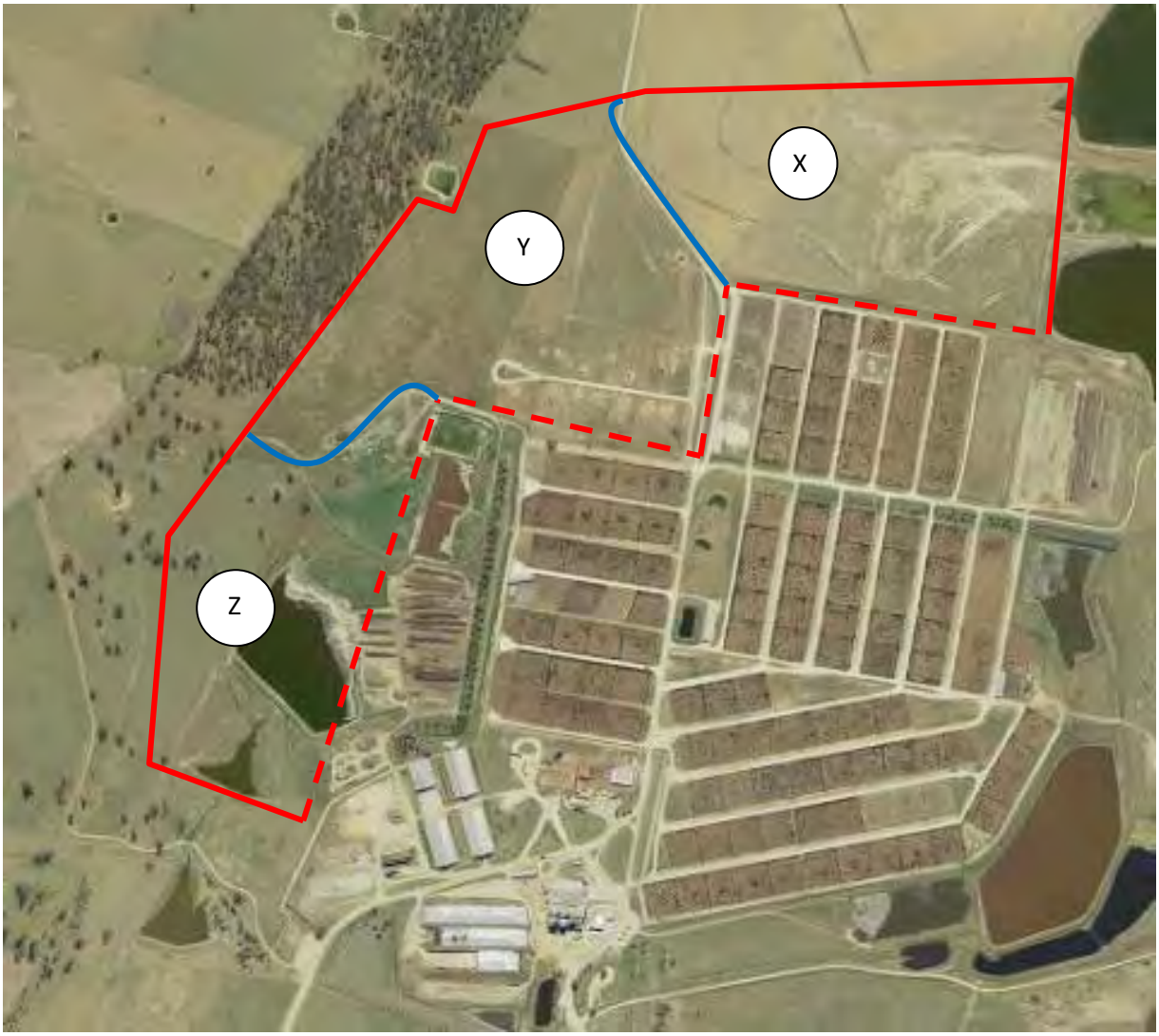

Figure 2. Areas surveyed in 2018 divided into 3 assessment units.

Area X. Centre pivot irrigation area. This area previously surveyed by Appleton as part of his “north-eastern paddock” had been converted into a cropping paddock with the addition of a centre pivot irrigation. On the day of the field assessment visibility was very good as the paddock had been ploughed and prepared for a corn crop that had been sown 4 days earlier. (Plates 1 & 2)

Area Y. Grazing / Holding paddocks. This area had been partially surveyed by Appleton as part of his “ridge and western paddock”. Grass cover was extensive although growth was short. (Plate 3) Survey tended to concentrate on:

- areas of bare earth scalds probably created by cattle “camping” where visibility was better

and

- the dirt roadway on the western fence line. (Plates 4, 5 & 6)

Area Z. Dam and western catchment paddock. Grass cover was extensive although growth was short. Survey tended to concentrate of areas of bare earth created by Infrastructure development for water catchment and diversion. (Plates 7 & 8)

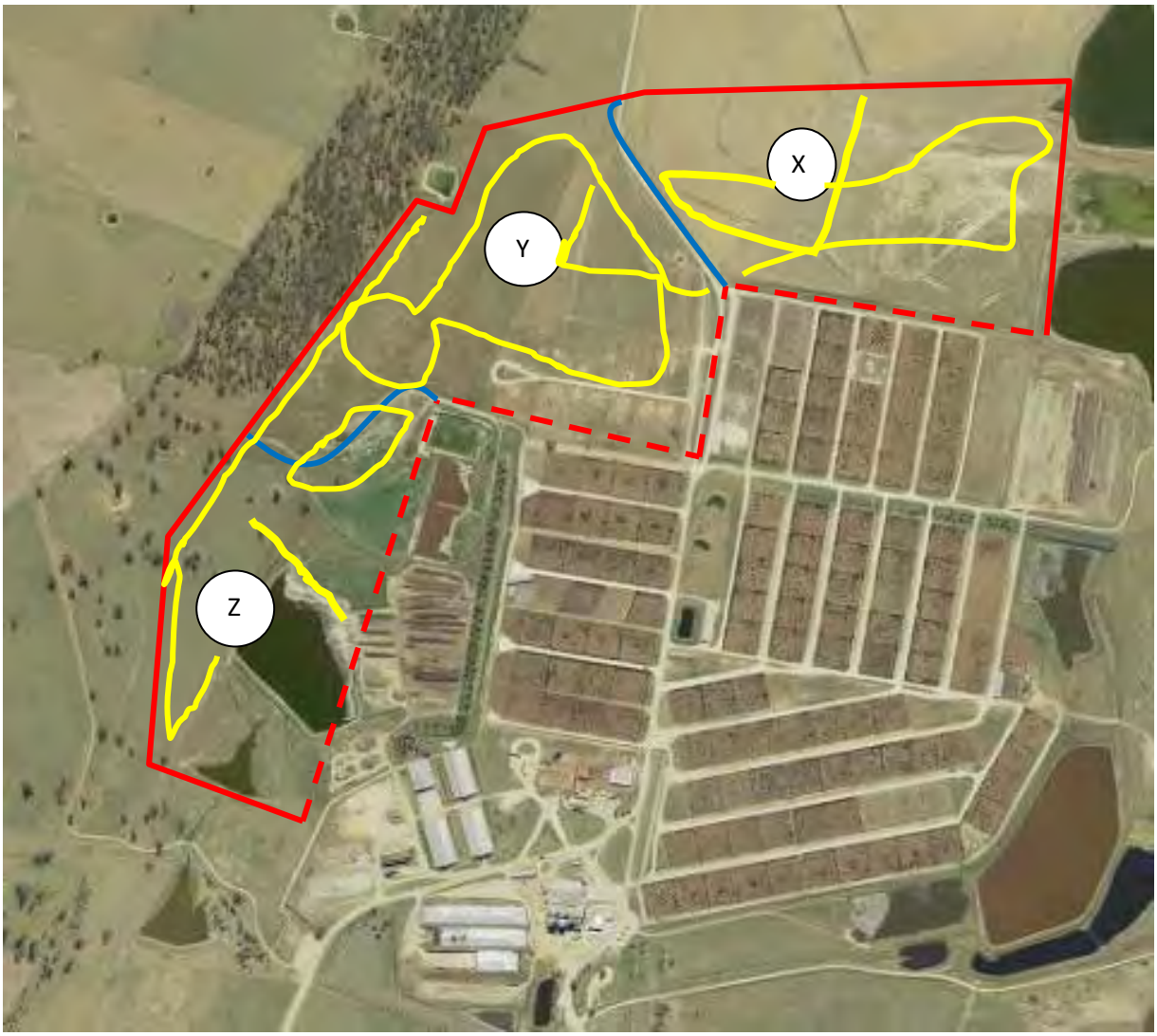

Figure 3. Survey coverage in 2018 by 3 assessment units.

6. Plates

Plate 1. Jaydyn Potter with centre pivot irrigator in background. Area surveyed included full half cultivated circle on southern area of paddock.

Plate 2. Harry White as part of survey of centre pivot irrigation area, western side.

Plate 3. Ground cover photo illustrative of Area Y grazing / holding paddock and Area Z western catchment.

Plate 4. Typical scald with good visibility

Plate 5. Jaydyn Potter and Harry White examine area of scald. Photo also illustrates grass cover and random occurrence of scalds. Photo taken looking west across grazing / holding paddocks Area Y.

Plate 6. Western edge of grazing / holding paddock area showing visibility of roadway running along western boundary Area Y.

Plate 7. Water diversion infrastructure works illustrating good visibility within assessment Area Z.

Plate 8. Contour bank with bare earth cattle track on crest within Area Z.

Plates 9a & 9b. Small nodules exposed in poorly structured granite soil. Yellow chert and red jasper both highly siliceous. No evidence of any modification as an artefact observed on water diversion bank Area Z.

Bibliography.

Appleton, J. (2001) Archaeological Investigation Report. Rangers Valley Feedlot. Unpublished Report for E.A.Systems Pty. Ltd. On behalf of Rangers Valley Cattle Station Pty. Ltd.

NSW GOVERNMENT | Office of Environment & Heritage

Our Ref: DOC19/132185
Your Ref: Email dated 7 December 2018

RDC Engineers Pty Ltd
PO Box 1223
Toowoomba QLD 4350

Attention: Mr Rod Davis

Dear Mr Davis

Re: Rangers Valley Feedlot, Aboriginal Cultural Heritage Assessment

Thank you for your email dated 7 December 2018 about the Aboriginal Heritage Assessment Review (AHAR) for the proposed Rangers Valley Feedlot seeking comments from the Office of Environment and Heritage (OEH). I appreciate the opportunity to provide input.

The OEH has reviewed the AHAR and accompanying information and we consider that all our previous requirements with regard to possible Aboriginal heritage values associated with the project have been addressed.

We note that no Aboriginal objects were identified during ground survey and that no known Aboriginal heritage constraints exist regarding the proposed works. We also note and concur with the recommendation that all personnel involved with the project are provided with an Aboriginal Heritage induction prior to commencing works.

The OEH recommends that a 'Chance Finds Procedure' is put into place to ensure that if any previously unidentified Aboriginal objects are located, they are dealt with in a legally and culturally appropriate manner.

If you have any further questions about this issue, Mr Roger Mehr, Archaeologist, Conservation and Regional Delivery, OEH, can be contacted on 6773 7005 or at Roger.Mehr@environment.nsw.gov.au.

Yours sincerely

Dimitri Young 28 March 2019

DIMITRI YOUNG
Senior Team Leader Planning, North East Branch
Conservation and Regional Delivery

Locked Bag 914 Coffs Harbour NSW 2450
Federation House, Level 8, 24 Moonee Street
Coffs Harbour NSW 2450
Tel: (02) 6659 8200 Fax: (02) 6659 8281
ABN 30 841 387 271
www.environment.nsw.gov.au

Annexure F – NSW Transport - Roads and Maritime Services – Submission and response

Transport
Roads & Maritime
Services

File No: NTH05/00287
Your Ref: DA 261-8-2002-i MOD 2

Industry Assessments
NSW Planning and Environment
GPO Box 39
SYDNEY NSW 2001

Attention: Shaun Williams

Dear Sir / Madam,

New England Highway [HW9]: Development Application 261-8-2002-I MOD 2 - Notice of Section 4.55(1A) - Modification to Rangers Valley Cattle Feedlot, Rangers Valley Road, Rangers Valley

I refer to your letter of 10 August 2018 requesting comment from Roads and Maritime Services in relation to the abovementioned development application.

Roles and Responsibilities

The key interests for Roads and Maritime are the safety and efficiency of the road network, traffic management, the integrity of infrastructure and the integration of land use and transport.

New England Highway is a classified (State) road under the *Roads Act 1993* (Roads Act). Glen Innes Shire Council is the roads authority for all public roads (other than freeways or Crown roads) in the local government area pursuant to Section 7 of the Roads Act. Roads and Maritime is the roads authority for freeways and can exercise roads authority functions for classified roads in accordance with the Roads Act. Any proposed works on a classified (State) road will require the consent of Roads and Maritime. Consent is provided under the terms of a Works Authorisation Deed (WAD).

In accordance with Clause 104 of the *State Environmental Planning Policy Infrastructure 2007* (ISEPP), Roads and Maritime is given the opportunity to review and provide comment on the subject development application as it meets the requirements under Schedule 3.

Roads and Maritime Response

Roads and Maritime has reviewed the referred information and provides the following comments to assist the consent authority in making a determination;

- The Environmental Assessment (EA) for the modification did not include an updated traffic impact assessment and it is unclear if the current intersection treatment is adequate for the expected traffic volumes / distributions for a typical ten year design horizon.

- New England Highway / Rangers Valley Road junction is showing signs of pavement failure due to heavy vehicle turning movements. The junction pavement should be reconstructed / upgraded to reduce maintenance requirements and improve road safety.

- The modification proposes additional turning movements during night time hours. Truck (crossing or entering) signs (W5-22) could be installed on the New England Highway on each approach to the junction in accordance with AS1742.2 Clause 4.11.2.5 to warn motorists and improve road safety.

Any works on the classified (State) road shall be designed and constructed in accordance with the current Austroads Guidelines, Australian Standards and Roads and Maritime supplements.

The developer will be required to enter into a Works Authorisation Deed (WAD) with Roads and Maritime for any works deemed necessary on the classified (State) road. The developer will be responsible for all costs associated with the works and administration for the WAD.

It is recommended that developers familiarise themselves with the requirements of the WAD process. Further information can be accessed using the following link:

http://www.rms.nsw.gov.au/projects/planning-principles/index.html

Advice to the Consent Authority

If you have any further enquiries regarding the above comments please do not hesitate to contact Mr Greg Sciffer, Development Assessment Officer, on (02) 6640 1362 or via email at: development.northern@rms.nsw.gov.au

Yours faithfully

Liz Smith
Network & Safety Manager, Northern Region

rod.davis@rdcengineers.com.au

From: rod.davis@rdcengineers.com.au
Sent: Monday, 15 October 2018 3:40 PM
To: 'development.northern@rms.nsw.gov.au'
Cc: 'Sean McGee'; 'Mark Whyte'; 'Keith Howe'
Subject: To Greg Sciffer: Re: File No: NTH05/00287 ; DA 261-8-2002-i MOD 2 - Review
Attachments: A8-114A RV SEE RMS Resp V1R2.pdf

Hi Greg,

I have prepared a draft response to the RMS request for additional information for Rangers Valley Feedlot (DA 261-8-2002-i MOD 2) development application based on our discussions last week.
Would you please be able to review the attached document for adequacy against the information/comments made in the RMS response. This will allow me to address any concerns or shortcomings prior to submission to DoP&E.

Regards,

Rod Davis
Director
—
0427629203
rod.davis@rdcengineers.com.au

RDC ENGINEERS | AGRICULTURAL ENVIRONMENTAL PROJECT MANAGEMENT

Response to RMS request for additional information in relation to Development Application 261-8-2002-i MOD 2 – Notice of Section 4.55(1A) – Modification to Rangers Valley Cattle Feedlot

Rangers Valley Cattle Station Pty Ltd
Rangers Valley Road
Glen Innes NSW 2370

Rangers Valley Cattle Station Pty Ltd
PO Box 63
GLEN INNES NSW 2370

[October 2018]

RDC ENGINEERS
AGRICULTURAL
ENVIRONMENTAL
PROJECT MANAGEMENT

PO Box 1223
TOOWOOMBA QLD 4350

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DOCUMENT STATUS RECORD

Prepared for:	Rangers Valley Cattle Station Pty Ltd (ABN 17 001 060 402)
Document Title:	Response to RMS request for additional information in relation to Development Application 261-8-2002-i MOD 2 - Notice of Section 4.55(1A) - Modification to Rangers Valley Cattle Feedlot
Project No:	A8-114A
Document File Name:	A8-114A RV SEE RMS Resp V1R3.docx

Version No	Date	Description	Prepared	Signature	Approved	Signature
V1R1	14/10/2018	Draft for client review	Rod Davis	R.J.Davis	Rod Davis	R.J.Davis
V1R2	15/10/2018	Draft for RMS	Rod Davis	R.J.Davis	Rod Davis	R.J.Davis
V1R3	18/10/2018	Final for DPE	Rod Davis	R.J.Davis	Rod Davis	R.J.Davis

Notes	Recipient	Lodgement	Copies
	Department of Planning and Environment (DPE)	Electronic	-

Citation: RDC Engineers Pty Ltd, 2018, Response to RMS request for additional information in relation to Development Application 261-8-2002-i MOD 2 - Notice of Section 4.55(1A) - Modification to Rangers Valley Cattle Feedlot, Rangers Valley Road, Glen Innes, V1R3 RDC Engineers Pty Ltd, Toowoomba, QLD, 4350.

Prepared by: Rodney James Davis B.Eng (Ag), M.Eng (Ag), FIEAust, CPEng, RPEQ, CPESC, C.Dec

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Executive Summary

Rangers Valley Cattle Station Pty Ltd own and operate an existing beef cattle feedlot, which is located about 28 km north of Glen Innes on the New England Tablelands, New South Wales.

In 2004, Development Consent DA-261-8-2002-i (DIPNR, 2004) was granted to Rangers Valley Cattle Station Pty Ltd for the expansion of the beef cattle feedlot from 24,000 head to 50,000 head.

In 2018, Rangers Valley Cattle Station Pty Ltd lodged a Development Application DA-261-8-2002-i MOD 2 with the Department of Planning and Environment (DPE) to modify Development Consent DA-261-8-2002-i for the Rangers Valley Feedlot. Development Application DA-261-8-2002-i MOD 2 is being assessed as State Significant Development.

Access to Rangers Valley Feedlot is via Rangers Valley Road. Rangers Valley Road is a local road under the jurisdiction of the Glen Innes Severn Council and forms a 'T' junction with the New England Highway some 13 km east of the feedlot site. The New England Highway is a State Road under the control of Roads and Maritime Services (RMS).

RMS requested additional information to assist the consent authority in making a determination for Development Application 261-8-2002-i MOD 2 for Rangers Valley Feedlot.

This response report has been prepared by RDC Engineers Pty Ltd on behalf of the proponent, Rangers Valley Cattle Station Pty Ltd for submission to the Secretary, DPE as part of the DPE's review process for Development Application 261-8-2002-i MOD 2.

This response report provides information to address the RMS request for additional information. This report demonstrates that the existing turn treatments CHR and AUL at the New England Highway and Rangers Valley Road T-intersection are acceptable treatments for the relevant traffic volumes from a safety perspective.

To improve the safety of the intersection, maintenance is required on the throat of the intersection by the relevant authority due to the existing condition of the pavement.

To further improve road safety at the intersection of the New England Highway and Rangers Valley Road, truck (crossing or entering) signs (W5-22) are proposed to be installed on each approach to the junction as an additional safety measure due to the number of heavy vehicle turning movements and the additional turning movements proposed during night time hours.

1 Introduction

1.1 Development background

Rangers Valley Cattle Station Pty Ltd own and operate an existing beef cattle feedlot, which is located about 28 km north of Glen Innes on the New England Tablelands in New South Wales as shown in Figure 1.

In 2004, Development Consent DA-261-8-2002-i (DIPNR, 2004) was granted to Rangers Valley Cattle Station Pty Ltd for the expansion of the beef cattle feedlot from 24,000 head to 50,000 head. Since that time there have been various minor variations approved to the Development Consent. Currently, Rangers Valley Feedlot has a built capacity of 32,500 head.

In 2018, Rangers Valley Cattle Station Pty Ltd lodged a Development Application DA-261-8-2002-i MOD 2 with the DPE to modify Development Consent DA-261-8-2002-i for the Rangers Valley Feedlot. Development Application DA-261-8-2002-i MOD 2 is being assessed as State Significant Development.

Development Application DA-261-8-2002-i MOD 2 seeks to modify site layout and staging; incorporate an emergency wet weather manure storage area; increase traffic movement hours; alter effluent and manure utilisation areas; and modify conditions of consent for the Rangers Valley Feedlot.

The principal road that provides access to Rangers Valley Feedlot is Rangers Valley Road. Rangers Valley Road is a local road under the jurisdiction of the Glen Innes Severn Council and forms a 'T' junction with the New England Highway some 13 km east of the feedlot site. The New England Highway is a State Road under the control of Roads and Maritime Services (RMS).

In accordance with Clause 104 of the *State Environmental Planning Policy Infrastructure 2007* (ISEPP), Roads and Maritime is given the opportunity to review and provide comment on Development Application DA-261-8-2002-i MOD 2 as it meets the requirements under Schedule 3.

RMS have reviewed Development Application DA-261-8-2002-i MOD 2 and have requested additional information to assist the assessment by the DPE.

This response report has been prepared by RDC Engineers Pty Ltd on behalf of the proponent, Rangers Valley Cattle Station Pty Ltd for submission to the Secretary, DPE as part of the DPE's review process for Development Application 261-8-2002-i MOD 2.

RANGERS VALLEY FEEDLOT

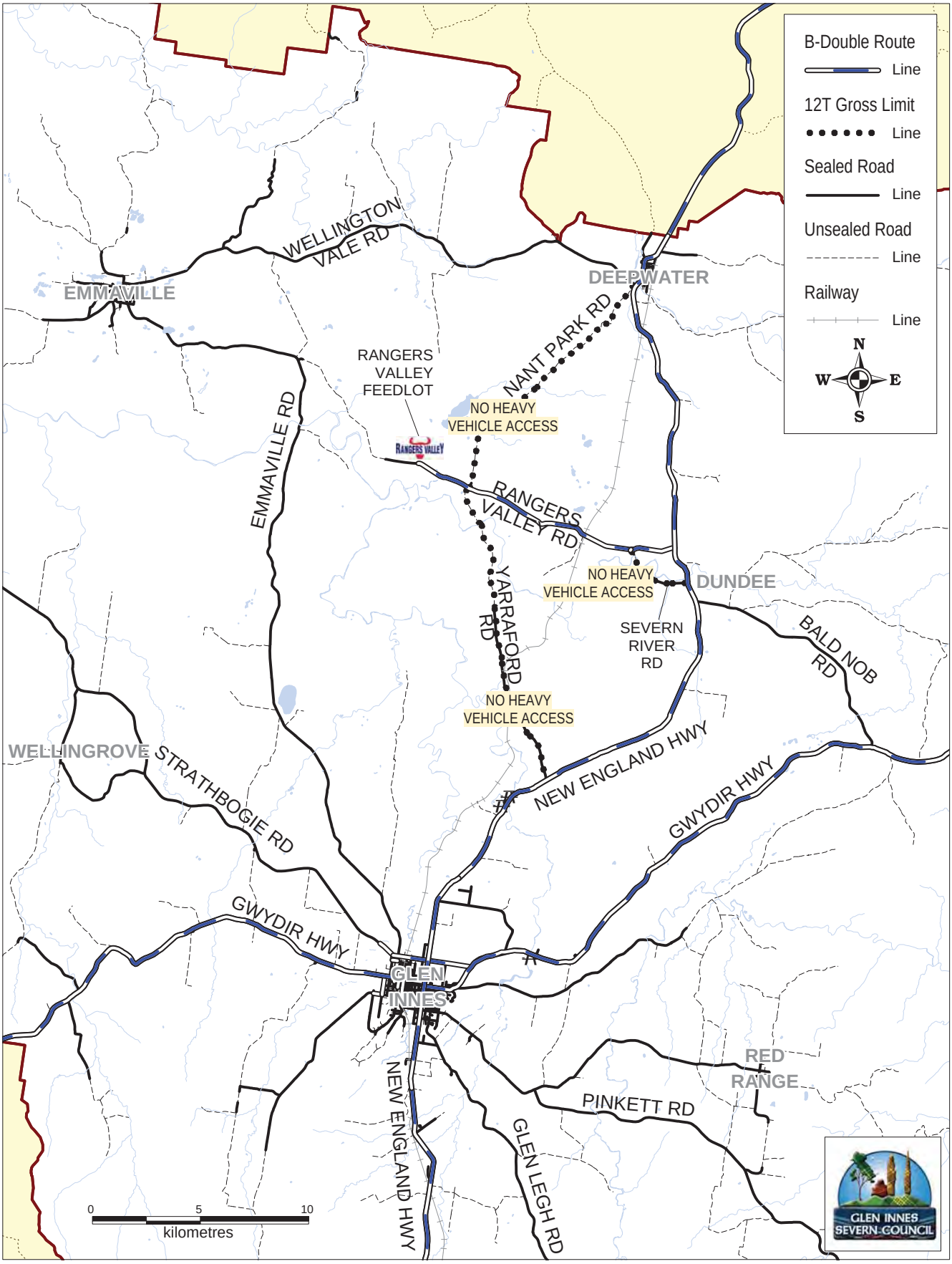

FIGURE 1

2 Response to request for additional information

The key interests for RMS are the safety and efficiency of the road network, traffic management, the integrity of infrastructure and the integration of land use and transport.

New England Highway is a classified (State) road under the *Roads Act 1993* (Roads Act). Glen Innes Severn Council is the roads authority for all public roads (other than freeways or Crown roads) in the local government area pursuant to Section 7 of the Roads Act. RMS is the roads authority for freeways and can exercise roads authority functions for classified roads in accordance with the Roads Act. Any proposed works on a classified (State) road will require the consent of RMS. Consent is provided under the terms of a Works Authorisation Deed (WAD).

RMS requested additional information to assist the consent authority in making a determination for Development Application 261-8-2002-i MOD 2 - Notice of Section 4.55(1A) - Modification to Rangers Valley Cattle Feedlot, Rangers Valley Road, Rangers Valley in a letter dated 18 August 2018. A copy of the RMS request is provided in Appendix A.

The following sections provide responses to the information requested by RMS in relation to Development Application DA-261-8-2002-i MOD 2.

2.1 Traffic Impact Assessment

Information requested - The Environmental Assessment (EA) for the modification did not include an updated traffic impact assessment and it is unclear if the current intersection treatment is adequate for the expected traffic volumes / distributions for a typical ten year design horizon.

The following sections provides updated information in relation to traffic impacts to determine if the current treatment of the New England Highway and Rangers Valley Road T-intersection is adequate for the expected traffic volumes and distributions for a typical ten year design horizon from a safety perspective.

2.1.1 Traffic volumes

2.1.1.1 New England Highway

Table 1 and Table 2 shows the daily traffic volumes including heavy vehicles using the New England Highway 200m north of the Severn River Road (Station ID T0259) in 2016 and 2017. This location is about 1,400 m south of the intersection of Rangers Valley Road and the New England Highway.

Reference to Table 1 and Table 2 shows that on a typical weekday (5 day average) and over a 12 month period, the New England Highway, south of Rangers Valley Road, carried southbound traffic volumes of 1105 vpd and 1137 vehicles per day (vpd) in 2016 and 2017 respectively. Southbound heavy vehicles (Austroad Classes 3 to 12) total 298 vpd and 293 vpd in 2016 and 2017 respectively.

Comparison between Table 1 and Table 2 shows that the southbound average annual daily traffic is slightly higher in 2017 when compared with 2016 volumes.

Heavy vehicles represented around 27% of total southbound traffic volumes using the New England Highway, south of Rangers Valley Road in 2016.

Reference to Table 2 shows that on a typical weekday (5 day average) and over a 12 month period, the New England Highway, south of Rangers Valley Road, carried two-way traffic volumes of 2,236 vpd and 2,223 vpd respectively. Heavy vehicles (Austroad Classes 3 to 12) comprised 591 vpd and 536 vpd respectively.

Heavy vehicles represented around 24% of total traffic volumes using the New England Highway, south of the Rangers Valley Road in 2017.

Table 1 – Traffic generation – AADT 2016 (Station ID T0259)

Direction	5 day	AADT
Northbound		
	ND	ND
Southbound		
All vehicles	1232	1105
Light vehicles	870	822
Heavy vehicles	362	298

*ND -no data available

Table 2 – Traffic generation – AADT 2017 (Station ID T0259)

Direction	5 day	AADT
Northbound		
All vehicles	1092	1086
Light vehicles	825	842
Heavy vehicles	267	243
Southbound		
All vehicles	1144	1137
Light vehicles	820	844
Heavy vehicles	324	293

Table 3 shows the hourly traffic volumes (vehicles per hour) using the New England Highway, south of Rangers Valley Road on an average weekday (5 day average) and weekly (7 day average).

Table 3 – Traffic generation - Hourly traffic volumes 2017 (Station ID T0259)

	5 Day Average		7 Day Average	
	Northbound vph	Southbound vph	Northbound vph	Southbound vph
Midnight – 1am	8	8	8	8
1am – 2am	7	7	7	7
2am – 3am	7	7	6	6
3am – 4am	7	5	6	5
4am – 5am	7	7	7	7
5am – 6am	13	14	12	12
6am – 7am	29	27	26	24
7am – 8am	50	47	45	41
8am – 9am	69	77	65	70
9am – 10am	87	83	84	79
10am – 11am	96	86	95	84
11am – 12 noon	99	87	**99**	85
12 noon – 1pm	93	90	94	89
1pm – 2pm	90	93	90	93
2pm – 3pm	89	100	82	**99**
3pm – 4pm	84	98	87	97
4pm – 5pm	75	87	71	86
5pm – 6pm	65	74	60	72
6pm – 7pm	43	50	40	50
7pm – 8pm	30	35	29	34
8pm – 9pm	23	26	22	25
9pm – 10pm	19	21	18	20
10pm – 11pm	14	16	14	15
11pm - Midnight	11	12	10	11
Total	1115	1157	1077	1119

Reference to Table 3, shows that over a 7-day average, the peak hourly traffic generation on the New England Highway, south of Rangers Valley Road in 2017 was about 99 vehicles per hour northbound and southbound respectively. This equates to about 8.4% of the AADT.

To determine the traffic generation for a ten year horizon a growth rate of 1% per year was assumed. This rate is conservative as the AADT traffic generation on the New England Highway was relatively similar between 2016 and 2017 data as shown in Table 1 and Table 2. The growth rate was applied to 2017 data shown in Table 2. In accordance with Austroads (2017), the peak hour volumes for the New England Highway based on 15% of the AADT for rural roads (Austroads, 2017) were calculated and are shown in Table 4. These data are higher than the measured peak hour data and as a conservative approach, the higher value of 15% of AADT was used in the assessment of the warrants.

Table 4 – New England Highway estimated traffic generation - Ten year horizon 2028

Direction	Peak hourly vph	AADT vpd
Northbound	181	1205
Southbound	189	1262

2.1.1.2 Rangers Valley Road

The traffic volume on Rangers Valley Road is characterised by traffic to and from the Rangers Valley Feedlot.

Glen Innes Severn Council have recorded traffic counting data on Rangers Valley Road at various locations in various years. These data are shown in Table 5 and includes both traffic not associated with the feedlot (background traffic) and traffic associated with the feedlot. Figure 1 shows the locals roads and New England Highway in relation to the feedlot site.

Table 5 – Rangers Valley Road AADT

Year	Location	AADT vpd	Heavy Vehicles vpd (%)
2016	Yarraford Road (southern)	100	7 (7)
2015	Rangers Valley Road (at junction with New England Highway)	83	34 (41)
2014	Nant Park Road (southern)	32	7 (21)
2014	Rangers Valley Road (west of Nant Park Road)	120	59 (49)
2012	Rangers Valley Road (west of feedlot truck entrance)	43	15 (35)

These data reflect vehicles not associated with the feedlot (background traffic) and feedlot related vehicles at the as-constructed capacity of the feedlot in those years which was 32,500 head not the approved capacity of 50,000 head in Development Consent DA-261-8-2002-i. These data recorded an average, daily traffic of 83 vpd and 88 vpd with 41% and 59% being heavy vehicles (~34 vpd, ~52vpd) at the junction with the New England Highway in 2014 and 2015 respectively. These data recorded an average daily traffic of 43 vpd with 35% being heavy vehicles (~15 vpd) west of the feedlot entrance. Consequently, these data were correlated with the traffic volumes estimated to be generated in Development Consent DA-261-8-2002-i.

Traffic volumes from the original Development Application were used and correlated with traffic count data shown in Table 5. Truck movements were estimated to be in the order of 37 two-way trips per day based on 37 trips in/37 trips out per day for an as-constructed capacity of 50,000 head. Currently, Rangers Valley Feedlot has an as-constructed capacity of 32,500 head and generated about 37 and 19 heavy vehicle movements per day in 2014 and 2015 as measured by traffic counters on Rangers Valley Road prior to the intersection with the New England Highway. The reduction in heavy vehicle movements in 2015 may reflect a greater use of B-Double vehicles than semi-trailers. The traffic count data comprise background heavy

vehicles not associated with the feedlot which has been estimated at 15 vpd from 2012 data. The estimated vehicles and equipment required during operation of the Rangers Valley Feedlot at an as-constructed capacity of 50,000 head are shown in Table 6.

The estimated number of heavy vehicles generated for a capacity of 50,000 head in the 2002 development application were based on a 50/50 split between semi-trailers and B-Doubles. Consequently, these volumes overestimate the likely volumes that would be generated in a developed capacity of 50,000 head as all livestock and a majority of commodities are currently, and would continue to be transported using B-double configurations.

Rangers Valley Feedlot currently employs in the order of 50 persons (FTEP) at the current developed capacity of 32,500 head. Employees travel to the site from the direction of Deepwater, Glen Innes and Emmaville. Employees and visitors travelling from Deepwater and Glen Innes also have alternate routes to the feedlot site other than the Rangers Valley Road and New England Highway T-intersection. These routes are Nant Park Road and Yarraford Road which are unsealed roads used predominantly in dry weather. Typically, about 25% of employees travel from the direction of Emmaville and Deepwater and 50% from Glen Innes.

The existing feedlot related light vehicle trips, assuming that visitor trips also occur, is estimated to be in the order of 38 two-way trips per day based on 19 trips in/19 trips out from the intersection of Rangers Valley Road and the New England Highway and 12 non-related feedlot light vehicle trips per day. This correlates with the AADT traffic measured on Rangers Valley Road of 49 light vehicles trip per day in 2015 by the Glen Innes Severn Council which includes feedlot and non-feedlot related vehicles.

At a developed capacity of 50,000 head, the development will employ in the order of 65 persons (FTEP). Using the same travel directional split as the current development and existing background traffic levels, it is expected that total feedlot and non-feedlot light vehicle trips will be in the order of 64 two-way trips per day based on 32 trips in/32 trips out from the intersection of Rangers Valley Road and the New England Highway.

Table 6 – Rangers Valley Road estimated traffic generation (50,000 head)

Activity	Vehicle Type	Peak hourly vph	AADT vpd
Feedlot livestock*	B-Double	2	14
Feedlot commodities*	B-Double/Semi-trailers	9	60
Background traffic	Heavy vehicles	2	15
Feedlot employees#	Light vehicles	8	52
Background traffic	Light vehicles	2	12
Total		23	153

*from original EIS (EA Systems, 2002)

#based on current staff levels at 32,500 head and required staff levels at 50,000 head

To determine the traffic generation for a ten year horizon a growth rate of 1% per year was applied from a baseline year of 2015. The growth rate was applied to data shown in Table 6 as if the development was at a fully developed capacity of 50,000 head. As the peak hour

volumes for Rangers Valley Road are not available it has been assumed that the design peak hour volume is equivalent to 15% of the AADT in accordance with Austroads (2017). The ten year horizon 2028 traffic generation for Rangers Valley Road is shown in Table 7.

Table 7 – Rangers Valley Road estimated traffic generation - Ten year horizon 2028

Activity	Vehicle Type	Peak hourly vph	AADT vpd
Feedlot livestock	B-Double	3	16
Feedlot commodities	B-Double/Semi-trailers	10	68
Background traffic	Heavy vehicles	3	17
Feedlot employees	Light vehicles	9	59
Background traffic	Light vehicles	2	14
Total		26	174

2.1.2 Traffic levels at key intersection

Based on current directional splits of light vehicles and heavy vehicles carrying livestock in and out and commodities (liquids, grains, hay etc) in, the following trips will be distributed across the New England Highway and Rangers Valley Road T-intersection:

- 66% of light vehicles entering Rangers Valley Road will be northbound from Glen Innes;
- 33% of light vehicles entering Rangers Valley Road will be southbound from Deepwater;
- 85% of heavy vehicles entering Rangers Valley Road will be northbound from Glen Innes; and
- 15% of heavy vehicles entering Rangers Valley Road will be southbound from Deepwater.

2.1.3 Compliance with Development Consent

New England Highway / Rangers Valley Road junction is showing signs of pavement failure due to heavy vehicle turning movements. The junction pavement should be reconstructed / upgraded to reduce maintenance requirements and improve road safety.

Rangers Valley Cattle Station Pty Ltd have undertaken various works in relation to traffic and transport impacts in accordance with the conditions of the Development Consent DA-261-8-2002-i dated 7th January 2004.

Prior to the commencement of operations, Rangers Valley Cattle Station Pty Ltd at its own cost upgraded the intersection of the New England Highway and Rangers Valley Road to a Type "B" intersection, in accordance with conditions of Development Consent DA-261-8-2002-i and the specifications and requirements of the NSW Roads and Traffic Authority (RTA) at that time. Currently, the T-intersection has channelised right turn (CHR) and auxiliary left turn (AUL) treatments on the New England Highway. These works were carried out in 2006. A copy of the as-constructed works is provided in Appendix B.

Rangers Valley Cattle Station Pty Ltd have implemented a Transport Code of Conduct as part of the Operational Environmental Management Plan for the development, required under condition 6.3 of the Development Consent.

Currently, Rangers Valley Cattle Station Pty Ltd contribute to the maintenance and repairs of Rangers Valley Road via a monetary contribution directly to the Glen Innes Severn Council in accordance with clause 3.46 of Development Consent DA-261-8-2002-i. This contribution is on a per tonne per kilometre per year basis. Consequently, the total contribution amount shall increase with an increase in the throughput of the development.

There is no formal instrument of agreement between Rangers Valley Cattle Station Pty Ltd and the Glen Innes Severn Council outlining any specific details of the coverage, timing, extent and/or nature of works on Rangers Valley Road in relation to this contribution.

Since the commencement of operations, Glen Innes Severn Council have undertaken various maintenance, repairs and upgrades to Rangers Valley Road and funds have been allocated for further works in 2018/2019.

2.1.4 Safety performance outcomes

2.1.4.1 Warrants for existing turn treatments

Evaluation of the safety performance of the New England Highway and Rangers Valley Road T-intersection was undertaken using the methodology outlined in section 2.3.6 of Austroads (2017). The methodology was used to determine the adequacy of the existing turn treatments from a safety perspective. The warrants shown in Figure 2.26 of Austroads (2017) are the warrants that apply to major road turn treatments with various design speeds. The warrants for a design speed greater than 100 km/hr for high-speed rural roads were adopted. This

corresponds with the warrants shown in Figure 2.26(a) of Austroads (2017) and they are reproduced in Figure 2.

The major road (New England Highway) traffic volumes are the peak-hour volumes for the ten year planning horizon accounting for turning volumes and through traffic. The peak-hour volumes for the ten year planning horizon of the New England Highway are outlined in section 2.1.1.1 and Table 4.

The turn volumes (Q_R or Q_L) off the New England Highway into Rangers Valley Road were determined from the traffic directional splits as outlined in section 2.1.2 multiplied by the peak-hour volumes for the ten year planning horizon for Rangers Valley Road. As the peak hour volumes for Rangers Valley Road are not available it has been assumed that the design peak hour volume is equivalent to 15% of the AADT. The peak hour traffic and AADT for Rangers Valley Road for a ten year planning horizon are provided in Table 7.

The through volumes were calculated from the New England Highway traffic volumes and the turn volumes into Rangers Valley Road. The peak hour turn and through volumes for the New England Highway and Rangers Valley Road T-intersection are provided in Table 8.

Table 8 – Peak hour turn and through volumes for New England Highway and Rangers Valley Road T-intersection

Road	Direction	Q_{T1} vph	Q_{T2} vph	Q_R vph	Q_L vph
New England Highway	Southbound	189	NA	6	NA
	Northbound	NA	161	NA	20

Once the peak hour turn and through volumes for the intersection were calculated, the values for Q_M were then determined from Figure 2.27 of Austroads (2017). Table 9 provides the peak hour traffic volumes (Q_M) for the New England Highway. Vehicles per hour (vph) is the same as the vehicle per hour (Veh/h) notation used in Austroads (2017).

Table 9 – New England Highway peak hour traffic volumes

Road Type	Turn Type	Q_M vph	Q_M vph
Two-lane two-way	Right, no splitter island	$= Q_{T1} + Q_{T2} + Q_{LI}$	370
	Left	$= Q_{T2}$	161

The value of Q_R and Q_L (Table 8) at each corresponding value of Q_M (Table 9) were plotted on Figure 2. As can be seen in Figure 2, the existing turn treatments CHR and AUL are acceptable treatments for the relevant traffic volumes from a safety perspective.

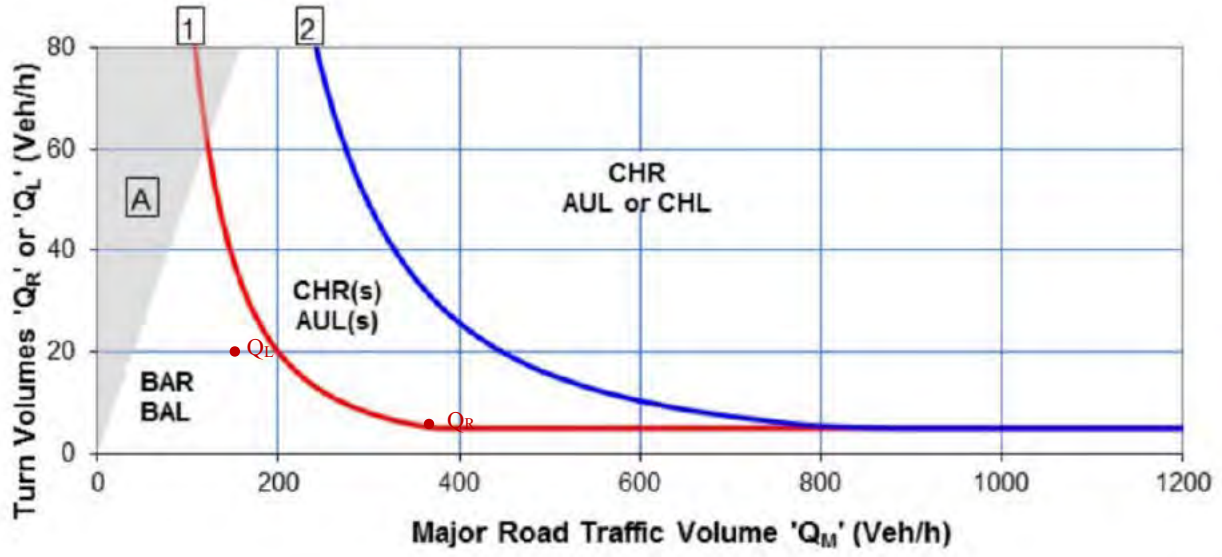

Figure 2 – Warrants for turn treatments on major roads at unsignalised intersections (Austroads, 2017)

2.1.4.2 Intersection condition

The current pavement condition of the New England Highway and Rangers Valley Road T-intersection is shown in Photograph 1 to Photograph 4. Photograph 1 is taken from Rangers Valley Road and is looking east towards the intersection. Photograph 2, Photograph 3 and Photograph 4 are taken from the New England Highway looking southbound, northbound and west down Rangers Valley Road respectively.

These photographs show that the New England Highway and Rangers Valley Road T-intersection is showing signs of pavement breakup in the throat of the intersection due to heavy vehicle turning movements. The southern turn radius pavement is in a worse condition than the northern turn radius pavement as the majority of heavy vehicles enter Rangers Valley Road from the south. The exact cause of the failure of the pavement is not known but possible causes are that the pavement is not carrying the load or vehicles are turning too quickly.

Consequently, to improve the safety of the intersection, maintenance is required on the throat of the intersection by the relevant authority.

Photograph 1 – New England Highway and Rangers Valley Road T-Intersection - Looking east

Photograph 2 – New England Highway and Rangers Valley Road T-Intersection - Looking south

Photograph 3 – New England Highway and Rangers Valley Road T-Intersection - Looking north

Photograph 4 – New England Highway and Rangers Valley Road T-Intersection - Looking west

2.1.4.3 Signage

The modification proposes additional turning movements during night time hours. Truck (crossing or entering) signs (W5-22) could be installed on the New England Highway on each approach to the junction in accordance with AS1742.2 Clause 4.11.2.5 to warn motorists and improve road safety.

To further improve road safety at the intersection of Rangers Valley Road and the New England Highway, additional safety measures are proposed due to the number of heavy vehicle turning movements and the additional turning movements proposed during night time hours.

It is proposed to install Truck (crossing or entering) signs (W5-22) size B (750 mm x 750 mm) on the New England Highway on each approach to the junction in accordance with AS1742.2 Clause 4.11.2.5 to warn motorists and improve road safety.

3 References

Austroads 2017, Guide to traffic management: part 6: Intersections, Interchanges and Crossings, AGTM06-17, Austroads, Sydney, NSW.

Department of Infrastructure, Planning and Natural Resources (DIPNR), 2004, Ministerial Consent - Integrated DA No. DA-261-8-2002-i, NSW Government Department of Infrastructure, Planning and Natural Resources.

EA Systems, 2002, Environmental Impact Statement, Feedlot Expansion, Rangers Valley Cattle Station, Armidale, NSW.

Appendix A – RMS Request for Information

Transport
Roads & Maritime
Services

File No: NTH05/00287
Your Ref: DA 261-8-2002-i MOD 2

Industry Assessments
NSW Planning and Environment
GPO Box 39
SYDNEY NSW 2001

Attention: Shaun Williams

Dear Sir / Madam,

New England Highway [HW9]: Development Application 261-8-2002-I MOD 2 - Notice of Section 4.55(1A) - Modification to Rangers Valley Cattle Feedlot, Rangers Valley Road, Rangers Valley

I refer to your letter of 10 August 2018 requesting comment from Roads and Maritime Services in relation to the abovementioned development application.

Roles and Responsibilities

The key interests for Roads and Maritime are the safety and efficiency of the road network, traffic management, the integrity of infrastructure and the integration of land use and transport.

New England Highway is a classified (State) road under the *Roads Act 1993* (Roads Act). Glen Innes Shire Council is the roads authority for all public roads (other than freeways or Crown roads) in the local government area pursuant to Section 7 of the Roads Act. Roads and Maritime is the roads authority for freeways and can exercise roads authority functions for classified roads in accordance with the Roads Act. Any proposed works on a classified (State) road will require the consent of Roads and Maritime. Consent is provided under the terms of a Works Authorisation Deed (WAD).

In accordance with Clause 104 of the *State Environmental Planning Policy Infrastructure 2007* (ISEPP), Roads and Maritime is given the opportunity to review and provide comment on the subject development application as it meets the requirements under Schedule 3.

Roads and Maritime Response

Roads and Maritime has reviewed the referred information and provides the following comments to assist the consent authority in making a determination;

- The Environmental Assessment (EA) for the modification did not include an updated traffic impact assessment and it is unclear if the current intersection treatment is adequate for the expected traffic volumes / distributions for a typical ten year design horizon.

- New England Highway / Rangers Valley Road junction is showing signs of pavement failure due to heavy vehicle turning movements. The junction pavement should be reconstructed / upgraded to reduce maintenance requirements and improve road safety.

- The modification proposes additional turning movements during night time hours. Truck (crossing or entering) signs (W5-22) could be installed on the New England Highway on each approach to the junction in accordance with AS1742.2 Clause 4.11.2.5 to warn motorists and improve road safety.

Any works on the classified (State) road shall be designed and constructed in accordance with the current Austroads Guidelines, Australian Standards and Roads and Maritime supplements.

The developer will be required to enter into a Works Authorisation Deed (WAD) with Roads and Maritime for any works deemed necessary on the classified (State) road. The developer will be responsible for all costs associated with the works and administration for the WAD.

It is recommended that developers familiarise themselves with the requirements of the WAD process. Further information can be accessed using the following link:

http://www.rms.nsw.gov.au/projects/planning-principles/index.html

Advice to the Consent Authority

If you have any further enquiries regarding the above comments please do not hesitate to contact Mr Greg Sciffer, Development Assessment Officer, on (02) 6640 1362 or via email at: development.northern@rms.nsw.gov.au

Yours faithfully

Liz Smith
Network & Safety Manager, Northern Region

Appendix B – New England Highway and Rangers Valley Road Intersection - As-constructed drawings

☑ **HEAD OFFICE**
PO Box 495 (148A Palmerin Street)
WARWICK QLD 4370
Ph: (07) 4660 3300 Fax: (07) 4660 3310
email: warwick@osbornlane.com

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email: mtisa@osbornlane.com

OSBORN LANE
Consulting Engineers

A Partnership of Osborn Lane Pty Ltd A.C.N 061 799 979
& Gremfield Pty Ltd A.C.N 073 121 258

Transmittal Advice

To:	John Perkins	From:	Arkadius Feininger
Of:	RTA Project Management Services, Northern Region Grafton PO Box 576 Grafton, NSW 2460	Date:	04.06.2007 = date of practical completion
		File No:	WK03-0369/RV06-01
Re:	Intersection New England Hwy/Dundee-Rangers Valley Road Quality Assurance Documents		

Copy

Forwarded herewith are the following documents:

Qnty	Dwg No.	Drawing Title
1	Folder	Civil Engineering Certificate plus ITPs

Sent By:- ☐ Mail ☐ Bus ☐ Collected ☐ Other _____

Osborn Lane Consulting Engineers

Per: _____

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OSBORN LANE
Consulting Engineers

A Partnership of Osborn Lane Pty Ltd A.C.N 061 799 979
& Gremfield Pty Ltd A.C.N 073 121 258

WK03-0369 RANGERS VALLEY, INTERSECTION UPGRADE NEW ENGLAND HIGHWAY / DUNDEE-RANGERS VALLEY ROAD

RTA-NSW Application Number: DA - 261 - 8 - 2002 - i
File No. 400.5414/N00287
Quality Assurance Documents

RTA Regional Office Grafton
Po Box 576
Grafton, NSW 2460

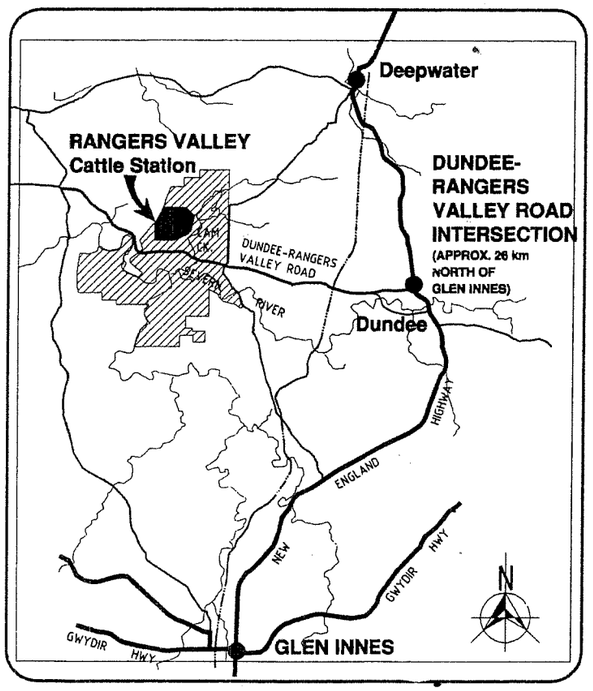
Engineering Certificate and Inspections Check Lists (ITP)

Original Sent: Yes / No By Post Other: .....

MODIFIED TYPE 'B' INTERSECTION

RANGERS VALLEY
CATTLE STATION
GLEN INNES NEW SOUTH WALES

NEW ENGLAND HIGHWAY/ DUNDEE-RANGERS VALLEY ROAD INTERSECTION



LOCALITY PLAN.
NOT TO SCALE

SCHEDULE OF DRAWINGS.

DWG. No.	DWG. DESCRIPTION	
RV0601/CS	COVER SHEET	
RV0601/C1	EXISTING INTERSECTION - GENERAL LAYOUT.	1:500
RV0601/C2	PROPOSED INTERSECTION - GENERAL LAYOUT.	1:500
RV0601/C3	PROPOSED INTERSECTION - DETAIL LAYOUT.	1:250
RV0601/C4	PROPOSED INTERSECTION - LINEMARKING AND SIGNAGE LAYOUT.	
RV0601/C5	ROAD LONGITUDINAL SECTIONS.	
RV0601/C6	ROAD CROSS SECTIONS - NEW ENGLAND HIGHWAY - SHEET 1.	
RV0601/C7	ROAD CROSS SECTIONS - NEW ENGLAND HIGHWAY - SHEET 2.	
RV0601/C8	ROAD CROSS SECTIONS - NEW ENGLAND HIGHWAY - SHEET 3.	
RV0601/C9	ROAD CROSS SECTIONS - NEW ENGLAND HIGHWAY - SHEET 4.	
RV0601/C10	ROAD CROSS SECTIONS - DUNDEE-RANGERS VALLEY ROAD.	

IT IS CERTIFIED THAT THE ORIGINAL DRAWING HAS BEEN CAREFULLY COMPARED WITH THE WORKS AS CONSTRUCTED, AS TO LINE, LEVEL AND DIMENSION AND IT HAS BEEN ACCURATELY AMENDED SO AS TO CONSTITUTE A TRUE AND CORRECT RECORD OF THE WORK AS CONSTRUCTED.

SIGNATURE: POSborn

DATE OF COMPLETION: 27.8.07

AS CONSTRUCTED

Project No. WK03-0369 / RV0601

RANGERS VALLEY

CONSULTING ENGINEERS

( ) 148a Palmerin Street Warwick Qld
PO Box 495 Warwick Qld 4370
Ph 07 4660 3300 Fax 07 4660 3310
Email : warwick@osbornlane.com

LEGEND.

EXISTING STORMWATER PIPE

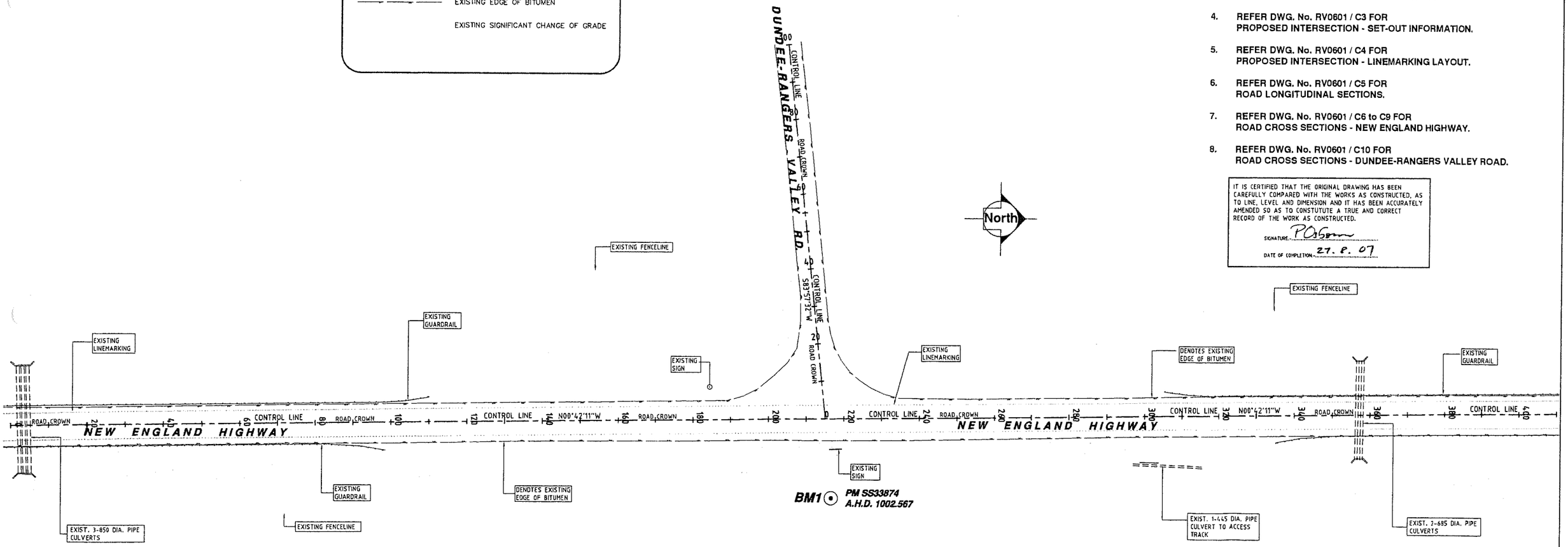
EXISTING DRAIN INVERT

EXISTING FENCE LINE

EXISTING GUARD RAIL

EXISTING EDGE OF BITUMEN

EXISTING SIGNIFICANT CHANGE OF GRADE



EXISTING INTERSECTION - GENERAL LAYOUT.

Scale D

NOTES :-

1. REFER DRAWING No. RV0601 / C2 FOR GENERAL NOTES, NOTES & DETAILS.
2. REFER DWG. No. RV0601 / C2 FOR PROPOSED INTERSECTION - GENERAL LAYOUT.
3. REFER DWG. No. RV0601 / C3 FOR PROPOSED INTERSECTION - DETAIL LAYOUT.
4. REFER DWG. No. RV0601 / C3 FOR PROPOSED INTERSECTION - SET-OUT INFORMATION.
5. REFER DWG. No. RV0601 / C4 FOR PROPOSED INTERSECTION - LINEMARKING LAYOUT.
6. REFER DWG. No. RV0601 / C5 FOR ROAD LONGITUDINAL SECTIONS.
7. REFER DWG. No. RV0601 / C6 to C9 FOR ROAD CROSS SECTIONS - NEW ENGLAND HIGHWAY.
8. REFER DWG. No. RV0601 / C10 FOR ROAD CROSS SECTIONS - DUNDEE-RANGERS VALLEY ROAD.

IT IS CERTIFIED THAT THE ORIGINAL DRAWING HAS BEEN CAREFULLY COMPARED WITH THE WORKS AS CONSTRUCTED, AS TO LINE, LEVEL AND DIMENSION AND IT HAS BEEN ACCURATELY AMENDED SO AS TO CONSTUTUTE A TRUE AND CORRECT RECORD OF THE WORK AS CONSTRUCTED.

SIGNATURE: P Osborn

DATE OF COMPLETION: 27. 8. 07

AS CONSTRUCTED

0 5 10 15 20 25m (A1)

Scale D (1:500)

NOTES :-

1. Contractor to verify all information & dimensions on site prior to commencement of construction.
2. DO NOT SCALE DRAWINGS
3. This drawing and the copyright thereof remains the property of Osborn Lane Consulting Engineers A.B.N. 51132296754

revision		
AS CONSTRUCTED	24/8/2007	AC
Issued for RTA Approval	24/02/2006	A

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RANGERS VALLEY CATTLE STATION

PROPOSED ROADWORKS NEW ENGLAND HIGHWAY GLEN INNES, NEW SOUTH WALES

EXISTING INTERSECTION - GENERAL LAYOUT

drawn: K.D./A.M.	date: FEB 2005
checked:	
scale: AS SHOWN	RV0601/C1
SHEET 1 OF 10	

A1

GENERAL NOTES.

1. The contractor shall make himself familiar with the Department of Infrastructure, Planning and Natural Resources (DIPNR) conditions of consent and Roads & Traffic Authority (RTA) NSW, requirements for the proposed works and shall comply with these conditions.
2. Levels & gradients at junctions to existing works as shown are indicative only & shall vary as required to achieve a satisfactory transition.
3. The contractor shall obtain the locations of all existing services prior to any excavation.
4. The contractor shall co-ordinate the works with the relevant authorities & shall be responsible for reinstating any existing services which become uncovered or damaged during the construction period.
5. Any alterations required to existing services to be carried out as directed by the Superintendent.
6. All design levels shown on drawings are finished surface levels u.n.o.
7. All levels are shown in Metres to A.H.D. –
   Benchmarks – Refer Dwg.
8. All construction shall comply with the relevant Standard Specifications, Drawings and By-laws of the Appropriate Authorities and Relevant Australian Standards. This includes, but is not limited to, Glen Innes Severn Shire council, RTA (Roads & Traffic Authority, NSW), Building Code of Australia (BCA), The Environmental Planning & Assessment Act. 1979 (EPA), and Department of Infrastructure, Planning and Natural Resources (DIPNR) requirements.
9. All Construction Works are to be supervised and Final Certification provided by the Superintendent's Registered Professional Engineer, including Earthworks, Retaining Walls, Drainage and Pavements.
10. Earthworks shall be completed in accordance with AS3798 (Refer Also to Earthworks Notes or Siteworks Notes as appropriate) and RTA Standard Specifications
11. The contractor shall check all information & dimensions shown on these drawings, on site, prior to commencement of construction.

EARTHWORKS NOTES.

1. Remove all topsoil, vegetation & deleterious material.
2. Proof roll subgrade to detect any soft spots. Soft spots shall be removed & backfilled with approved subgrade material.
3. Maximum batter slope to be as indicated on the cross sections – Refer Drawings
4. Fill to be placed at optimum moisture content & compacted to 98% Standard Compaction as defined by A.S. 1289.5.1.1
5. Fill to be placed in maximum 150mm layers.
6. The contractor shall comply with the requirements of the RTA Standard Specifications applicable to Earthworks, which include, but are not limited to :–
   - R41 Clearing & Grubbing
   - R44 Earthworks (Cut, Fill, Imported Fill and Imported Selected Material)
   - R49 Construction of Verges
   - R50 Stabilisation of Earthworks

ROAD SUBGRADE & PAVEMENT NOTES.

1. Remove all topsoil, vegetation & deleterious material.
2. Proof roll subgrade to detect any soft spots. Soft spots shall be removed & backfilled with approved sub-base material.
3. Compact subgrade to 100% Standard density as defined by A.S. 1289.5.1.1
4. Pavement courses to be placed at optimum moisture content & compacted to 100% Modified Compaction as defined by A.S. 1289.5.1.1
5. Fill to be placed in maximum 150mm layers, and placed at optimum moisture content.
6. The contractor shall comply with the requirements of the RTA Standard Specifications applicable to Earthworks, which include, but are not limited to :–
   - R71 Unbound Pavement Course (Normal Duty)

ENVIRONMENTAL MANAGEMENT NOTES.

1. The contractor shall submit an Erosion & Sediment Control Mangement Plan, detailing the erosion & sediment control measures to be used and maintenance procedures required to the Superintendent, for submission to the Roads and Traffic Authority (RTA) NSW for approval, prior to commencement of construction.
3. All erosion managment measures shall be in accordance with The Urban Erosion & Sedimentation Handbook, DEC's Pollution Control Manual for Urban Stormwater, Dept. of Housing Soil and Water Management for Urbon Development and the Managing Urbon Stormwater – Soils & Construction and the Soil Erosion and Sediment Control manual, published by the Institution of Engineers Australia
4. The contractor shall be responsible for the installation and maintenance of silt management facilities from the time of commencement of construction until the work is completed.
5. Diversion drains and ponds, as necessary, shall be installed on site prior to commencement of any other work, to ensure that "dirty water" is contained, or isolated.
6. All erosion and Sediment Control measures shall be inspected after each significant rainfall event.
7. The contractor shall ensure that the proposed works will not cause erosion or sediment deposits etc. outside the proposed construction site area.
8. The contractor shall comply with the requirements of the RTA Standard Specifications applicable to Earthworks, which include, but are not limited to :–
   - R1 Erosion and Sedimentation Control (Permanent and Temporary)
   - R2 Erosion and Sedimentation Control (Temporary)

NOTE :–
REFER ALSO TO PAVEMENT REPORT FOR GEOTECHNICAL TESTING RESULTS AND PAVEMENT DESIGN INFORMATION

NOTE :–
REFER TO SPECIFICATION FOR PAVEMENT BASE COURSE & SUB-BASE COURSE MATERIAL SPECIFICATIONS

ROAD PAVEMENT DETAIL.
SCALE 1:20

ROADS AND TRAFFIC AUTHORITY OF NSW STANDARD SPECIFICATIONS.

1. The contractor shall comply with the requirements of the RTA Standard Specifications where applicable, which include, but are not limited to :–
2. General :–
   - G10 Control of Traffic
   - G21 – G24 Occupational Health and Safety
   - G35, G36 Environmental Protection
   - G38, G39 Soil and Water Management
3. Bituminous Products :–
   - R106 Sprayed Bituminous Surfacing (with Cutback Bitumen)
   - R107 Sprayed Bituminous Surfacing (with Polymer Modified Bitumen)
   - R111 Sprayed Bituminous Surfacing (with Bitumen Emulsion)
4. Miscellaneous :–
   - R131 Guide Posts
   - R132 Safety Barrier Systems
   - R141 Pavement Marking
   - R142 Raised Pavement Markers
   - R143 Signposting
   - R146 Pavement Marking Maintainance (Rural Regions)

ROADS AND TRAFFIC AUTHORITY OF NSW STANDARD DRAWINGS.

1. The contractor shall obtain and comply with the the RTA Standard Drawings where applicable.

LEGEND.

- EXISTING STORMWATER PIPE
- EXISTING DRAIN INVERT
- EXISTING FENCE LINE
- EXISTING GUARD RAIL
- EXISTING EDGE OF BITUMEN
- EXISTING SIGNIFICANT CHANGE OF GRADE
- PROPOSED GUARD RAIL
- PROPOSED EDGE OF BITUMEN
- PROPOSED 2 COAT BITUMEN SEAL

HORIZONTAL ALIGNMENT STATION AND CURVE REPORT.
ALIGNMENT: NEW ENGLAND HIGHWAY

DESC.	STATION	SPIRAL/CURVE DATA		NORTHING	EASTING
CC	0			29686.914	9548.099
	Length:	410.000	Course:	N 00-42-11 W	
CC	410			30096.883	9543.068
		TANGENT DATA			
	0			29686.914	9548.099
	410			30096.883	9543.068
	Length:	410.000	Course:	N 00-42-11 W	

HORIZONTAL ALIGNMENT STATION AND CURVE REPORT.
ALIGNMENT: DUNDEE-RANGERS VALLEY ROAD

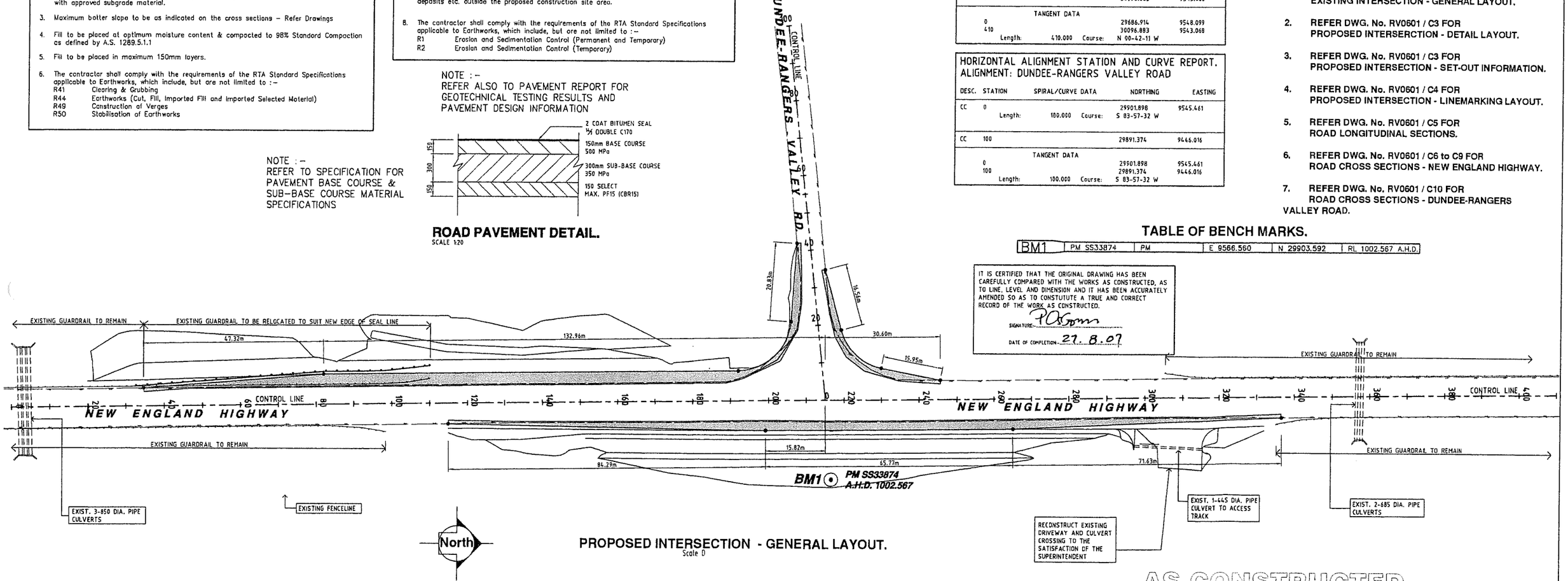
DESC.	STATION	SPIRAL/CURVE DATA		NORTHING	EASTING
CC	0			29901.898	9545.461
	Length:	100.000	Course:	S 83-57-32 W	
CC	100			29891.374	9446.016
		TANGENT DATA			
	0			29901.898	9545.461
	100			29891.374	9446.016
	Length:	100.000	Course:	S 83-57-32 W	

NOTES :-
1. REFER DWG. No. RV0601 / C1 FOR EXISTING INTERSECTION - GENERAL LAYOUT.
2. REFER DWG. No. RV0601 / C3 FOR PROPOSED INTERSERCTION - DETAIL LAYOUT.
3. REFER DWG. No. RV0601 / C3 FOR PROPOSED INTERSECTION - SET-OUT INFORMATION.
4. REFER DWG. No. RV0601 / C4 FOR PROPOSED INTERSECTION - LINEMARKING LAYOUT.
5. REFER DWG. No. RV0601 / C5 FOR ROAD LONGITUDINAL SECTIONS.
6. REFER DWG. No. RV0601 / C6 to C9 FOR ROAD CROSS SECTIONS - NEW ENGLAND HIGHWAY.
7. REFER DWG. No. RV0601 / C10 FOR ROAD CROSS SECTIONS - DUNDEE-RANGERS VALLEY ROAD.

TABLE OF BENCH MARKS.

BM1	PM SS33874	PM	E 9566.560	N 29903.592	RL 1002.567 A.H.D.

IT IS CERTIFIED THAT THE ORIGINAL DRAWING HAS BEEN CAREFULLY COMPARED WITH THE WORKS AS CONSTRUCTED, AS TO LINE, LEVEL AND DIMENSION AND IT HAS BEEN ACCURATELY AMENDED SO AS TO CONSTUTUTE A TRUE AND CORRECT RECORD OF THE WORK AS CONSTRUCTED.
SIGNATURE P O'Connor
DATE OF COMPLETION 27.8.07



PROPOSED INTERSECTION - GENERAL LAYOUT.
Scale D

AS CONSTRUCTED

Scale D (1:500) 0 5 10 15 20 25m (A1)

NOTES :-
1. Contractor to verify all information & dimensions on site prior to commencement of construction.
2. DO NOT SCALE DRAWINGS
3. This drawing and the copyright thereof remains the property of Osborn Lane Consulting Engineers A.B.N. 51132296754

revision:		
AS CONSTRUCTED	22/8/2007	AC
Revised, Re-issued	25/10/2006	C
Revised, Re-issued	06/10/2006	B
Issued for RTA Approval	24/02/2006	A

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RANGERS VALLEY CATTLE STATION
PROPOSED ROADWORKS
NEW ENGLAND HIGHWAY
GLEN INNES, NEW SOUTH WALES

PROPOSED INTERSECTION - GENERAL LAYOUT

drawn: K.D./J.H.	date: FEB 2005
checked:	
scale: AS SHOWN	RV0601/C2
SHEET 2 OF 10	

NOTES :-
1. REFER ALSO TO DWG. No. RV0601 / C4, PROPOSED INTERSECTION - LINEMARKING LAYOUT FOR GUIDE POST LOCATION INFORMATION.

2. PROVIDE RAISED REFLECTIVE PAVEMENT MARKERS IN ACCORDANCE WITH RTA STANDARD DRAWINGS.

IT IS CERTIFIED THAT THE ORIGINAL DRAWING HAS BEEN CAREFULLY COMPARED WITH THE WORKS AS CONSTRUCTED, AS TO LINE, LEVEL AND DIMENSION AND IT HAS BEEN ACCURATELY AMENDED SO AS TO CONSTUTUTE A TRUE AND CORRECT RECORD OF THE WORK AS CONSTRUCTED.

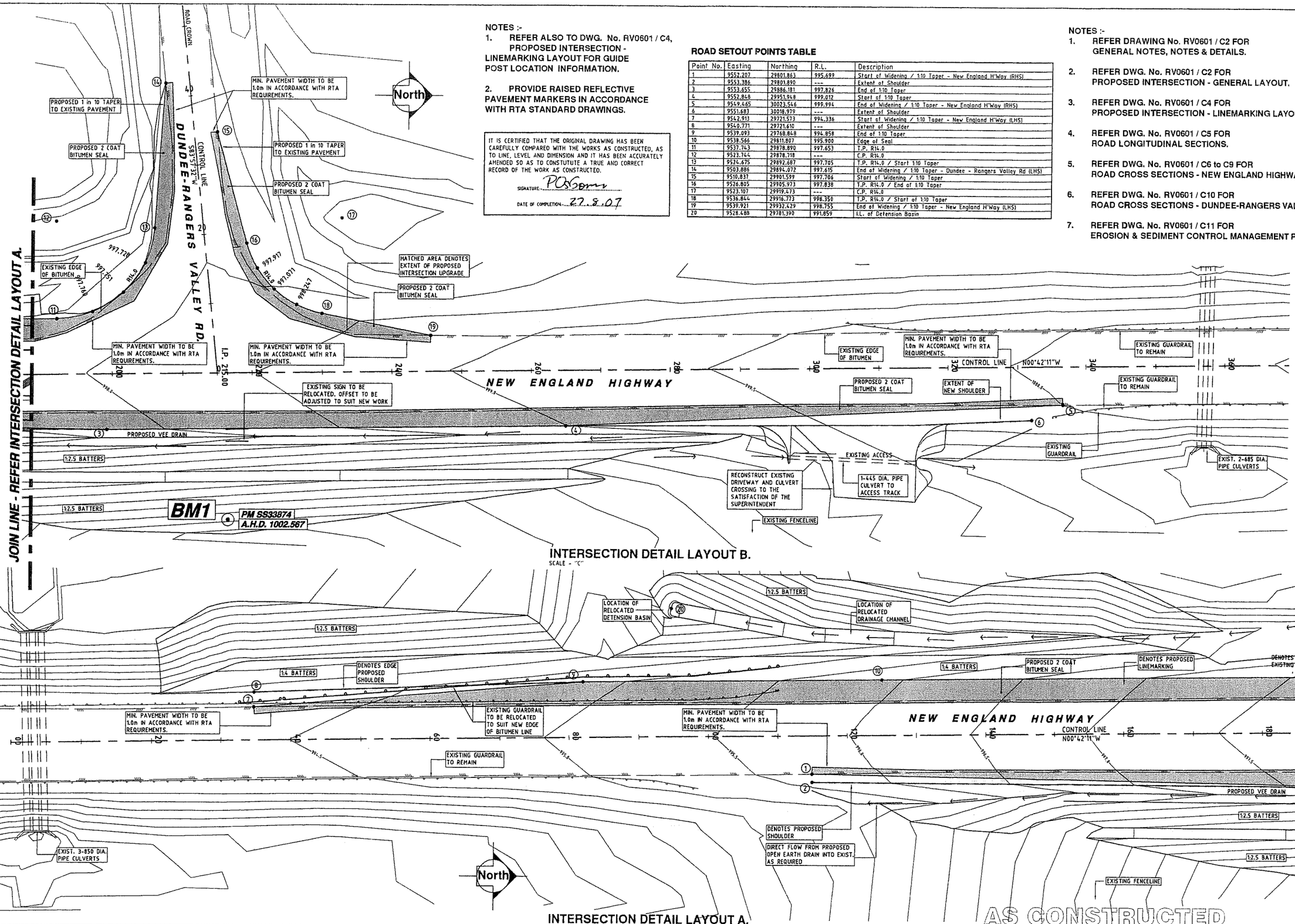
SIGNATURE: POGorman

DATE OF COMPLETION: 27.8.07

ROAD SETOUT POINTS TABLE

Point No.	Easting	Northing	R.L.	Description
1	9552.207	29801.863	995.699	Start of Widening / 1:10 Taper - New England H'Way (RHS)
2	9553.386	29801.890	---	Extent of Shoulder
3	9553.655	29886.181	997.826	End of 1:10 Taper
4	9552.848	29951.948	999.012	Start of 1:10 Taper
5	9549.405	30023.546	999.994	End of Widening / 1:10 Taper - New England H'Way (RHS)
6	9551.483	30018.979	---	Extent of Shoulder
7	9542.913	29721.573	994.336	Start of Widening / 1:10 Taper - New England H'Way (LHS)
8	9540.771	29721.610	---	Extent of Shoulder
9	9539.093	29768.848	994.858	End of 1:10 Taper
10	9538.566	29811.807	995.900	Edge of Seal
11	9537.743	29878.890	997.653	T.P. R14.0
12	9523.744	29878.718	---	C.P. R14.0
13	9524.675	29892.687	997.705	T.P. R14.0 / Start 1:10 Taper
14	9503.886	29894.672	997.615	End of Widening / 1:10 Taper - Dundee - Rangers Valley Rd (LHS)
15	9510.837	29901.599	997.704	Start of Widening / 1:10 Taper
16	9526.805	29905.973	997.838	T.P. R14.0 / End of 1:10 Taper
17	9523.107	29919.473	---	C.P. R14.0
18	9536.844	29916.773	998.350	T.P. R14.0 / Start of 1:10 Taper
19	9539.921	29932.429	998.755	End of Widening / 1:10 Taper - New England H'Way (LHS)
20	9528.488	29781.390	991.859	I.L. of Detension Basin

NOTES :-
1. REFER DRAWING No. RV0601 / C2 FOR GENERAL NOTES, NOTES & DETAILS.
2. REFER DWG. No. RV0601 / C2 FOR PROPOSED INTERSECTION - GENERAL LAYOUT.
3. REFER DWG. No. RV0601 / C4 FOR PROPOSED INTERSECTION - LINEMARKING LAYOUT.
4. REFER DWG. No. RV0601 / C5 FOR ROAD LONGITUDINAL SECTIONS.
5. REFER DWG. No. RV0601 / C6 to C9 FOR ROAD CROSS SECTIONS - NEW ENGLAND HIGHWAY.
6. REFER DWG. No. RV0601 / C10 FOR ROAD CROSS SECTIONS - DUNDEE-RANGERS VALLEY ROAD.
7. REFER DWG. No. RV0601 / C11 FOR EROSION & SEDIMENT CONTROL MANAGEMENT PLAN.



AS CONSTRUCTED

0 2.5 5 7.5 10 12.5m (A1)
Scale C (1:250)

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revision:		
AS CONSTRUCTED	24/8/2007	M
Revised, Re-issued	06/10/2006	B
Issued for RTA Approval	24/02/2006	A

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RANGERS VALLEY CATTLE STATION
PROPOSED ROADWORKS
NEW ENGLAND HIGHWAY
GLEN INNES, NEW SOUTH WALES

PROPOSED INTERSECTION - DETAIL LAYOUT

drawn: K.D./J.H.	date: FEB 2005
checked:	
scale: AS SHOWN	
SHEET 3 OF 10	RV0601/C3

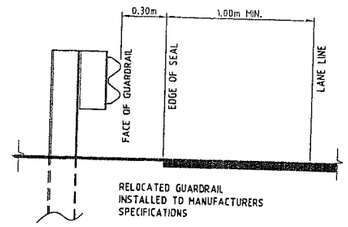
A1

LINEMARKING SETOUT POINTS TABLE

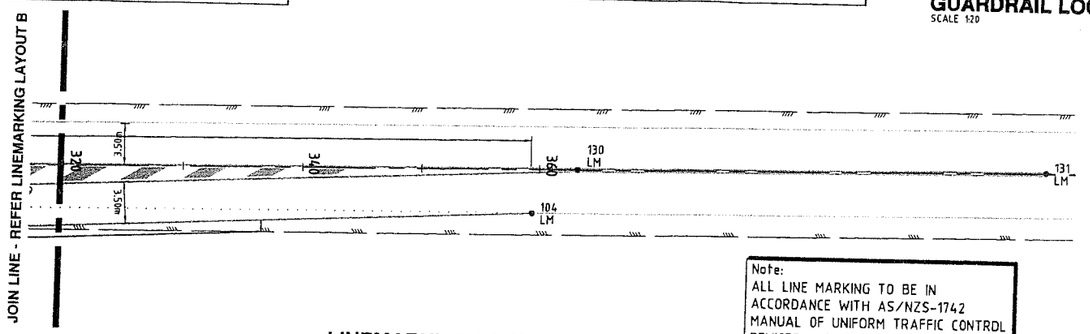
Point No.	Easting	Northing	Description	Location
101	9550.387	29801.814	LM	NEW ENGLAND HIGHWAY (RHS)
102	9552.655	29886.190	LM	NEW ENGLAND HIGHWAY (RHS)
103	9551.847	29951.980	LM	NEW ENGLAND HIGHWAY (RHS)
104	9547.387	30046.333	LM	NEW ENGLAND HIGHWAY (RHS)
105	9541.533	29936.806	LM	NEW ENGLAND HIGHWAY (LHS)
106	9537.860	29916.760	LM/T.P. R15.0	NEW ENGLAND HIGHWAY (LHS)
107	9527.323	29905.078	LM/T.P. R15.0	DUNDEE - RANGERS VALLEY ROAD (RHS)
108	9516.188	29901.817	LM	DUNDEE - RANGERS VALLEY ROAD (RHS)
109	9485.479	29898.567	LM	DUNDEE - RANGERS VALLEY ROAD (RHS)
110	9537.970	29901.105	LM	DUNDEE - RAHGERS VALLEY ROAD (CENTRE)
111	9505.683	29897.688	LM	DUNDEE - RANGERS VALLEY ROAD (CENTRE)
112	9485.794	29895.584	LM	DUNDEE - RANGERS VALLEY ROAD (CENTRE)
113	9486.110	29892.600	LM	DUNDEE - RANGERS VALLEY ROAD (LHS)
114	9507.325	29894.845	LM	DUNDEE - RANGERS VALLEY ROAD (LHS)
115	9524.741	29893.685	LM/T.P. R15.0	DUNDEE - RANGERS VALLEY ROAD (LHS)
116	9538.743	29878.902	LM/T.P. R15.0	NEW ENGLAND HIGHWAY (LHS)

LINEMARKING SETOUT POINTS TABLE

Point No.	Easting	Northing	Description	Location
117	9540.093	29768.895	LM	NEW ENGLAND HIGHWAY (LHS)
118	9544.290	29718.942	LM	NEW ENGLAND HIGHWAY (LHS)
119	9542.061	29893.705	LM	NEW ENGLAND HIGHWAY (LHS)
120	9543.631	29768.938	LM	NEW ENGLAND HIGHWAY (LHS)
121	9547.934	29706.918	LM	NEW ENGLAND HIGHWAY (CENTRE)
122	9546.779	29800.883	LM	NEW ENGLAND HIGHWAY (CENTRE)
123	9549.157	29886.284	LM/T.P. R12.5	NEW ENGLAND HIGHWAY (CENTRE)
124	9545.561	29893.748	LM/T.P. R12.5	NEW ENGLAND HIGHWAY (CENTRE)
125	9548.922	29905.149	LM	NEW ENGLAND HIGHWAY (CENTRE)
126	9548.348	29951.876	LM	NEW ENGLAND HIGHWAY (CENTRE)
127	9545.502	29905.107	LM	NEW ENGLAND HIGHWAY (CENTRE)
128	9544.732	29964.668	LM	NEW ENGLAND HIGHWAY (CENTRE)
129	9545.982	30001.912	LM	NEW ENGLAND HIGHWAY (CENTRE)
130	9543.629	30050.009	LM	NEW ENGLAND HIGHWAY (CENTRE)
131	9543.105	30089.383	LM	NEW ENGLAND HIGHWAY (CENTRE)

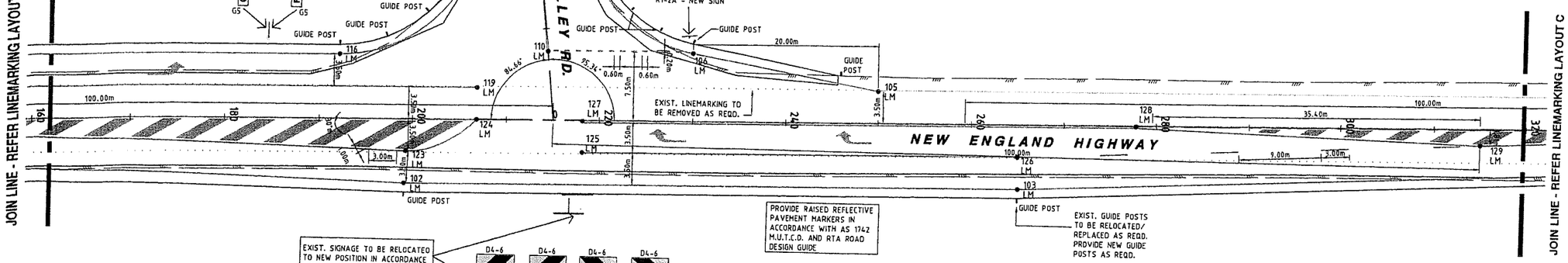


GUARDRAIL LOCATION DETAIL
SCALE 1:20

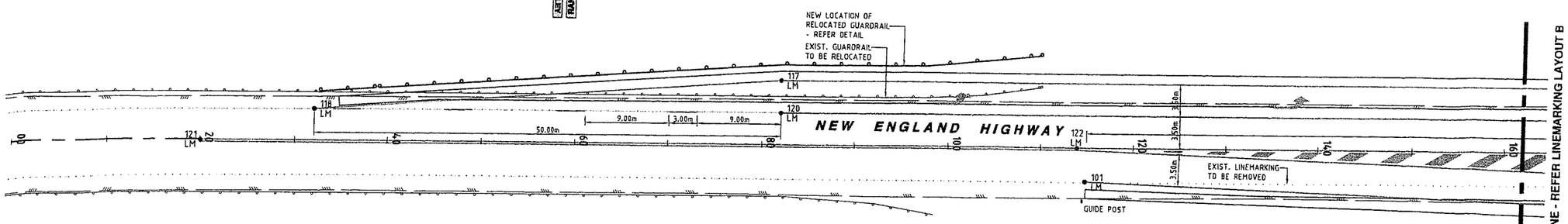


LINEMARKING LAYOUT C.
SCALE - "C"

Note:
ALL LINE MARKING TO BE IN ACCORDANCE WITH AS/NZS-1742 MANUAL OF UNIFORM TRAFFIC CONTRDL DEVICES AND RTA ROAD DESIGN GUIDE.



LINEMARKING LAYOUT B.
SCALE - "C"



LINEMARKING LAYOUT A.
SCALE - "C"

NOTES :-
1. REFER DRAWING No. RV0601 / C2 FOR GENERAL NOTES, NOTES & DETAILS.
2. REFER DWG. No. RV0601 / C2 FOR PROPOSED INTERSECTION - GENERAL LAYOUT.
3. REFER DWG. No. RV0601 / C3 FOR PROPOSED INTERSECTION - DETAIL LAYOUT.

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SIGNATURE
DATE OF COMPLETION 27.8.07

AS CONSTRUCTED

0 2.5 5 7.5 10 12.5m (A1)
Scale C (1:250)

NOTES :-
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revision:		
AS CONSTRUCTED	24/8/2007	AC
Revised, Re-issued	06/10/2006	B
Issued for RTA Approval	24/02/2006	A

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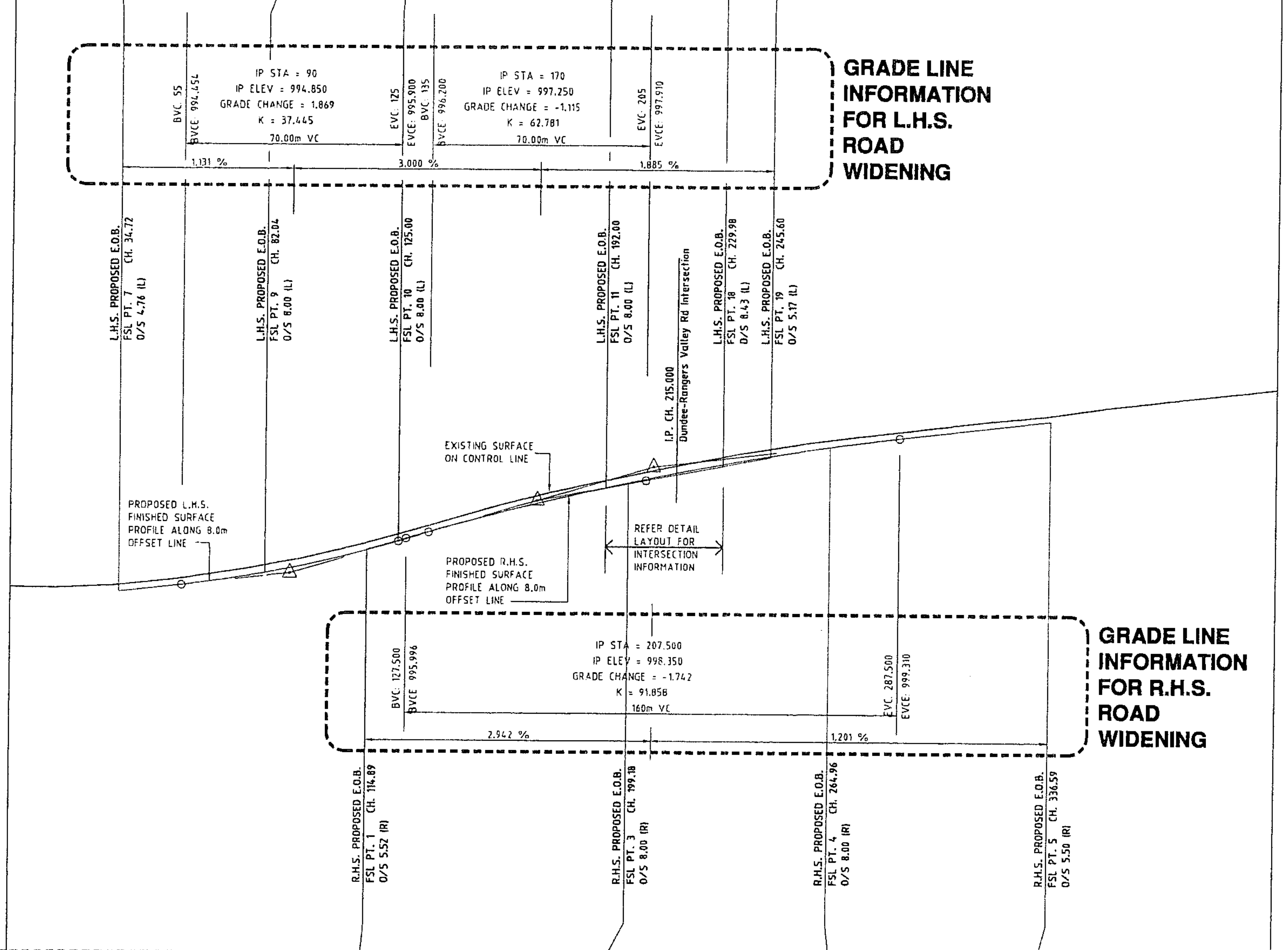
RANGERS VALLEY CATTLE STATION
PROPOSED ROADWORKS
NEW ENGLAND HIGHWAY
GLEN INNES - NEW SOUTH WALES

PROPOSED INTERSECTION - LINEMARKING AND SIGNAGE LYT.	
drawn: K.D./J.H.	date: FEB 2005
checked:	
scale: AS SHOWN	RV0601/C4

A1

X-FALL ON PROPOSED ROAD WIDENING (%)	4.67	3.08	3.42	3.51	3.60	3.75	3.48	3.29	2.78	3.20	3.76	3.99	2.45	2.99	5.00
L.H.S. FINISHED SURFACE ALONG EDGE OF BITUMEN	994.336	994.380	994.563	994.826	994.858	995.233	995.753	995.900	996.348	996.901	997.389	997.653	998.350	998.619	998.755
L.H.S. SURFACE ALONG E.O.B. CUTBACK LINE	994.35	994.40	994.63	994.94	994.98	995.36	995.87	996.01	996.44	997.01	997.51	997.75	998.40	998.66	998.77
CHAINAGE	34.72	40	60	80	82.04	100	120	125.00	140	160	180	192.09	229.98	240	245.60



DATUM 980.000

X-FALL ON PROPOSED ROAD WIDENING (%)	3.67	2.40	3.70	4.91	4.04	2.75	2.87	3.56	3.38	2.36	2.59	2.69	3.55	4.02	2.14
R.H.S. FINISHED SURFACE ALONG EDGE OF BITUMEN	995.699	995.848	996.416	996.950	997.414	997.826	997.843	998.252	998.617	998.939	999.012	999.230	999.501	999.783	999.994
R.H.S. SURFACE ALONG E.O.B. CUTBACK LINE	995.71	995.86	996.46	997.03	997.50	997.90	997.92	998.34	998.70	999.00	999.08	999.29	999.56	999.82	1000.00
CHAINAGE	114.89	120	140	160	180	199.18	200	220	240	260	264.96	280	300	320	336.59

EXISTING SURFACE ON CONTROL LINE	994.37	994.38	994.50	994.74	995.07	995.48	995.99	996.56	997.14	997.64	998.08	998.49	998.86	999.17	999.43	999.67	999.91	1000.13	1000.41	1000.65	1000.87	1000.98
CHAINAGE	00	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400	410

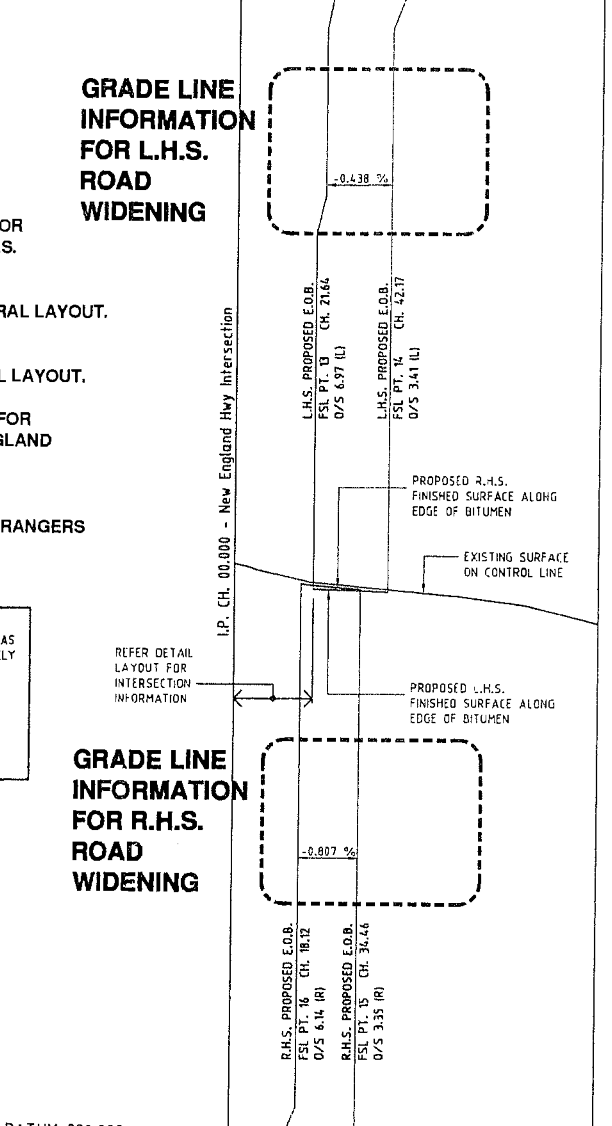
LONGITUDINAL SECTION - NEW ENGLAND HIGHWAY.
SCALE "A" VERT. / "E" HORIZ.

NOTES :-
1. REFER DRAWING No. RV0601 / C2 FOR GENERAL NOTES, NOTES & DETAILS.
2. REFER DWG. No. RV0601 / C2 FOR PROPOSED INTERSECTION - GENERAL LAYOUT.
3. REFER DWG. No. RV0601 / C3 FOR PROPOSED INTERSECTION - DETAIL LAYOUT.
4. REFER DWG. No. RV0601 / C6 to C9 FOR ROAD CROSS SECTIONS - NEW ENGLAND HIGHWAY.
5. REFER DWG. No. RV0601 / C10 FOR ROAD CROSS SECTIONS - DUNDEE-RANGERS VALLEY ROAD.

IT IS CERTIFIED THAT THE ORIGINAL DRAWING HAS BEEN CAREFULLY COMPARED WITH THE WORKS AS CONSTRUCTED, AS TO LINE, LEVEL AND DIMENSION AND IT HAS BEEN ACCURATELY AMENDED SO AS TO CONSTUTUTE A TRUE AND CORRECT RECORD OF THE WORK AS CONSTRUCTED.

SIGNATURE:- P OsGorman
DATE OF COMPLETION:- 27.8.07

X-FALL ON PROPOSED ROAD WIDENING (%)	2.08	3.62	5.00
L.H.S. FINISHED SURFACE ALONG EDGE OF BITUMEN	997.705	997.625	997.615
L.H.S. SURFACE ALONG E.O.B. CUTBACK LINE	997.75	997.65	997.63
CHAINAGE	21.64	40	42.17



DATUM 980.000

X-FALL ON PROPOSED ROAD WIDENING (%)	2.33	2.77	4.67
R.H.S. FINISHED SURFACE ALONG EDGE OF BITUMEN	997.838	997.813	997.706
R.H.S. SURFACE ALONG E.O.B. CUTBACK LINE	997.89	997.87	997.72
CHAINAGE	18.12	20	34.47

EXISTING SURFACE ON CONTROL LINE	998.39	997.91	997.72	997.54	997.29	996.80
CHAINAGE	00	20	40	60	80	100

LONGITUDINAL SECTION - DUNDEE-RANGERS VALLEY ROAD.
SCALE "A" VERT. / "E" HORIZ.

AS CONSTRUCTED

Vertical Scale A (1:100) 0 1 2 3 4 5m (A1)
Horizontal Scale E (1:1000) 0 10 20 30 40 50m (A1)

NOTES :-
1. Contractor to verify all information & dimensions on site prior to commencement of construction.
2. DO NOT SCALE DRAWINGS
3. This drawing and the copyright thereof remains the property of Osborn Lane Consulting Engineers A.B.N. 51132296754

AS CONSTRUCTED	24/8/2007	AC
Issued for RTA Approval	24/02/2006	A
revision:		

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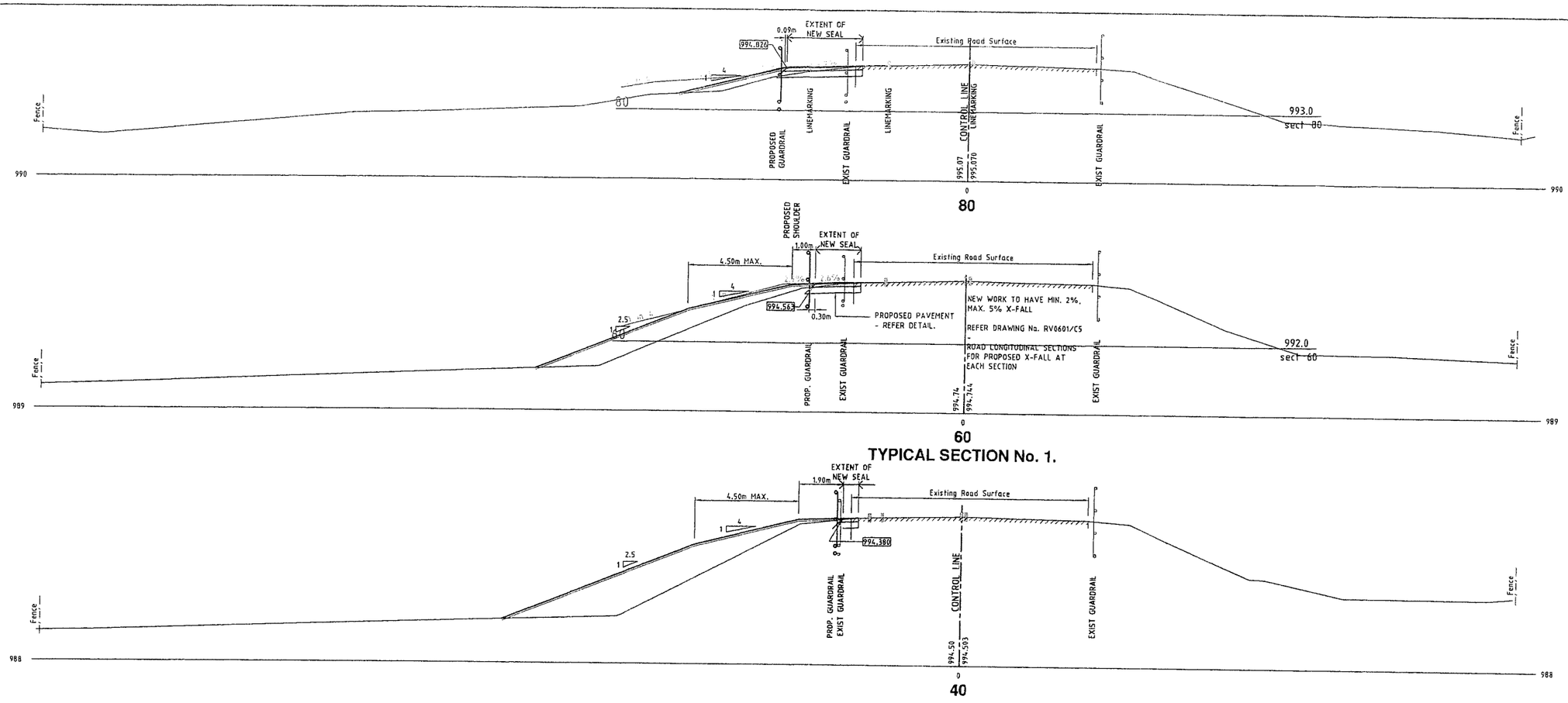
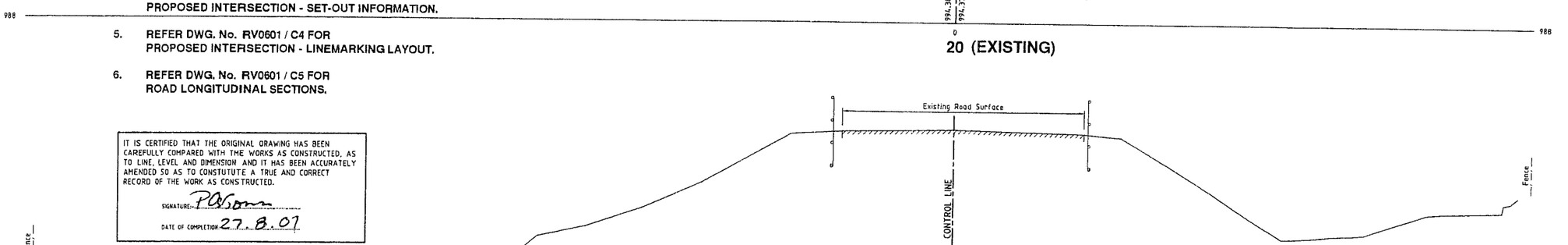
RANGERS VALLEY CATTLE STATION
PROPOSED ROADWORKS
NEW ENGLAND HIGHWAY
GLEN INNES, NEW SOUTH WALES

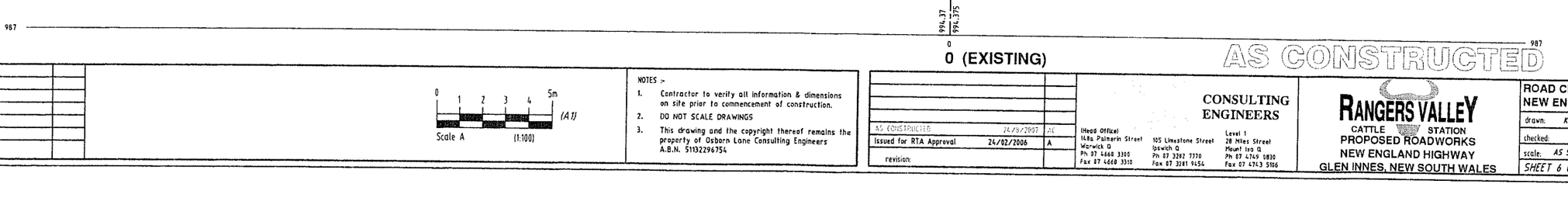
ROAD LONGITUDINAL SECTIONS
drawn: R.E.B. date: FEB 2005
checked:
scale: AS SHOWN
SHEET 5 OF 10
RV0601/C5

A1



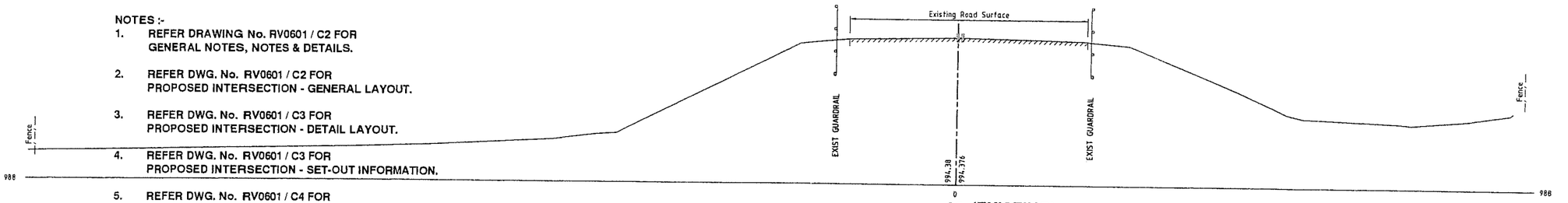


TYPICAL SECTION No. 1.



NOTES :-

1. REFER DRAWING No. RV0601 / C2 FOR GENERAL NOTES, NOTES & DETAILS.
2. REFER DWG. No. RV0601 / C2 FOR PROPOSED INTERSECTION - GENERAL LAYOUT.
3. REFER DWG. No. RV0601 / C3 FOR PROPOSED INTERSECTION - DETAIL LAYOUT.
4. REFER DWG. No. RV0601 / C3 FOR PROPOSED INTERSECTION - SET-OUT INFORMATION.
5. REFER DWG. No. RV0601 / C4 FOR PROPOSED INTERSECTION - LINEMARKING LAYOUT.
6. REFER DWG. No. RV0601 / C5 FOR ROAD LONGITUDINAL SECTIONS.



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SIGNATURE:- PAOsborn

DATE OF COMPLETION 27.8.07

AS CONSTRUCTED

0 1 2 3 4 5m (A1)

Scale A (1:100)

NOTES >

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AS CONSTRUCTED	24/9/2007	JC
Issued for RTA Approval	24/02/2006	A
revision:		

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RANGERS VALLEY CATTLE STATION

PROPOSED ROADWORKS

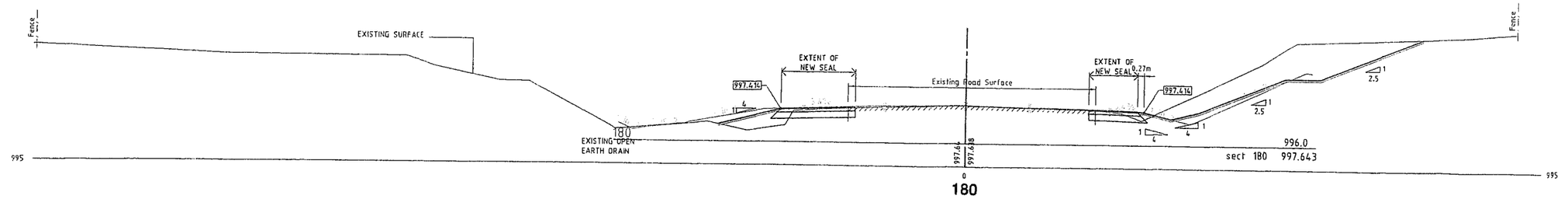
NEW ENGLAND HIGHWAY

GLEN INNES, NEW SOUTH WALES

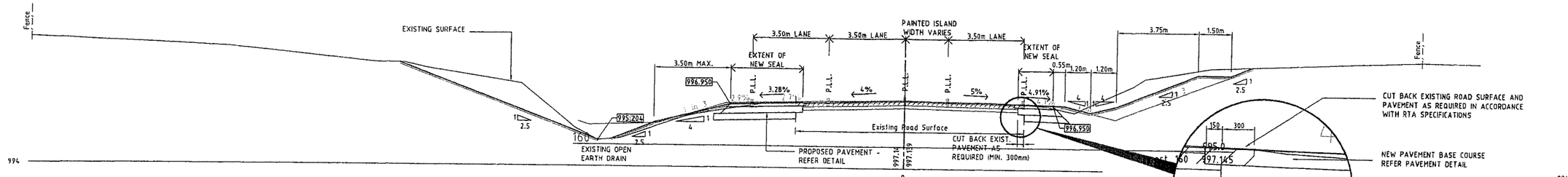
ROAD CROSS SECTIONS - NEW ENGLAND HIGHWAY No. 1.

drawn: K.D./J.H.	date: FEB 2005
checked:	
scale: AS SHOWN	RV0601/C6
SHEET 6 OF 10	

A1



180

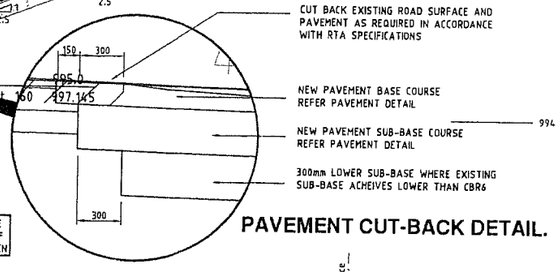


160

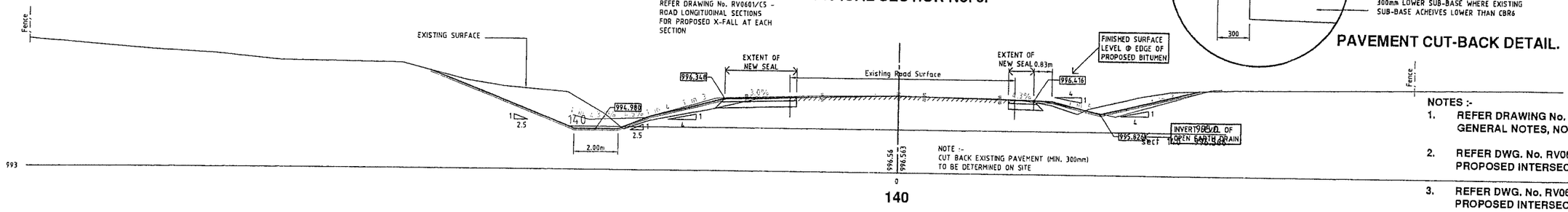
NEW WORK TO HAVE MIN. 2%, MAX. 5% X-FALL

REFER DRAWING No. RV0601/C5 - ROAD LONGITUDINAL SECTIONS FOR PROPOSED X-FALL AT EACH SECTION

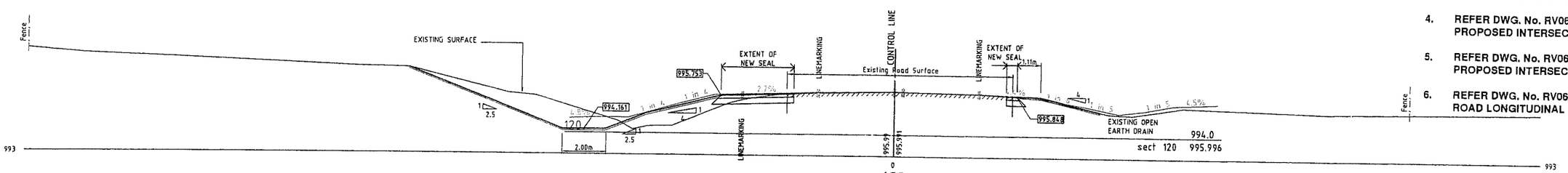
TYPICAL SECTION No. 3.



PAVEMENT CUT-BACK DETAIL.

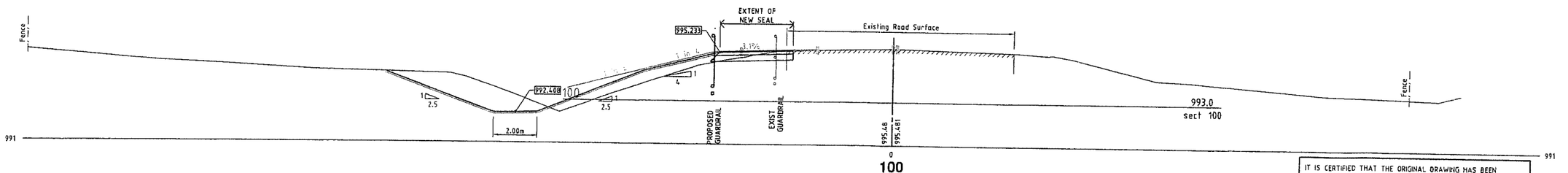


140



120

TYPICAL SECTION No. 2.



100

ROAD CROSS SECTIONS - NEW ENGLAND HIGHWAY No. 2.
SCALE - "A"

IT IS CERTIFIED THAT THE ORIGINAL DRAWING HAS BEEN CAREFULLY COMPARED WITH THE WORKS AS CONSTRUCTED, AS TO LINE, LEVEL AND DIMENSION AND IT HAS BEEN ACCURATELY AMENDED SO AS TO CONSTUTUTE A TRUE AND CORRECT RECORD OF THE WORK AS CONSTRUCTED.

SIGNATURE:- POsborn

DATE OF COMPLETION:- 27.8.07

AS CONSTRUCTED

NOTES :-

1. REFER DRAWING No. RV0601 / C2 FOR GENERAL NOTES, NOTES & DETAILS.
2. REFER DWG. No. RV0601 / C2 FOR PROPOSED INTERSECTION - GENERAL LAYOUT.
3. REFER DWG. No. RV0601 / C3 FOR PROPOSED INTERSECTION - DETAIL LAYOUT.
4. REFER DWG. No. RV0601 / C3 FOR PROPOSED INTERSECTION - SET-OUT INFORMATION.
5. REFER DWG. No. RV0601 / C4 FOR PROPOSED INTERSECTION - LINEMARKING LAYOUT.
6. REFER DWG. No. RV0601 / C5 FOR ROAD LONGITUDINAL SECTIONS.

0 1 2 3 4 5m
Scale A (1:100) (A1)

NOTES :-
1. Contractor to verify all information & dimensions on site prior to commencement of construction.
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revision:		
AS CONSTRUCTED	24/08/2007	AC
Revised, Re-issued	06/10/2006	B
Issued for RTA Approval	24/02/2006	A

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RANGERS VALLEY CATTLE STATION
PROPOSED ROADWORKS
NEW ENGLAND HIGHWAY
GLEN INNES, NEW SOUTH WALES

ROAD CROSS SECTIONS - NEW ENGLAND HIGHWAY No. 2.

drawn: K.D./J.H.	date: FEB 2005
checked:	
scale: AS SHOWN	
SHEET 7 OF 10	RV0601/C7

A1

NOTES :-

1. REFER DRAWING No. RV0601 / C2 FOR GENERAL NOTES, NOTES & DETAILS.
2. REFER DWG. No. RV0601 / C2 FOR PROPOSED INTERSECTION - GENERAL LAYOUT.
3. REFER DWG. No. RV0601 / C3 FOR PROPOSED INTERSECTION - DETAIL LAYOUT.
4. REFER DWG. No. RV0601 / C3 FOR PROPOSED INTERSECTION - SET-OUT INFORMATION.
5. REFER DWG. No. RV0601 / C4 FOR PROPOSED INTERSECTION - LINEMARKING LAYOUT.
6. REFER DWG. No. RV0601 / C5 FOR ROAD LONGITUDINAL SECTIONS.

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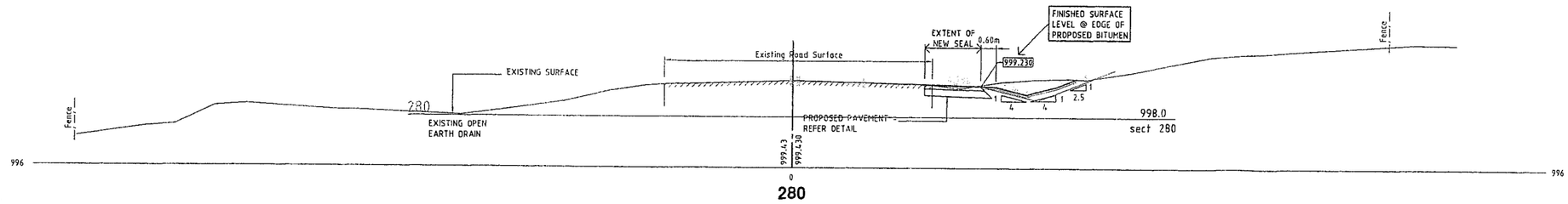
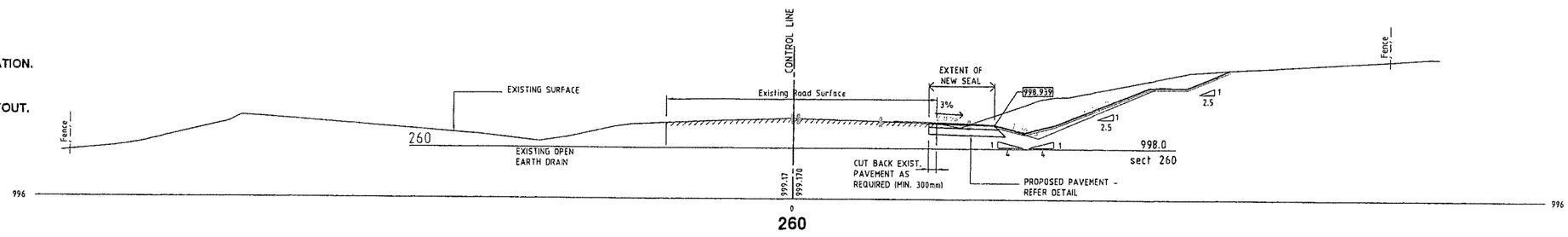
SIGNATURE:- POSom

DATE OF COMPLETION:- 27.8.07



280



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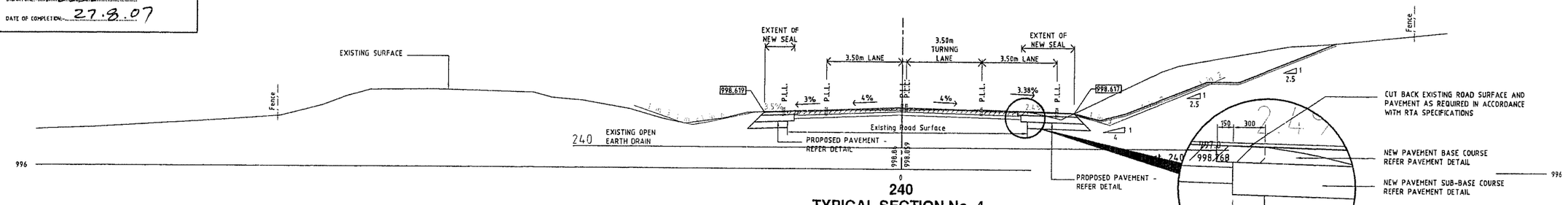


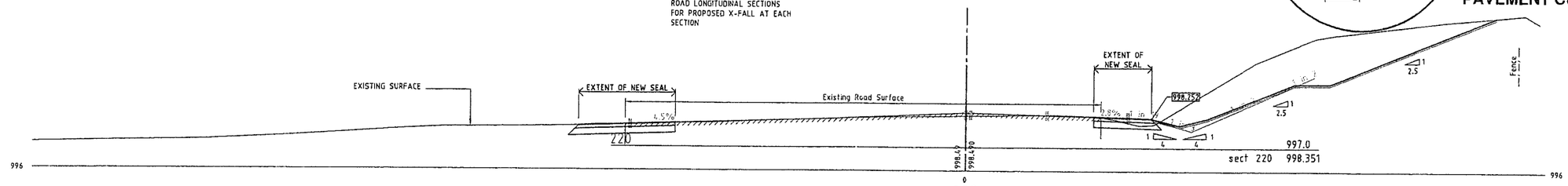
240

TYPICAL SECTION No. 4.

PAVEMENT CUT-BACK DETAIL.

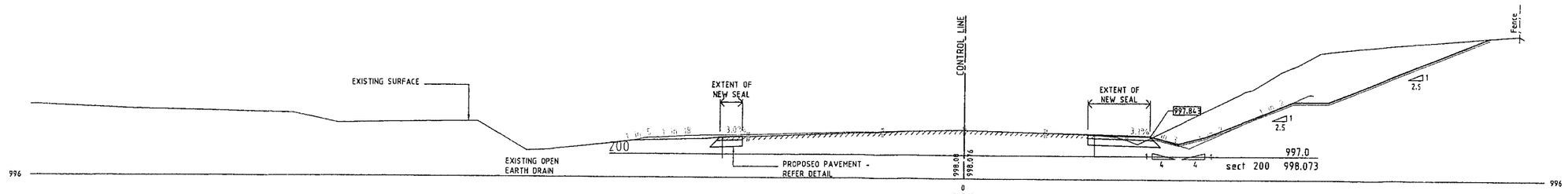
NEW WORK TO HAVE MIN. 2%, MAX. 5% X-FALL

REFER DRAWING No. RV0601/C5 - ROAD LONGITUDINAL SECTIONS FOR PROPOSED X-FALL AT EACH SECTION



220

I.P. CH. 215.000 - DUNDEE-RANGERS VALLEY ROAD INTERSECTION



200

AS CONSTRUCTED

Scale A (1:100) (A1)

NOTES :-

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AS CONSTRUCTED	24/9/2007	xC
Revised. Re-issued	06/10/2006	B
Issued for RTA Approval	24/02/2006	A
revision		

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RANGERS VALLEY CATTLE STATION

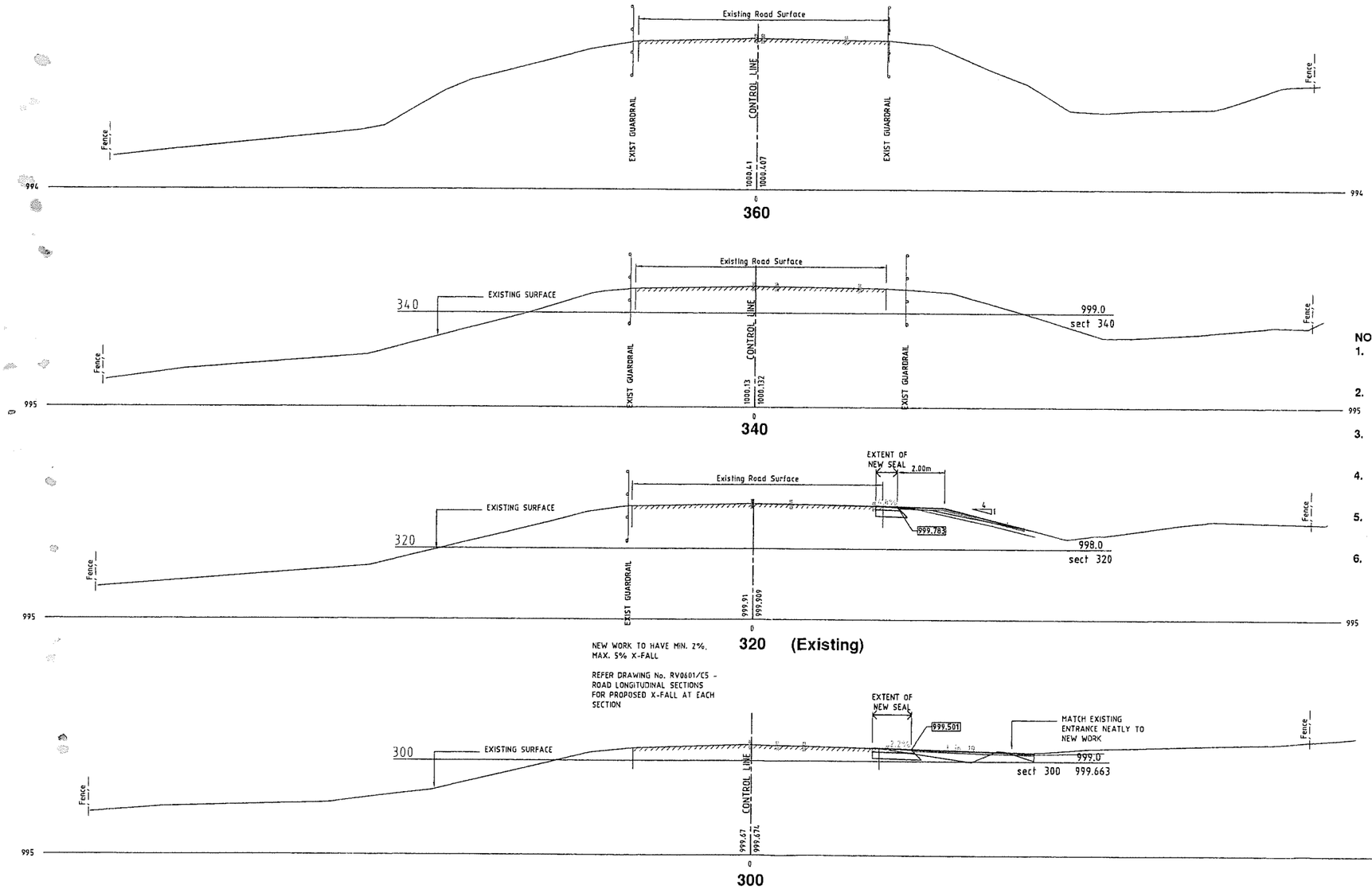
PROPOSED ROADWORKS NEW ENGLAND HIGHWAY GLEN INNES, NEW SOUTH WALES

ROAD CROSS SECTIONS - NEW ENGLAND HIGHWAY No.3

drawn: K.D./J.H.	date: FEB 2005
checked:	
scale: AS SHOWN	SHEET 8 OF 10

RV0601/C8

A1



NOTES :-

1. REFER DRAWING No. RV0601 / C2 FOR GENERAL NOTES, NOTES & DETAILS.
2. REFER DWG. No. RV0601 / C2 FOR PROPOSED INTERSECTION - GENERAL LAYOUT.
3. REFER DWG. No. RV0601 / C3 FOR PROPOSED INTERSECTION - DETAIL LAYOUT.
4. REFER DWG. No. RV0601 / C3 FOR PROPOSED INTERSECTION - SET-OUT INFORMATION.
5. REFER DWG. No. RV0601 / C4 FOR PROPOSED INTERSECTION - LINEMARKING LAYOUT.
6. REFER DWG. No. RV0601 / C5 FOR ROAD LONGITUDINAL SECTIONS.

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SIGNATURE: P Osborn

DATE OF COMPLETION: 21.8.07

AS CONSTRUCTED

0 1 2 3 4 5m (A1)

Scale A (1:100)

NOTES :-

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revision:		
AS CONSTRUCTED	24/08/2007	AC
Issued for RTA Approval	24/02/2004	A

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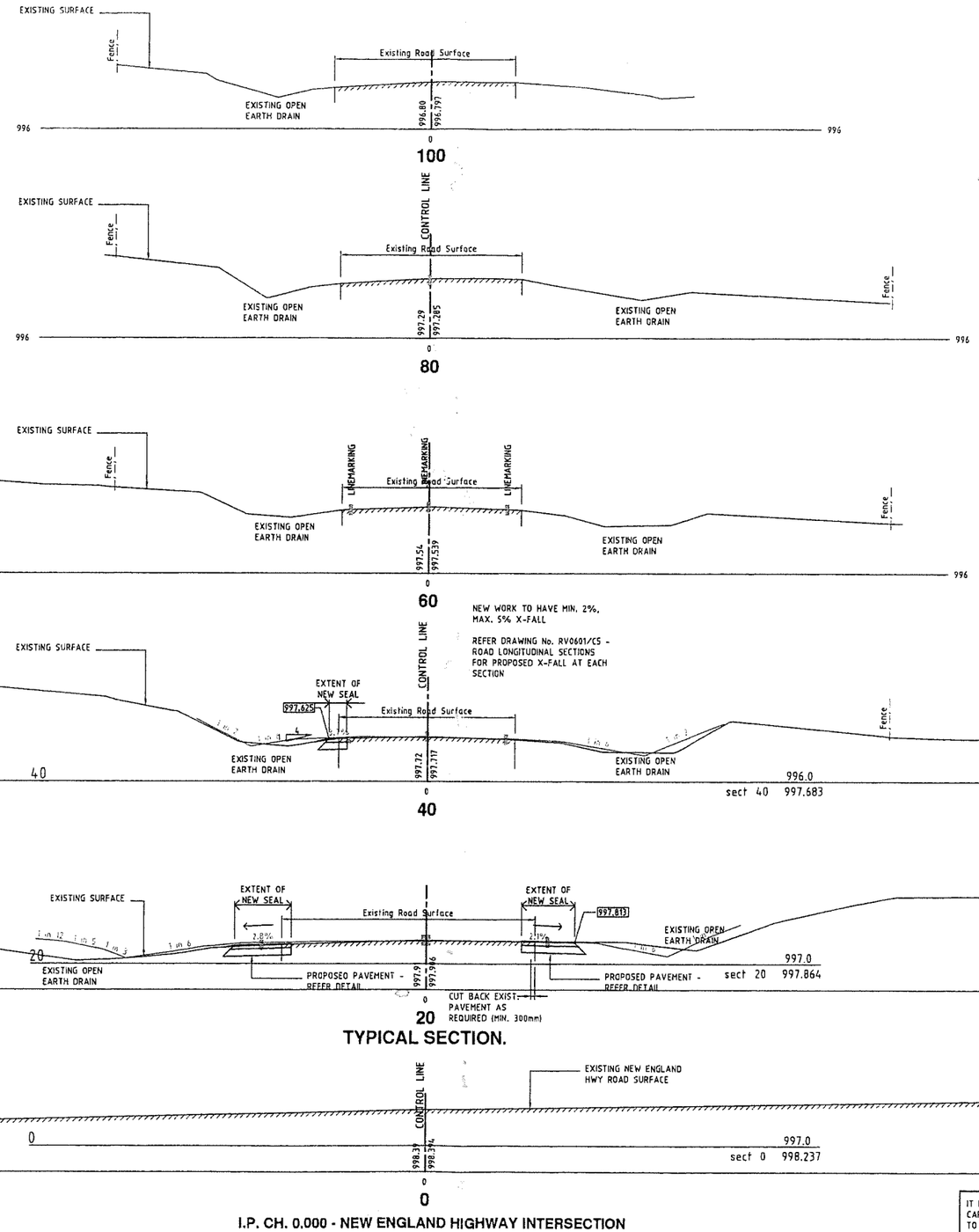
Mount Isa Q
Ph 07 4749 0830
Fax 07 4743 5106

RANGERS VALLEY CATTLE STATION

PROPOSED ROADWORKS
NEW ENGLAND HIGHWAY
GLEN INNES, NEW SOUTH WALES

ROAD CROSS SECTIONS - NEW ENGLAND HIGHWAY No.4

drawn: K.D./J.H.	date: FEB 2005
checked:	
scale: AS SHOWN	RV0601/C9
SHEET 9 OF 10	



TYPICAL SECTION.

I.P. CH. 0.000 - NEW ENGLAND HIGHWAY INTERSECTION

NOTES :-

1. REFER DRAWING No. RV0601 / C2 FOR GENERAL NOTES, NOTES & DETAILS.
2. REFER DWG. No. RV0601 / C2 FOR PROPOSED INTERSECTION - GENERAL LAYOUT.
3. REFER DWG. No. RV0601 / C3 FOR PROPOSED INTERSECTION - DETAIL LAYOUT.
4. REFER DWG. No. RV0601 / C3 FOR PROPOSED INTERSECTION - SET-OUT INFORMATION.
5. REFER DWG. No. RV0601 / C4 FOR PROPOSED INTERSECTION - LINEMARKING LAYOUT.
6. REFER DWG. No. RV0601 / C5 FOR ROAD LONGITUDINAL SECTIONS.

ROAD CROSS SECTIONS - DUNDEE-RANGERS VALLEY ROAD.

SCALE - "A"

IT IS CERTIFIED THAT THE ORIGINAL DRAWING HAS BEEN CAREFULLY COMPARED WITH THE WORKS AS CONSTRUCTED, AS TO LINE, LEVEL AND DIMENSION AND IT HAS BEEN ACCURATELY AMENDED SO AS TO CONSTUTUTE A TRUE AND CORRECT RECORD OF THE WORK AS CONSTRUCTED.

SIGNATURE: PO'Connor

DATE OF COMPLETION: 22.8.07

AS CONSTRUCTED

0 1 2 3 4 5m

Scale A (1:100) (A1)

NOTES :-

1. Contractor to verify all information & dimensions on site prior to commencement of construction.
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Issued for RTA Approval	24/02/2006	A
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RANGERS VALLEY CATTLE STATION
PROPOSED ROADWORKS
NEW ENGLAND HIGHWAY
GLEN INNES, NEW SOUTH WALES

ROAD CROSS SECTIONS - DUNDEE - RANGERS VALLEY RD.

drawn: K.D./J.H.	date: FEB 2005
checked:	
scale: AS SHOWN	RV0601/C10
SHEET 10 OF 10	

OSBORN LANE
Consulting Engineers

A Partnership of Osborn Lane Pty Ltd A.C.N 061 799 979
& Gremfield Pty Ltd A.C.N 073 121 258

A.B.N: 51 132 296 754

CIVIL ENGINEERING CERTIFICATE

Job No:- :- WK03-0369/RV0601 SH 9, Date: 04.06.2007

We, being Registered Professional Engineers in the State of Queensland, hereby certify that:

(i) We are responsible for the civil engineering design and project supervision of the project work described as:- **State Highway No.9, Intersection Upgrade Dundee-Rangers Valley Road** which has been constructed for:- **RTA NSW**

We confirm that the project has been finalised and fit for its intended use except following item:

- Second bituminous coat.

Location:- **LGA Glen Innes, 27 km north of Glen Innes**

(ii) This project work is detailed on drawing numbers:-

RV0601/CS, RV0601/C1"a", RV0601/C2"c", RV0601/C3"b", RV0601/C4"b", RV0601/C5"a", RV0601/C6"a", RV0601/C7"b", RV0601/C8"b", RV0601/C9"a", RV0601/C10"a"

and is designed in accordance with the accepted theory of civil engineering. Australian Standards and other design standards relevant to this design are:-

NSW Dept. of Planning Conditions of Consent, Austroads Standards, AS 1289.5.1.1, DIPNR &EPA Requirements, RTA Standards and Standard Specifications

(iii) Site Investigation Details:-

Site visits, Truck Proof Roll Inspections, Material & Compaction Testing.

Osborn Lane Consulting Engineers

PCOsborn

Peter Osborn, B.A., B.E., (Civil), M.I.E.A.
NPER No. 247679

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Ph: (07) 4749 0830
Fax: (07) 4743 5106
email: mtisa@osbornlane.com

☐ **IPSWICH OFFICE**
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Fax: (07) 3281 9454
email: peter.o@osbornlane.com